Regular Board Meeting
Monday, October 26, 2026 7:30 PM Eastern

Board Room of the Administration Building
800 Pine Street
Emmaus, PA 18049

Shonta Ford:	Present
Jeffrey Jankowski:	Absent
Timothy Kelly:	Present
Gabrielle Klotz:	Present
Joshua Levinson:	Present
Rita Perez:	Present
Christine Price:	Present
Melissa Stiavelli:	Present
William Whitney:	Present

Present: 8, Absent: 1.

1. **MEETING OPENING**
   - 1.A. Call to Order; Pledge of Allegiance
   - 1.B. Student Recognition: 2027 National Merit Scholarship Semifinalists and Commended Students
   - 1.C. EHS Student Government Association Report- School Board Student Representatives: Laura Kackenmeister & Abigail Perez
   - 1.D. Requests to Comment at Board Meeting
2. **MINUTES**
   - 2.A. Minutes of the October 12, 2026, Regular Board Meeting
3. **SUPERINTENDENT OF SCHOOLS**
   - 3.A. District Update — Dr. Kristen Campbell
4. **CURRICULUM**
   - 4.A. Course Curricula
   - 4.B. Emmaus High School 2027-2028 Program of Studies
   - 4.C. Instructional Resources
   - 4.D. Educational Conferences
5. **PERSONNEL**
   - 5.A. Personnel Items
6. **BUSINESS OPERATIONS**
   - 6.A. Contracts/Agreements

6.B. Vendor	6.C. Contract/Agreement	6.D. Amount
6.E. Unami Fish & Game Protective Association, Inc.	6.F. Rifle Shooting Range Agreement November 1, 2026 - February 21, 2027	6.G. $2,500.00

6.H. CADES	6.I. Private School Agreement for student with significant functional impairments 2026-2027 School Year	6.J. $80,490.60
6.K. EPSD/NWLSD	6.L. Interdistrict Student Transportation Agreement 2026-2027 School Year	6.M. N/A

6.N. Use of District Facilities — Group IV Organizations

7. **POLICY**
   - 7.A. Third Reading & Adoption of Policies: 102, 105, 105.2, 204.1, 209, 246, 249, 704, 803, 805.2, & 822.
8. **OLD BUSINESS**
   - 8.A. Dual Enrollment Data
   - 8.B. Follow up on Policy discussion 003-Functions
9. **NEW BUSINESS**
10. **OTHER EDUCATIONAL ENTITIES**
    - 10.A. Carbon Lehigh Intermediate Unit Board Member Report - Dr. William Whitney
11. **ANNOUNCEMENTS**
    - 11.A. Executive Session - 7:00PM
    - 11.B. Regular Board Meeting: Monday, November 9, 2026; 7:30PM
12. **ADJOURN**

BOARD OF SCHOOL DIRECTORS EAST PENN SCHOOL DISTRICT

MINUTES OF THE OCTOBER 12, 2026 REGULAR BOARD MEETING

Board Members Present:
Shonta Ford
Jeffrey Jankowski
Timothy Kelly
Gabrielle Klotz
Dr. Joshua Levinson
Christine Price
Dr. Rita Perez
Melissa Stiavelli
Dr. William Whitney

Others Present:
Dr. Kristen Campbell, Superintendent
Miranda Ortiz, Board Secretary
Marc S. Fisher, Gross McGinley, LLP, Solicitor
Robert E. Saul, Treasurer

1. MEETING OPENING

1.A. Call to Order; Pledge of Allegiance

- Call to action at 7:44PM followed by the Pledge of Allegiance

1.B. Requests to Comment at Board Meeting

- No requests for public comment

2. MINUTES

2.A. Minutes of the September 28, 2026, Regular Board Meeting
Motion that the Board of School Directors of East Penn SD approve the minutes of the September 28, 2026 Regular Board Meeting. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

3. SUPERINTENDENT OF SCHOOLS

3.A. District Update — Dr. Kristen Campbell

- Dr. Campbell started her report by sharing with the community that October is National Principal's Month, and East Penn has been having a great time highlighting the extraordinary work of our dedicated leaders of our 10 schools, and thanking them for all of their hard work. Dr. Campbell also highlighted the Homecoming football game on Friday 10/9, and the homecoming dance on 10/10, noting there were about 1500 EHS students who enjoyed a great evening at the dance which took place at EHS, as well as congratulating Reiken Bechtel and Makayla McGinniss who were crowned Homecoming King & Queen at Friday night's game! In addition, Dr. Campbell recognized students at Eyer Middle School, specifically, the Multicultural Club who hosted its third annual Dominoes tournament that welcomed 12 different teams this

year; Dr. Campbell also congratulated two 8th grade winners, Hudson Schmoyer and Chase Loban.

- Dr. Campbell shared upcoming events, which include: The EHS Theater department's production of Romeo & Juliet, which will be performed on November 5th, 6th and 7th in the High School's auditorium. Tickets for the play can be purchased online via the EHS website starting October 13th, with tickets also being sold at the door. Dr. Campbell reminded the community that any senior citizen gold cardholder may present their gold card at the main office or at the door to receive their complimentary ticket to a performance. Another upcoming event includes LCTI's annual open house for prospective students for the upcoming year, on November 12th, from 6-8 with more information to come on both the EPSD website, and LCTI's website.
- Dr. Campbell closed out her report by mentioning to families that remote learning day communications have been sent out with resources for students going home starting October 5th and reminding the community that remote learning days have replaced flexible instruction days (FIDs). For elementary students, these resources include paper and pencil hands-on activities, and families are encouraged to review and house these materials in a safe and accessible location.

4. CURRICULUM

4.A. Course Curricula

- Dr. Michael Mihalik, Secondary STEM Supervisor in the Office of Teaching & Learning, started the presentation with the new course curriculum being proposed to be added to the Emmaus High School Program of Studies. He provided the board with a brief overview of all 10 courses being proposed, as well as the timeline for when the courses are expected to roll out. He also gave a funding breakout highlighting a recent grant awarded to EPSD, as well as additional funding efforts going forward.
    - Board members expressed their enthusiasm and satisfaction with the proposed courses and how they will support the students beyond their years in EHS. Board members also asked questions for clarification, and were provided feedback by administration.

4.B. Emmaus High School 2027-2028 Program of Studies

- Mrs. Beth Guarriello, Principal at Emmaus High School, spoke about the changes to the 2027-2028 Emmaus High School Program of Studies, and the many reasons for said changes and also highlighted the new courses being proposed and where they fit in on the Program of Studies.
    - Board members asked questions, which were addressed by Ms. Guarriello. They also expressed their appreciation for the information she presented.

4.C. Instructional Resources

- Updated list to include grades 6–12 STEELS & Special Education instructional resources.

4.D. Educational Conferences
Motion that the Board of School Directors of East Penn SD approve the estimated expenses for the individual(s) attending educational conferences, as per Educational Conferences exhibit. Educational Conferences expensed through the general fund unless otherwise noted. This motion, made by Jankowski and seconded by Klotz, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

5. PERSONNEL

5.A. Personnel Items
Motion that the Board of School Directors of East Penn SD approve the personnel items being recommended by the Superintendent, as per Personnel Agenda Items exhibit and corresponding exhibit(s). This motion, made by Levinson and seconded by Whitney, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

- Clerical error noted under section 7, Support Staff appointments of the personnel agenda. The new staff assistant for Lincoln Elementary School is listed as "Kathleen Keenan"; the correct name should be "Katherine Keenan."

6. BUSINESS OPERATIONS

6.A. District Bills
Motion that the Board of School Directors of East Penn SD approve the District bills, as per Bill List exhibit(s). This motion, made by Klotz and seconded by Levinson, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

6.B. Treasurer's Report
Motion that the Board of School Directors of East Penn SD approve the Treasurer's Report for month ended August 2026, as per Treasurer's Report exhibit. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

6.C. Contracts/Agreements

Vendor	Contract/Agreement	Amount
PPL Center	License Agreement 2027 Emmaus High School Graduation Ceremony	$22,000 - plus production related expenses

Motion that the Board of School Directors of East Penn SD approve the following contract(s)/ agreement(s), as per corresponding exhibits. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

6.D. Use of District Facilities — Group IV Organizations
Motion that the Board of School Directors of East Penn SD grant permission for the following organizations to use district facilities. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

6.E. Budget Transfer - Student Supports Coordinator
Motion that the Board of School Directors of East Penn SD approve budget transfers for the Student Supports Coordinator at Eyer MS, as per Budget Transfers exhibit. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

6.F. Student Activity Fund Advisors and Officers
Motion that the Board of School Directors of East Penn SD approves the list of student activity accounts and grants signature authority to the listed advisors and student officers for disbursement requests from student activity funds for the 2026-2027 school year, in compliance with the requirements of School Board Policy 618, "Student Activity Funds," as outlined in the 2026-2027 Student Activity Account Listing exhibit. This motion, made by Klotz and seconded by Jankowski, Resolved.
Shonta Ford: Aye, Jeffrey Jankowski: Aye, Timothy Kelly: Aye, Gabrielle Klotz: Aye, Joshua Levinson: Aye, Rita Perez: Aye, Christine Price: Aye, Melissa Stiavelli: Aye, William Whitney: Aye
Aye: 9, Nay: 0

7. POLICY

7.A. New Policy: 204.1 & Update of Current Policies: 102, 105, 105.2, 209, 246, 249, 704, 803, 805.2, & 822 - Second Reading

- Dr. Povilaitis followed up with answers to previously asked questions from the September 28 board meeting.
    - No further questions at this time.

8. **OLD BUSINESS**

- Nothing to report

9. **NEW BUSINESS**

9.A. Policy discussion on Policy 006.1: Attendance at Meetings via Electronic means

- Discussion item withdrawn for discussion with the right to bring the discussion item back reserved.

9.B. Policy discussion on Policy 003-Functions.

- Dr. Perez started the discussion on Policy 003 to discuss functions on policy decision-making. The concern was brought forth due to a change in agenda platform (the transition from the previous platform to the new policy platform) and the access to the Policy News Network (PNN).
    - Dr. Campbell clarified what the PNN is, where it is published, and how it is currently provided to the Board. She also provided a resolution which will give Board members access to both historic and current PNNs via a Google Drive folder.

10. **ANNOUNCEMENTS**

10.A. Executive Session -7:00PM

- Executive session held at 7PM to discuss confidential matters.

10.B. Regular Board Meeting: Monday, October 26, 2026; 7:30 PM

11. **ADJOURN**

- There being no further business to come before the board. This motion, made by Price and seconded by Jankowski, Resolved.
  Motion was unanimously adopted by voice vote. Meeting adjourned at 9:38 PM.

Respectfully submitted,

Miranda Ortiz

Miranda Ortiz
Board Secretary
East Penn School District

Analyze the evidence found at a crime scene and help the medical examiner uncover clues left on a body to solve a mystery. Question, diagnose, and propose treatment and care for patients in a family medical practice. Track down the source of a mysterious outbreak at a local hospital. Access and stabilize a patient during an emergency and prepare for medical surge and mobile medical care. Collaborate with professionals in other fields to innovate and design solutions to local and global medical problems.

Whether seeking a career in medicine or healthcare or simply looking for the challenge of real-world problems, students in Principles of Biomedical Science will practice how to think creatively and critically to innovate in science and will gain practical experience with experimental design and the design process.

PLTW Principles of Biomedical Science (PBS) is a full-year high school course in the PLTW Biomedical Science pathway. This course serves to provide foundational knowledge and skills in fields such as biology, anatomy and physiology, genetics, microbiology, and epidemiology as well as to engage students in how this content can be applied to real-world situations, cases, and problems.

Through both individual and collaborative team activities, projects, and problems, students tackle real-world challenges faced by biomedical professionals in the field. They work with the same tools and equipment used in hospitals and labs as they engage in relevant hands-on work. Students develop skills in technical documentation to represent and communicate experimental findings and solutions to problems. In addition, students explore how connections to other disciplines such as computer science and engineering shape the future of medicine and practice collaboration techniques that will help them connect with professionals across any field.

Following is a summary of the units of study. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher through an online delivery system, PLTW Courses.

The course requires a rigorous pace, and it is likely to contain more material than a skilled teacher new to the course will be able to complete in the first iteration. Building enthusiasm for and a real understanding of the role, impact, and practice of biomedical scientists is a primary goal of the course.

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PBS Unit Summary

Unit 1	Medical Investigation
Unit 2	Clinical Care
Unit 3	Outbreaks & Emergencies
Unit 4	Innovation, Inc.

Unit 1: Medical Investigation

In Unit 1, students engage in forensic science and medical examination investigations in order to: (a.) explore biological and forensic science careers; (b.) gain experience in experimental design and data analysis; (c.) learn about biomolecules and their role in determining identity; (d.) learn about human anatomy and physiology and causes of death; (e.) practice synthesizing multiple forms of data to draw conclusions; and (f.) work to develop professional communication skills.

Medical Investigation Lesson Summary

Lesson 1.1	Investigating the Scene
Lesson 1.2	Master the Morgue
Lesson 1.3	Open Investigation

Lesson 1.1 Investigating the Scene

In Lesson 1.1, students begin their training as medical investigators. Shadowing members of the forensic investigation team, they document and analyze the clues left at the scene of a woman's death. A video from the police commissioner emphasizes the severity of the situation, the need for more qualified professionals to help solve these types of cases, and the need for them to get to the bottom of the case ASAP. Students sketch the crime scene and document evidence, analyze trace evidence in the lab, analyze biometric data of interviewed suspects, and record a video check-in for the police commissioner chronicling what they have learned about the case in this lesson. Students are also introduced to experimental design as well as proper scientific documentation.

Lesson 1.2 Master the Morgue

In Lesson 1.2, students shadow the medical examiner to investigate what clues the body provides about the cause and manner of death. Students explore human body system structure and function as they investigate the composition of an autopsy. They explore the many pieces of evidence that go into determining time of death and complete toxicology testing to determine the presence of drugs or chemicals in the body of the decedent. Examining basic tissue types in the body, students zoom in to the microscopic level for clues that can't be seen with the naked eye. Students then explore gross anatomy as they complete an "autopsy" dissection of

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a preserved heart. Using what they have learned in this lesson and from the examination of evidence from the scene, students determine the cause, mechanism, and manner of death of the decedent.

Lesson 1.3 Open Investigation
Now that students have "graduated" from their training, they are tasked to solve a new case. They explore a virtual crime scene, gather evidence from the scene and persons of interest, complete laboratory testing, analyze evidence to deduce what happened, and complete an autopsy report using test and examination results. In preparation for court testimony, they must create an evidence board that illustrates the case to a judge or jury.

Unit 2: Clinical Care

Students assume the role of different medical professionals working through the schedule of patients in a family care clinic to: (a.) explore medical careers; (b.) practice professional communication; (c.) gain experience collecting, recording, and interpreting physiological data; (d.) learn how to perform routine medical tests and evaluate results; (e.) learn about cutting-edge technologies revolutionizing healthcare; (f.) understand the interconnectedness between body systems; and (g.) explore the various causations and inheritance of disease.

Clinical Care Lesson Summary

Lesson 2.1	Talk to Your Doc
Lesson 2.2	Decoding a Diagnosis
Lesson 2.3	New to the Practice

Lesson 2.1 Talk to Your Doc
Students begin their day at the PLTW Total Care Clinic. Each patient they see highlights key clinical skills and allows students to explore biological and physiological content. Students explore effective questioning techniques, learn about documentation of patient data and medical history in electronic medical records, and investigate issues related to patient privacy. They collect and analyze vital signs from a patient, investigating how each vital sign relates to the overall health and homeostasis of the body as well as how these vital signs can be used as part of clinical care and disease diagnosis. Students interpret the results of routine bloodwork and make recommendations on ways to improve overall health and limit disease risk. Students are also introduced to telehealth, wearable devices, and remote monitoring as they simulate a virtual visit with a diabetic patient. At the end of the lesson, students apply what they have learned to design a plan for a routine visit of a patient with a chronic health condition.

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Lesson 2.2 Decoding a Diagnosis
In this lesson, students explore the relationship between DNA, chromosomes, genes, and proteins as they work through the diagnosis of various patients in the practice. Students investigate the process of protein synthesis as they piece together how mutations are related to various health conditions. Students also explore how abnormalities with chromosomes can contribute to disease and overall health. At the end of the lesson, students use what they have learned to help a family interested in learning more about their genetic risk.

Lesson 2.3 New to the Practice
In the problem, students are tasked with helping a new patient at the PLTW Total Care Clinic. They need to evaluate all medical evidence, question the family, record vital signs, order and evaluate bloodwork and synthesize data to make a diagnosis.

Unit 3: Outbreaks & Emergencies

Working as public health officials and then as emergency responders, students are presented with a series of events they must address while exploring: (a.) careers in public health, epidemiology, microbiology, and emergency medicine; (b.) professional communication and presentation; (c.) data analysis; (d.) processes by which critical medical decisions are made and acted upon; and (e.) processes by which patients are diagnosed with a contagious disease and by which a causative agent is identified.

Outbreaks & Emergencies Lesson Summary

Lesson 3.1	Nosocomial Nightmare
Lesson 3.2	Emergency Response
Lesson 3.3	Information Sharing

Lesson 3.1 Nosocomial Nightmare
In this lesson, students are part of the PLTW Disease Defense Team and they have been called to the local hospital. There have been a number of hospital-acquired infections and the patients are not related or in the same ward. Students are challenged to investigate the case, determine why and how patients are getting sick, and design a strategy for resolving the outbreak (and preventing another one). Through their investigation, students investigate the chain of infection, agents of disease, and basic structure and function of the human immune system. In the lab, students work to identify the infectious agent that plagues the fictional hospital.

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Lesson 3.2 Emergency Response
Students now serve as part of an emergency medical response team, trained to respond when access to care is limited during accidents, natural disasters, and other mass casualty events. As they respond to an emergency in the field, students investigate assessment and stabilization of a patient, drug delivery and metabolism, techniques to stop bleeding, and communication between medical care providers. Students evaluate hospital protocol for medical surge during an event as well as design a mobile response facility to assist with patient triage and care.

Lesson 3.3 Information Sharing
Students apply what they have learned in the unit as they plan the design of an app to be used to trace outbreaks, respond to emergencies (local or global), increase response efficiency in emergencies, or provide another public health function. This app can be used by medical professionals or can be designed to be used by civilians in an emergency. Students create mock-ups of their app, modeling the interactivity, and peer review each other's designs.

Unit 4: Innovation, Inc.

Welcome to PLTW Innovation, Inc.—an incubator for innovation where some of the best minds in science and engineering endeavor to solve some of the world's most pressing biomedical challenges. Students tour Innovation, Inc. labs and engage in experiences designed to: (a.) build their engineering and experimental design process skills; (b.) challenge them to design solutions to current and emerging issues both on and off this world; (c.) tangibly highlight that solutions to biomedical science problems rely on collaboration between professions; (d.) build their computer science skills by using computer-aided design (CAD) and geographic information system (GIS) to innovate the future of medicine; and (e.) explore career fields on the forefront of medicine.

Innovation, Inc. Lesson Summary

Lesson 4.1	Designing the Future
Lesson 4.2	New Frontiers
Lesson 4.3	Invitation to Innovation

Lesson 4.1 Designing the Future
In Lesson 4.1, students tour labs in the company, each dedicated to a different area of research, innovation, and design. They investigate innovation in medical device development as they design model vessels for testing of cardiac stents. They explore how CAD can be used for modeling and prototyping in innovation. Students explore innovation in drug delivery as they design and test the formulation for a new drug. Focusing on large-scale efforts in disease prevention and health promotion, they then design a comprehensive initiative that could be implemented in communities around the country.

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Lesson 4.2 New Frontiers
In this lesson, students expand their exploration of innovation to new frontiers. They explore how the body reacts to travel to and life in space and design innovative improvements. They then dive under the sea as they locate and test marine organisms for bioactive compounds useful as therapeutics. In the project, students are tasked with identifying the next frontier for scientific exploration using GIS and designing an innovation for use in exploring, existing in, or adapting materials from this new frontier. Students summarize their research and present their proposal in an interactive story map.

Lesson 4.3 Invitation to Innovation
In the problem, students are tasked with competing for open lab space at PLTW Innovation, Inc. To make their case, students apply all they have learned in this unit (and course) to design a medical innovation.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial culturing, plating, and identification (Gram staining)
- Blood testing and typing
- Dissection
- DNA extraction
- DNA gel electrophoresis
- Fingerprint and hair analysis
- Karyotyping
- Applied math
- Micropipetting
- Microscopy
- Standard curve creation and utilization

Clinical Skills

- Bloodwork analysis
- Blood drawing
- Blood pressure measurement and analysis
- Clinical empathy
- Heart rate measurement and analysis
- HIPAA legislation and implications understanding
- Scientific terminology and abbreviation usage
- Patient questioning, record keeping and documentation
- Pedigree construction and analysis
- Controlled bleeding techniques
- Triage

Equipment and Software Proficiencies

- ArcGIS
- TinkerCAD
- Microsoft Office (Excel, Word, PowerPoint)
- Probes and sensors (temperature, respiration, heart rate)
- Data acquisition software (Graphical Analysis)
- Light microscope
- Gel electrophoresis
- Micropipettors
- Electronic balance

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

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Design Process Skills

- Solve a problem using an iterative design process
- Work collaboratively on a design team to design a product or solve a problem
- Document in detail the design process used to solve a problem or design a product
- Develop a detailed and comprehensive design brief
- Brainstorm to generate creative ideas and potential solutions to a problem
- Carry out a plan to compare alternate solutions and select the best solution path
- Evaluate a design solution with respect to design criteria and constraints

Professional Skills

- Team collaboration
- Peer review and feedback
- Project management
- Problem-solving
- Oral communication and presentation
- Technical writing
- Ethical reasoning

Course Knowledge

- Bioethics
- Biomedical science careers
- Body systems (selected) anatomy and physiology
- Cancer biology
- Cell biology
- Crime scene investigation
- Disease treatment and prevention
- Drug design
- Emergency medicine and medical surge
- Forensic investigation, manner, mechanism and cause of death
- High throughput screening (HTS)
- Homeostasis and positive and negative feedback mechanisms
- Infectious disease transmission
- Inheritance
- Interrelationship between body systems, health, and disease
- Mitosis and meiosis
- Molecular biology
- Pathology of disease: infectious, hereditary, and physiological diseases
- Protein synthesis
- Punnett squares
- Relationship between DNA, mutations, protein structure, and disease or dysfunction
- Relationship between genes, chromosomes, and DNA
- Restriction fragment length polymorphisms (RFLP) analysis
- Structure of DNA

Engagement Experiences

- Laboratory investigations
- Case studies
- Instant challenges
- Simulations
- Role playing
- Digital design: podcasts, videos, etc.
- Thought experiments
- Design thinking

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PLTW Standards Connection
Principles of Biomedical Science

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Principles of Biomedical Science connects to standards in the following:

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National Consortium for Health Science Education Page 2

Common Core State Standards for Mathematics Page 17

Common Core State Standards for English Language Arts Page 20

Next Generation Science Standards Page 33

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology

1.1.1 a

Identify basic levels of organization of the human body
a. Chemical
b. Cellular
c. Tissue
d. Organs
e. Systems
f. Organism

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal
- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Structure and support
  - Muscle attachment and movement
  - Mineral storage
  - Hematopoiesis

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 b

Muscular
- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Vitamin D production
  - Sensory organ
  - Infection protection
  - Temperature regulation
  - UV light protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Identify cardiovascular organs
  - Label the parts of the heart
  - Distinguish blood components
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Transports nutrients, waste, antibodies, hormones, and gases
  - Cardiac conduction system

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Provide protection against disease
  - Movement of lymph fluid

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.2 g

Structures of the nervous system
- Identify organs of the nervous system
- Identify structures of the special sense organs

- Functions of the nervous system
  - Sensation
  - Movement
  - Processing

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 h

Endocrine
- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Production of hormones
  - Regulation of body processes
  - Controls metabolism
  - Regulates growth, development, and maturation

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 i

Digestive
- Structures of the digestive system
  - Identify digestive organs in sequence
  - Differentiate between alimentary and accessory organs
- Functions of the digestive system
  - Chemical and mechanical digestion
  - Absorption of nutrients
  - Excretion of waste

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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1.1.2 j

Urinary

- Structures of the urinary system
  - Identify urinary organs
  - Identify gross and microscopic anatomy of the kidney
- Functions of the urinary system
  - Process of urine formation
  - Urine composition
  - Homeostatic balance

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

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National Consortium for Health Science Education

Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Arthritis
- Asthma
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic fibrosis
- Diabetes mellitus
- Dementia
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular Dystrophy
- Myocardial Infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cardiovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene testing
- Gene therapy
- Cloning
- Stem cell research

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National Consortium for Health Science Education

Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1 b

Mathematical

- Average
- Ratios
- Fractions
- Percentages
- Addition / Subtraction
- Multiplication / Division

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 c

Conversions

- Height (inches/meters)
- Weight/mass (pounds/grams)
- Length (inches/meters)
- Volume (ml/cc)
- Temperature (F/C)
- Household measurements (Tbsp/tsp/cup/oz)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.3

Demonstrate use of the 24-hour clock/military time.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 d

Use directional terms

- Anterior / Posterior
- Medial / Lateral
- Proximal / Distal
- Superficial /Deep
- Superior / Inferior
- Ventral / Dorsal

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.1 e

Identify body cavities

- Abdominal
- Cranial
- Dorsal
- Pelvic
- Spinal
- Thoracic

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Silence
- Summarizing
- Reflecting

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.4

Interpret elements of communication using sender-message-receiver feedback model.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

2.1.5

Modify communication to meet the needs of the patient/client and be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.1.6

Describe appropriate interactions with patients throughout various stages of psychosocial development.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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2.2.2

Interpret common medical abbreviations to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.3.2

Prepare examples of technical and informative writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 3: Systems Identify how key systems affect services performed and quality of care.

Healthcare Delivery Systems - Differentiate healthcare delivery systems and healthcare related agencies.

3.1.1 a

Types of practice settings
• Acute care
• Ambulatory care
• Behavioral and mental health services
• Home care
• Long-term care
• Medical and dental practices

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Healthcare Delivery Systems

3.1.2

Examine the healthcare consumer’s rights and responsibilities within the healthcare system.
• Self-advocacy
• Compliance
• Patient’s Bill of Rights

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Personal Traits of the Health Professional

4.1.1

Identify personal traits and attitudes desirable in a career ready member of a health team.

- Acceptance of criticism
- Competence
- Dependability
- Discretion
- Empathy
- Enthusiasm
- Honesty
- Initiative
- Integrity
- Patience
- Positive Attitude
- Responsibility
- Self-motivation
- Tact
- Team player
- Willingness to learn

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

4.1.2

Summarize professional standards as they apply to hygiene, dress, language, confidentiality and behavior.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

4.3.2

Distinguish differences among careers within a health science pathway.

- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 5: Legal Responsibilities Describe legal responsibilities, limitations, and implications on healthcare worker actions.

Legal Practices

5.2.1

Apply standards for the safety, privacy and confidentiality of health information.
• HIPAA
• Privileged communication

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

5.2.3

Summarize the essential characteristics of a patient's basic rights within a healthcare setting.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.1

Differentiate between ethical and legal issues impacting healthcare.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.1.2

Identify ethical issues and their implications related to healthcare.
• Ethics committee
• Euthanasia
• In vitro fertilization
• Organ donation
• Scope of practice

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.2.2

Demonstrate respectful and empathetic treatment of ALL patients/clients.
• Civility
• Customer service
• Patient satisfaction

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens
- Bacteria
- Fungi
- Parasites
- Protozoa
- Viruses

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 b

Describe characteristics of microorganisms
- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 c

Recognize chain of infection

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 d

Describe mode of transmission
- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
- Sanitization
- Antisepsis
- Disinfection
- Sterile technique
- Sterilization

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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7.1.2 b

Standard precautions
• Handwashing
• Gloving
• Personal Protective Equipment (PPE)
• Environmental cleaning

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 c

Isolation precautions
• Transmission-based contact

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 d

Bloodborne pathogen precautions

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

7.1.2 e

Vaccinations

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Personal Safety

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.4.2

Comply with safety signs, symbols, and labels.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.1

Evaluate roles and responsibilities of healthcare team members.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

8.1.2

Identify characteristics of effective teams.
- Defined roles
- Common purpose
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics
- Focused and driven
- Interpersonal skills
- Motivates and inspires
- Organized and balanced

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 c

Roles
- Communicates vision
- Leads change
- Manages accountability

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Team Member Participation

8.2.4

Evaluate why teamwork is an important part of healthcare and how it improves patient care.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote behaviors of health and wellness.
• Exercise
• Nutrition
• Relationships
• Sleep habits
• Stress management
• Weight control

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

9.1.2

Examine various aspects of behavioral health.
• Anxiety
• Depression
• Substance abuse
• Suicide

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

9.1.3

Describe strategies for prevention of disease.
• Community health education outreach programs
• Immunizations
• Medical, dental, and mental health screenings
• Routine physical exams
• Stress management

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Healthcare Across the Lifespan

9.2.1

Discuss physical, mental, social and behavioral development and its impact on healthcare.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs including the normal ranges.
- Blood pressure
- Temperature
- Oxygen saturation
- Pain
- Pulse
- Respirations

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Foundation Standard 11: Information Technology in Healthcare
Apply information technology practices common across health professions.

Key Principles, components and practices of Health Information Systems

11.1.1

Identify components of an electronic health record (EHR) and/or electronic medical record (EMR).
- Diagnostic tests
- History and physical
- Medications
- Patient demographics
- Progress notes
- Treatment Plan

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

11.1.2

Explore different types of health data collection tools.
- Medical wearable devices
- Patient monitoring equipment
- Phone application
- Telemedicine/telehealth

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

11.1.3

Create electronic documentation that reflects timeliness, completeness, and accuracy.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for Mathematics

Quantities

Reason Quantitatively and Use Units to Solve Problems

CCSS.MATH.CONTENT.HSN.Q.A.1

Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.2

Define appropriate quantities for the purpose of descriptive modeling.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Seeing Structure in Expressions

Interpret the Structure of Expressions

CCSS.MATH.CONTENT.HSA.SSE.A.1

Interpret expressions that represent a quantity in terms of its context.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Creating Equations

Create Equations That Describe Numbers Or Relationships

CCSS.MATH.CONTENT.HSA.CED.A.1

Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSA.CED.A.4

Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law V = IR to highlight resistance R.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Reasoning with Equations and Inequalities

Understand Solving Equations as a Process of Reasoning and Explain the Reasoning

CCSS.MATH.CONTENT.HSA.REI.A.1

Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Solve Equations and Inequalities in One Variable

CCSS.MATH.CONTENT.HSA.REI.B.3

Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Represent and Solve Equations and Inequalities Graphically

CCSS.MATH.CONTENT.HSA.REI.D.10

Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Linear, Quadratic, and Exponential Models

Construct and Compare Linear, Quadratic, and Exponential Models and Solve Problems

CCSS.MATH.CONTENT.HSF.LE.A.1.B

Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Modeling with Geometry

Apply Geometric Concepts in Modeling Situations

CCSS.MATH.CONTENT.HSG.MG.A.3

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Making Inferences and Justifying Conclusions

Make Inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.5.A

Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast- food restaurant.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.6

(+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Informational Text

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.10

By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.9-10.9.B

Apply grades 9–10 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning”).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Informational Text

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.11-12.10

By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.6

Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading History/Social Studies

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.1

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

HS.LS1.4

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.6

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Ecosystems: Interactions, Energy, and Dynamics

HS.LS2.5

Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

HS.LS2.8

Evaluate the evidence for the role of group behavior on an individual's and species' chances to survive and reproduce.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Next Generation Science Standards

Heredity: Inheritance and Variation of Traits

HS.LS3.1

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.2

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Biological Evolution: Unity and Diversity

HS.LS4.3

Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Earth and Human Activity

HS.ESS3.4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

HS.ETS1.2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

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Next Generation Science Standards

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

HS.ETS1.4

Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

PS1.A Matter and Its Interactions - Structure and Properties of Matter

• Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• The periodic table orders elements horizontally by the number of protons in the atom’s nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart. (HS-PS1-4)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

PS3.A Energy - Definitions of Energy

• Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HSPS3-1), (HS-PS3-2)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

• At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy . (HSPS3-2), (HS-PS3-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

PS3.B Energy - Conservation of Energy and Energy Transfer

- Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1), (HS-PS3-4)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- The availability of energy limits that can occur in any system. (HS-PS3-1)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- Uncontrolled systems always evolve toward more stable states— that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). (HS-PS3-4)

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

ETS1.B Engineering Design - Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS1-6)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1), (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.B From Molecules to Organisms: Structures and Processes - Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.C From Molecules to Organisms: Structures and Processes - Organization for Matter and Energy Flow in Organisms

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6), (HS-LS1-7)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

LS2.B Ecosystems: Interactions, Energy, and Dynamics - Cycles of Matter and Energy Transfer in Ecosystems

• Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

LS2.C Ecosystems: Interactions, Energy, and Dynamics - Ecosystem Dynamics, Functioning, and Resilience

• Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

LS3.A Heredity: Inheritance and Variation of Traits - Inheritance of Traits

• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA . All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

• In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

• Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

LS4.A Biological Evolution: Unity and Diversity - Evidence of Common Ancestry and Diversity

• Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

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Next Generation Science Standards

LS4.B Biological Evolution: Unity and Diversity - Natural Selection

- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2) (HS-LS4-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS4.D Biological Evolution: Unity and Diversity - Biodiversity and Humans

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7), (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

ESS3.C Earth and Human Activity - Human Impacts on Earth Systems

- Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions
  - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.
  - that arise from examining models or a theory, to clarify and/or seek additional information and relationships.
  - to determine relationships, including quantitative relationships, between independent and dependent variables.
  - to clarify and refine a model, an explanation, or an engineering problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate a question to determine if it is testable and relevant.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

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- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical, and/or environmental considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Design a test of a model to ascertain its reliability.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Develop a complex model that allows for manipulation and testing of a proposed process or system.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Apply techniques of algebra and functions to represent and solve scientific and engineering problems.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

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- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

- Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.
Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Crosscutting Concepts

Patterns

• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Mathematical representations are needed to identify some patterns.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Empirical evidence is needed to identify patterns.

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Next Generation Science Standards

Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Systems can be designed to cause a desired effect.

  ☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Changes in systems may have various causes that may not have equal effects.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Scale, Proportion, and Quantity

- In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

  ☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Systems and System Models

- A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

  ☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

- Systems can be designed to do specific tasks.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Feedback (negative or positive) can stabilize or destabilize a system.

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Join a team of physical therapists and other medical professionals to diagnose and provide treatment and rehabilitation to patients at an outpatient center. Work as an intern in a research center and design a comprehensive laboratory investigation using a model organism. Keep clients safe and healthy on adventure trips in remote locations. Showcase a medical story or mystery at an interactive exhibit about the human body. Solve mini-cases and medical challenges at the Quick Clinic!

Whether seeking a career in medicine or healthcare or just looking for the challenge of solving real-world problems, students in Human Body Systems will practice how to think creatively and critically to innovate in science while gaining practical experience with clinical medicine and experimental design.

PLTW Human Body Systems (HBS) is a full-year high school course designed to follow Principles of Biomedical Science (PBS) in the PLTW Biomedical Science pathway. The HBS course provides foundational knowledge and skills in anatomy and physiology, clinical medicine, and laboratory research. The course engages students in how this content can be applied to real-world situations, cases, and problems. The HBS course includes interviews, challenges, and testimonials from biomedical professionals in a variety of settings—clinical, research, and public health.

Through both individual and collaborative team activities, projects, and problems, students tackle real-world challenges that biomedical professionals face in the field. Students work with the same tools and equipment used in hospitals and labs as they engage in relevant hands-on work. They explore BioDigital™ 3D interactive models, simulations, and assessments to visualize human anatomy and physiology. Students develop skills in technical documentation to represent and communicate experimental findings and solutions to problems, as well as skills in ethical reasoning and clinical empathy.

Following is a summary of the units of study. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher and students through an online delivery system, PLTW Courses.

The HBS course requires a rigorous pace and contains more material than a skilled teacher new to the course will be able to complete in their first experience. However, building enthusiasm for and a real understanding of the role, impact, and practice of biomedical scientists is a primary goal of the course.

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HBS Unit Summary

Unit 1	Road to Rehabilitation
Unit 2	Research Ready
Unit 3	Adventure Awaits
Unit 4	Patient Perspectives

Unit 1: Road to Rehabilitation

In this unit, students join a dynamic team of biomedical professionals dedicated to helping patients with illness or injury progress through rehabilitation, getting them back to doing what they love. Students explore the human skeletal and muscular systems as they gain the knowledge and skills they need to design a solution for their assigned patient—involving physical rehabilitation, assistive devices, and overall strategies for physical and mental well-being. Throughout the unit, students gather medical evidence and information about their patient and use what they learn along the way to help them develop a comprehensive health and wellness plan for the patient.

Road to Rehabilitation Lesson Summary

Lesson 1.1	Beginning with Bones	(16 days)
Lesson 1.2	Muscles and Motion	(22 days)
Lesson 1.3	Relief Within Reach	(5 days)

Lesson 1.1 Beginning with Bones

In Lesson 1.1, students meet five patients with medical conditions or injuries that need physical therapy or rehabilitative care. As they explore the medical history of each patient, students practice the language of anatomy, using directional and regional terms and terms for body cavities and planes, to reference the patient's injury or condition. Students investigate tissues of the human body, focusing on the structure and function of bones. They use their knowledge of the skeletal system to analyze a patient's fracture and explore biomechanical engineering solutions to repair the fracture.

Lesson 1.2 Muscles and Motion

In Lesson 1.2, students model the physiology of muscle contraction as they assist a patient suffering from chronic muscle cramps. They build muscles on a Maniken® skeletal model, demonstrating how the orientation of a muscle relates to the role the muscle plays in the body and how a patient's muscles are impacted in injury or illness. They use physiology sensors and probes to monitor muscle strength and design an experiment to test muscle fatigue. To help a

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patient with a knee injury, students measure and analyze range of motion of the joints, perform diagnostic tests on a dynamic knee model, and practice kinesiology taping techniques guided by an athletic trainer.

Lesson 1.3 Relief Within Reach
Now that students have studied the skeletal and muscular system, they are ready to design a comprehensive solution for their patient in the outpatient center. To create a personalized care and rehabilitation plan to give to the patient, their caregivers, and future healthcare providers, students analyze the patient's medical data available in a patient medical portal along with the data they have collected in the unit. Students consider and demonstrate the importance of empathy and respect in patient care as they design a plan to help the patient manage their condition, progress forward, and maintain the activities and lifestyle they love.

Unit 2: Research Ready

In this unit, students have accepted an internship at the Development and Aging Research Center at a local university. The researchers in this lab are especially interested in exploring how the brain and other parts of the nervous system change as a person ages and how the endocrine system controls how a person's body carries out various processes. The research findings of this lab will inform innovations, treatments, and strategies to improve the quality of life and longevity for people around the world.

Students explore the various labs at the research center through a virtual gaming environment. They gather advice from career professionals and design experiments and research projects. Students are tasked to acquire the knowledge and skills they need to gain access to the main research laboratory, which is dedicated to solving problems that help unlock the mysteries of the communication network in the body—the nervous and endocrine systems.

Research Ready Lesson Summary

Lesson 2.1	Getting Nervous	(22 days)
Lesson 2.2	Everything Endocrine	(16 days)
Lesson 2.3	Challenge Accepted	(6 days)

Lesson 2.1 Getting Nervous
Students begin their first day as interns at the Development and Aging Research Center. Over the course of the lesson, students tour the facility through a 3D gaming environment, dissect a sheep brain to visualize the connection between structure and function, complete a virtual lab to evaluate the impact of specific drugs on signaling of neurons, and use physiological sensors to compare reflex and reaction time. At the end of the lesson, students participate in a Lab Leads Challenge where they apply what they have learned to diagnose a patient and model how their condition is linked to the function of the nervous system.

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Lesson 2.2 Everything Endocrine
In this lesson, students enter the Endocrinology Lab to research the role the endocrine system plays in the development of the human body. To examine feedback loops and how the endocrine system helps the body maintain homeostasis, students stimulate hormone action in a role-playing game. This game uses blood sugar and insulin as the models for hormone regulation, which students map on a graphic organizer.

Students then work in the lab with a model organism, C. elegans, designing and running experiments to explore the impact of neurotransmitters and hormones on body function. Students explore scientific literature as they assist a colleague in preparing a poster presentation related to reproductive regulation. At the end of the lesson, they meet a new set of patients, analyze their conditions, and decide what laboratory testing each patient needs to help support a final diagnosis.

Lesson 2.3 Challenge Accepted
In the problem, students complete an open-ended research experiment with the model organism, C. elegans, to see how heavy metals affect the nervous and endocrine systems. They design an investigation of their choosing, run the experiment with their team, and analyze data to make conclusions.

Unit 3: Adventure Awaits

In this unit, students join a team of expedition leaders who escort adventure travelers through a series of activities and events in extreme or remote environments. They are tasked with ensuring the health and wellness of their group—focusing on the cardiovascular, respiratory, and immune systems—as they identify and address health risks or challenges travelers may encounter in these environments.

They investigate pathogens native to an assigned environment and interventions to prevent and treat those pathogens. Students use what they have learned to work together to respond to an emergency medical incident that happens on an adventure trip, presented in an interactive simulation.

Adventure Awaits Lesson Summary

Lesson 3.1	Cardiopulmonary Connection	(20 days)
Lesson 3.2	Body Guards	(12 days)
Lesson 3.3	Adventure Medicine	(5 days)

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Lesson 3.1 Cardiopulmonary Connection
Lesson 3.1 introduces students to their new role as adventure guides for an expedition company. Through the engaging lens of adventure medicine, students investigate the cardiovascular and respiratory systems. Students explore the movement of blood to organs and tissues, build the heart and major blood vessels on their Maniken model, perform cardiovascular measurements and calculations, and learn how to record and interpret EKGs.

They investigate the connection between the cardiovascular and respiratory systems through a sheep pluck dissection, diagnose a fictional patient with respiratory issues, and use spirometry to measure lung volumes and flow rates. Finally, students apply all they've learned to analyze the cardiovascular and respiratory data of fictional clients and then make a recommendation as to whether they should be cleared for a climbing expedition.

Lesson 3.2 Body Guards
Students continue their work with the expedition company as they explore the systems, structures, and cells that function to protect the body from illness and injury. They investigate agents of disease and how the human body works to fight against invaders. Students complete a plaque assay in the lab to evaluate the effectiveness of antiviral medicines. They dissect a cow eye to investigate conditions of the eye that can be an issue on adventure expeditions.

Lesson 3.3 Adventure Medicine
In the problem, students use an interactive to design an expedition, choosing the destinations and activities, and then prepare a guide to help keep travelers healthy on this journey. Their guide must address the impacts of their assigned environment on human physiology—specifically the cardiovascular, respiratory, and immune systems. They must identify and address health risks of the extreme environment, as well as the risks related to pathogens native to the chosen location.

Through an interactive experience, student teams are faced with an emergency on their trip. Using the guide they created, they work together to apply what they have learned to help their clients through the emergency and maintain the health and well-being of all adventurers on the expedition.

Unit 4: Patient Perspectives

In this unit, students are biomedical science advisors working on the development of an interactive exhibit. Ins and Outs of the Body: Patient Perspectives will combine art and storytelling into an immersive experience that spotlights the stories of real patients to investigate the structure and function of the urinary and digestive systems.

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Patient Perspectives Lesson Summary

Lesson 4.1	Keeping It Renal	(19 days)
Lesson 4.2	It Takes Guts	(12 days)
Lesson 4.3	Engage in the Exhibit	(5 days)

Lesson 4.1 Keeping It Renal

In Lesson 4.1, students hear from a kidney donor and a kidney recipient as they explore how the body filters the blood and processes liquid waste. They dissect both normal and abnormal kidneys to map filtration and determine impacts of cysts on overall kidney function. They build a 3D model nephron and complete a laboratory experiment to model kidney function. Students gain an appreciation for how changes in clinical algorithms and medical evaluation criteria highlight the push for equitable care to all patients. Students use gel electrophoresis to explore the genetics and inheritance of polycystic kidney disease. Finally, students complete simulated urinalysis, allowing them to see that clues in the urine may signal problems in other human body systems. They tell the stories of these patients while creating a unique patient perspective asset for the exhibit.

Lesson 4.2 It Takes Guts

In this lesson, students experience the story of a young woman who has had a full digestive system transplant. As they follow her case and hear about her journey, students model the digestive system on their Maniken model and explore microscopic images of digestive tissue. They investigate gut health—how microbes play a role in healthy digestion—and how diagnostic tests are used to detect disease. In the project, students complete laboratory tests to investigate how enzymes function in the breakdown of food and relate the results of these experiments to digestive conditions.

Lesson 4.3 Engage in the Exhibit

In the problem, student teams are challenged to design and storyboard an interactive element for the exhibit that allows visitors to apply their knowledge of biomedical science to investigate a medical story. They are tasked with providing a new patient perspective to showcase key science and using art and media to engage their audience.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course resumes also detail student experience with tools, software, lab work, and design and innovation. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Micropipetting
- DNA gel electrophoresis
- Restriction digestion
- Dissection
- Aseptic technique
- Plaque assay

Clinical Medicine

- EKG analysis
- Spirometry
- Urinalysis
- Evaluation of circulation — ankle brachial index (ABI)
- EMG analysis
- Taking and interpreting vital signs
- Diagnostic image analysis
- Kinesiology evaluation and taping
- Fracture repair techniques
- Tissue histology
- Physical therapy

Equipment and Software Proficiencies

- Vernier physiology sensors and probes
- Data acquisition software (Vernier® Graphical Analysis® 4)
- Microscope
- Goniometer

Scientific Experimentation Skills

- Locating, reading, and summarizing research presented in scientific journals
- Scientific experiment design and facilitation
- Laboratory data analysis and interpretation
- Graphing (by hand and using online tools)
- Analysis of experimental data to draw conclusions
- Communication of results and conclusions orally and in writing
- Error analysis

Professional Skills

- Teamwork, group collaboration, and conflict resolution
- Project management
- Problem solving
- Technical writing
- Verbal and written communication
- Critical and creative thinking
- Ethical reasoning

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Course Knowledge

- Biomedical science careers
- Structure and function of all human body systems
- Language of anatomy—regional and directional terminology
- Maintenance of homeostasis and feedback regulation
- Exercise physiology
- Mechanisms of pharmacologic action
- Movement at joints
- Muscle contraction
- Cardiac cycle and gas exchange
- Reflex and voluntary action
- Action potential and signal transduction
- Eye anatomy and physiology
- Human immunity and pathogen defense
- Hormonal regulation
- Enzyme action in digestion
- Nephron action
- Gut microbes and health
- Inheritance of genetic disease

Engagement Experiences

- Laboratory investigations
- Case studies
- Instant challenges and Quick Clinics
- Simulations
- Role play
- Gaming
- Design challenges

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PLTW Standards Connection
Human Body Systems

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Human Body Systems connects to standards in the following:

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Common Core State Standards for Mathematics

Quantities

Reason Quantitatively and Use Units to Solve Problems

CCSS.MATH.CONTENT.HSN.Q.A.1

Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.2

Define appropriate quantities for the purpose of descriptive modeling.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSN.Q.A.3

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Seeing Structure in Expressions

Interpret the Structure of Expressions

CCSS.MATH.CONTENT.HSA.SSE.A.1

Interpret expressions that represent a quantity in terms of its context.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Reasoning with Equations and Inequalities

Represent and Solve Equations and Inequalities Graphically

CCSS.MATH.CONTENT.HSA.REI.D.10

Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Interpreting Functions

Interpret Functions That Arise in Applications in Terms of the Context

CCSS.MATH.CONTENT.HSF.IF.B.6

Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for Mathematics

Analyze Functions Using Different Representations

CCSS.MATH.CONTENT.HSF.IF.C.7

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

CCSS.MATH.CONTENT.HSS.ID.A.3

Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Summarize, Represent, and Interpret Data on Two Categorical and Quantitative Variables

CCSS.MATH.CONTENT.HSS.ID.B.6

Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Making Inferences and Justifying Conclusions

Make inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.3

Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.IC.B.5

Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.5.B

Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.7

Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.9-10.8

Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.B

Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.C

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.D

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.2

Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.2

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

ETS1.B Engineering Design - Developing Possible Solutions

• When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

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- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Design a test of a model to ascertain its reliability.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

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Next Generation Science Standards

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

- Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

Crosscutting Concepts

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Stability and Change

- Feedback (negative or positive) can stabilize or destabilize a system.

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 a

Identify levels of organization
- Cellular
- Chemical
- Organ
- Organsim
- System
- Tissue

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 b

Demonstrate anatomical position

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 c

Identify body planes
- Coronal / Frontal
- Midsagittal
- Sagittal
- Transverse / Horizontal

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 d

Use directional terms
- Anterior / Posterior
- Cephalic/Cadual
- Medial / Lateral
- Proximal / Distal
- Superficial /Deep
- Superior / Inferior
- Ventral / Dorsal

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1.1.1 e

Identify body cavities

- Abdominal
- Cranial
- Dorsal
- Nasal
- Oral
- Orbital
- Pelvic
- Spinal
- Thoracic

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.1 f

Identify the components of the abdominal quadrants

- Left upper
- Left lower
- Right upper
- Right lower

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Hematopoiesis
  - Mineral storage
  - Muscle attachment and movement
  - Ossification
  - Structure and support

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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National Consortium for Health Science Education

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Infection protection
  - Sensory organ
  - Temperature regulation
  - UV light protection
  - Vitamin D production

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Distinguish blood components
  - Identify cardiovascular organs
  - Label the parts of the heart
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Cardiac conduction system
  - Transports nutrients, waste, antibodies, hormones, and gases

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Movement of lymph fluid
  - Provide protection against disease

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 g

Nervous

- Structures of the nervous system
  - Differentiate CNS and PNS
  - Differentiate sympathetic and parasympathetic
  - Identify organs of the nervous system
  - Identify structures of the special sense organs
- Functions of the nervous system
  - Movement
  - Processing
  - Sensation

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Controls metabolism
  - Production of hormones
  - Regulation of body processes
  - Regulates growth, development, and maturation

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

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1.1.2 i

Digestive

- Structures of the digestive system
  - Differentiate between alimentary and accessory organs
  - Identify digestive organs in sequence
- Functions of the digestive system
  - Absorption of nutrients
  - Chemical and mechanical digestion
  - Excretion of waste

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 j

Urinary

- Structures of the urinary system
  - Identify gross and microscopic anatomy of the kidney
  - Identify urinary organs
- Functions of the urinary system
  - Homeostatic balance
  - Process of urine formation
  - Urine composition

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

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National Consortium for Health Science Education

Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Anxiety
- Arthritis
- Asthma
- Bipolar Disorder
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic fibrosis
- Diabetes
- Dementia
- Depression
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular Dystrophy
- Myocardial Infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cerebrovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene editing
- Gene testing
- Gene therapy
- Immunizations
- Immunotherapy
- Stem cell research

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Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system
- Centi-
- Deci-
- Kilo-
- Milli-
- Micro-

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 b

Mathematical
- Addition / Subtraction
- Average
- Fractions
- Multiplication / Division
- Percentages
- Ratios

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.3.1 c

Conversions
- Height (inches/meters)
- Household measurements (Tbsp/tsp/cup/oz)
- Length (inches/meters)
- Temperature (F/C)
- Volume (ml/cc)
- Weight/mass (pounds/grams)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

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Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication - Identify common barriers to communication.

2.1.2 a

Physical disabilities
- Aphasia
- Developmental level
- Hearing loss
- Impaired vision

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

2.1.2 b

Psychological barriers
- Attitudes
- Bias
- Prejudice
- Stereotyping

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.5

Modify communication to meet the needs of the patient/client and to be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.2.2

Interpret common medical abbreviations to communicate information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.3.2

Prepare examples of technical and informative writing.

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Foundation Standard 3: Systems Identify how key systems affect services performed and quality of care.

Healthcare Delivery Systems - Differentiate healthcare delivery systems and healthcare related agencies.

3.1.1 a

Types of practice settings

- Acute care
- Ambulatory care
- Behavioral and mental health services
- Home care
- Long-term care
- Medical and dental practices

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Personal Traits of the Health Professional

4.1.1

Identify personal traits and attitudes desirable in a career ready member of a health team.

- Acceptance of criticism
- Competence
- Dependability
- Discretion
- Empathy
- Enthusiasm
- Honesty
- Initiative
- Integrity
- Patience
- Positive attitude
- Responsibility
- Self-motivation
- Social and cultural competence
- Tact
- Team player
- Willingness to learn

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Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

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4.3.2

Distinguish differences among careers within a health science pathway.
- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 5: Legal Responsibilities Describe legal responsibilities, limitations, and implications on healthcare worker actions.

Legal Practices

5.2.1

Apply standards for the safety, privacy and confidentiality of health information.
- Privileged communication

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.2

Identify ethical issues and their implications related to healthcare.
- Ethics committee
- Euthanasia
- Gene editing
- Immunizations
- In vitro fertilization
- Organ donation/transplantation
- Scope of practice

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6.2.1

Discuss religious, social, and cultural values as they impact healthcare.

- Ageism
- Ethnicity
- Gender
- Race
- Religion

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Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens

- Bacteria
- Fungi
- Parasites
- Protoza
- Viruses

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 b

Describe characteristics of microorganisms

- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.1 c

Recognize chain of infection

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7.1.1 d

Describe mode of transmission

- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis

- Antisepsis
- Disinfection
- Sanitization
- Sterile technique
- Sterilization

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 b

Standard precautions

- Environmental cleaning
- Gloving
- Handwashing
- Personal Protective Equipment (PPE)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.1.2 e

Vaccinations

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.2

Identify characteristics of effective teams.

- Collaboration
- Defined roles
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.

- Communicate assertively
- Gather the facts
- Mediate disputes
- Negotiate resolutions
- Set clear expectations

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.4

Evaluate why teamwork is an important part of healthcare and how it improves patient care.

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs in both normal and abnormal ranges - including but not limited to:

- Blood pressure
- Height and weight
- Oxygen saturation
- Pain
- Pulse
- Respirations
- Temperature

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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Follow the fictitious Smith family as you learn about the prevention, diagnosis, and treatment of disease.

Play the role of biomedical professionals to analyze case information and diagnose and treat your patients. Investigate the medical interventions of the past and present, and begin to brainstorm the innovations of the future.

PLTW Medical Interventions (MI) allows students to investigate the variety of interventions involved in the prevention, diagnosis, and treatment of disease as they follow the lives of a fictitious family. A "How-To" manual for maintaining overall health and homeostasis in the body, the course explores how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose, and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics. Each family case scenario introduces multiple types of interventions, reinforces concepts learned in the previous two courses, and presents new content. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. These interventions are showcased across the generations of the family and provide a look at the past, present, and future of biomedical science. Lifestyle choices and preventive measures are emphasized throughout the course as well as the important role that scientific thinking and engineering design play in the development of interventions of the future.

Students practice problem solving with structured activities and progress to open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.

The following is a summary of the units of study that are included in the course for the academic year. Course content is designed with strong connections to state and national standards. Activities, projects, and problems are provided to the teacher in the form of student-ready handouts, teacher notes, and supplementary materials, including resource documents, student response sheets, and presentations.

MI Unit Summary

Unit 1	How to Fight Infection (25%)
Unit 2	How to Screen What Is in Your Genes (15%)
Unit 3	How to Conquer Cancer (30%)
Unit 4	How to Prevail When Organs Fail (30%)

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Unit 1: How to Fight Infection

In this unit, students are introduced to Sue Smith, the 18-year-old daughter of Mr. and Mrs. Smith. Sue is a college freshman who is presenting symptoms of an unknown infectious disease, which students eventually identify as bacterial meningitis. Sue survives the infection but is left with hearing impairment. Through this case, students explore the diagnostic process used to identify an unknown infection, the use of antibiotics as a treatment, how bacteria develop antibiotic resistance, how hearing impairment is assessed and treated, and how vaccinations are developed and used to prevent infection.

How to Fight Infection Lesson Summary

Lesson 1.1	The Mystery Infection
Lesson 1.2	Antibiotic Treatment
Lesson 1.3	The Aftermath: Hearing Loss
Lesson 1.4	Vaccination

Lesson 1.1 The Mystery Infection

The goal of this lesson is to expose students to interventions involved in detecting, fighting, and preventing an infectious disease as they investigate a potential outbreak at a fictitious college. Sue Smith, a freshman, thinks she just has a cold, but further investigation reveals something far more serious. Students use various techniques and technologies to diagnose Sue and determine the source of the disease on campus. They analyze clues found in the history and physical of each possible patient, identify pathogens present in body fluids through DNA sequence analysis, and test for the infectious agent using the antibody-based Enzyme-Linked Immunosorbent Assay (ELISA). Students are introduced to the field of bioinformatics as they explore genetic databases to identify known gene sequences. At the conclusion of the investigation, students outline a plan to stop a potential outbreak on campus and discuss interventions such as antibiotic therapy and vaccination, two topics to be explored in greater detail in the subsequent lessons.

Lesson 1.2 Antibiotic Treatment

In this lesson, students review bacterial structure and investigate the mechanisms by which DNA from one bacterial cell is transferred to another. Students then explore various types of antibiotics and their mode of action against the bacteria they target. They suggest an antibiotic treatment for Sue Smith, as she was diagnosed with a bacterial infection in the previous lesson. Finally, students look at the propagation of antibiotic-resistant bacteria and how the misuse of antibiotics plays a role in the development of antibiotic-resistant bacteria.

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Lesson 1.3 The Aftermath: Hearing Loss
The goal of this lesson is to introduce students to the auditory system. Students investigate the physics of sound, learn how hearing works, and conduct a variety of hearing assessments. Students are assigned a patient with a specific type of hearing loss. Using the assigned patient case study, students explore how damage to the outer, middle, and/or inner ear results in hearing loss. Students learn how to interpret audiograms and match up their patient case study with the corresponding audiogram. Students then use what they have learned to make a recommendation as to what intervention is the most appropriate for the patient case study. Finally, students investigate the science behind cochlear implants and debate the use of this medical intervention.

Lesson 1.4 Vaccination
The goal of this lesson is for students to explore infectious disease prevention and the development of vaccinations. Students discuss the impact vaccination has had on public health over the years and interpret how vaccines have altered disease trends. Students review how vaccines work in the body and relate this mechanism to the workings of the human immune system. Students explore the techniques scientists use to produce vaccines. They delve deeper into the science of recombinant DNA technology and learn how genetic engineering can be used to manufacture viable vaccines. Students engineer a paper plasmid to produce a viral protein that can be used as a vaccine. Finally, students explore the career field of epidemiology. Working as epidemiologists, they brainstorm steps and questions needed to deal with a potential outbreak, analyze data to gather evidence, design epidemiologic studies, and design and implement prevention and treatment strategies.

Unit 2: How to Screen What Is in Your Genes

In this unit, students are introduced to Mr. and Mrs. Smith, Sue's parents. Mr. and Mrs. Smith are very excited to find out they are expecting a new baby. Because the couple is in their early 40s, the doctor has suggested genetic screening and testing. Through this case, students explore how to screen and evaluate the code in DNA, the value of good prenatal care, and the future of genetic technology.

How to Screen What Is in Your Genes Lesson Summary

Lesson 2.1	Genetic Testing and Screening
Lesson 2.2	Our Genetic Future

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Lesson 2.1 Genetic Testing and Screening

The goal of this lesson is for students to examine the available types of genetic testing and screening and discuss ethical implications of these tests. Assuming the role of genetic counselors, students analyze a patient case concerning issues of genetic testing and provide appropriate recommendations. Next, students explore molecular techniques necessary to complete a genetic test. They use the tools of molecular biology to extract their own DNA, amplify a part of the gene for bitter-tasting ability, identify their own gene sequence by restriction digest, and view their resultant genotype using gel electrophoresis. Students then have a chance to test their own phenotype and see how well this genotype predicts their own ability. Finally, students investigate the interventions that exist to help protect and monitor a growing fetus.

Lesson 2.2 Our Genetic Future

The goal for this lesson is for students to examine how the study of genetics alters the way doctors and scientists treat disease and the way humans reproduce. Students learn about gene therapy, debate its safety, and write a policy statement highlighting guidelines and restrictions on gene therapy testing and research. Students examine available reproductive technology and debate and discuss medical interventions of the future.

Unit 3: How to Conquer Cancer

In this unit, students are introduced to Mike Smith, the 16-year-old son of Mr. and Mrs. Smith. Mike is diagnosed with osteosarcoma, a type of bone cancer that often affects teenagers. Mike's treatments put him into remission; however, to remove all of the cancerous tissue, he had to have most of his arm amputated. Mike now needs a prosthesis. Through this case, students explore the diagnostic process used to determine the presence of cancerous cells, the risk factors and prevention of cancer, rehabilitation after disease or injury, and the design process for new medications, prosthetics, and nanotechnology.

How to Conquer Cancer Lesson Summary

Lesson 3.1	Detecting Cancer
Lesson 3.2	Reducing Your Risk
Lesson 3.3	Treating Cancer
Lesson 3.4	Building a Better Cancer Treatment

Lesson 3.1 Detecting Cancer

In this lesson, students are introduced to Mike Smith, the 16-year-old son in the Smith family. For the last couple of months, Mike has been experiencing pain in his upper arm that may be indicative of cancer. Through the exploration of Mike's case, students explore techniques used to diagnose Mike's particular cancer, including diagnostic imaging and examination of cancerous tissue. Students look at the physiology of cancer and investigate the genes involved with cancer.

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Students examine the technology that is being used to give researchers a better understanding of the differences in gene expression in both cancer cells and normal cells. Students learn ways that this technology is being used to potentially develop personalized medicine for treating cancer.

Lesson 3.2 Reducing Your Risk
The goal of this lesson is for students to look at some of the risk factors associated with cancer by exploring the various situations which cause changes to our DNA. In particular, students investigate mutations caused by UV light, mutations that are inherited, and mutations caused by viruses. Students design and perform an experiment to test the effectiveness of various sunscreens or types of cloth against UV light as they attempt to protect UV-sensitive yeast cells. They analyze marker analysis results to diagnose a BRCA2 gene mutation associated with breast cancer, play the role of a virologist working with viruses associated with cancer, and create a timeline of routine cancer screenings we must complete in our lifetime. Throughout the lesson, students look at lifestyle choices that can reduce the chances that a person will develop particular types of cancer.

Lesson 3.3 Treating Cancer
The goal of this lesson is for students to follow Mike Smith as he progresses through treatment for his osteosarcoma. Students learn about the treatments available for cancer patients, as well as the therapies available to help patients cope with the pain associated with treatment. This lesson begins with an introduction to chemotherapy and radiation therapy. Next, students investigate biofeedback therapy. They use data acquisition software to monitor their body's reaction to stress and test methods to reduce their response level. Students learn that Mike will have to have his arm amputated to prevent further tumor growth. Through this scenario, students study prosthetic limb technologies, design and build a model prosthetic arm, and explore the role physical and occupational therapists play in a patient's rehabilitation following amputation surgery.

Lesson 3.4 Building a Better Cancer Treatment
The goal of this lesson is for students to explore the future of cancer treatment. Students begin this lesson with an investigation into how one drug can cause varied effects in similar patients and learn about personalized medicine, also known as pharmacogenetics. Students then investigate the set-up of clinical trials and consider the ethics governing clinical trials. Students study the nanoscale and the possible application of nanotechnology in medicine. Finally, students research the variety of nanotechnologies currently being developed for the diagnosis and treatment of cancer. They use everything they have learned in this unit to design their own nanotechnology-based cancer treatment and design a clinical trial to test the safety and efficacy of their designed treatment.

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Unit 4: How to Prevail When Organs Fail

In this unit, students are introduced to Mrs. Jones, the 44-year-old sister of Mrs. Smith. Mrs. Jones has been struggling with Type 1 diabetes for 20 years. Over the years, Mrs. Jones did not take good care of herself or properly control her diabetes. She eventually began using an insulin pump and changed her lifestyle to regulate her blood sugar levels, but the damage had already been done. Mrs. Jones is now dealing with end-stage renal failure and needs a kidney transplant. Through this case, students explore protein production, blood sugar regulation, dialysis, organ donation and transplantation, and non-invasive surgery techniques. In addition, students create a bionic human.

How to Prevail When Organs Fail Lesson Summary

Lesson 4.1	Manufacturing Human Proteins
Lesson 4.2	Organ Failure
Lesson 4.3	Transplant
Lesson 4.4	Building a Better Body

Lesson 4.1 Manufacturing Human Proteins

The goal of this lesson is for students to investigate the biomanufacturing of human proteins used for medical interventions. They first use the process of bacterial transformation to insert a plasmid containing the gene for green fluorescent protein (GFP) into E. coli cells. Students then use chromatography to separate the GFP protein from the other proteins in the bacterial cells. They collect proteins in differential fractions and analyze the contents of these fractions using gel electrophoresis. Students relate their molecular work to the case of Diana Jones, who is a Type 1 diabetic on insulin therapy. Without insulin produced by the biomanufacturing process explored in this lesson, she would have died long ago. As the unit progresses, students research and design other medical interventions that will help Diana in her battle with diabetes and renal failure.

Lesson 4.2 Organ Failure

The goal of this lesson is for students to use problem solving and critical thinking skills to solve Diana Jones' medical mystery. Students investigate Diana's symptoms, suggest further diagnostic tests, and use information they find to piece together the clues provided to make a diagnosis and suggest the best treatment option.

Lesson 4.3 Transplant

In Lesson 4.2, students diagnosed Diana Jones with end-stage renal disease. In this lesson, students follow Diana as she goes through the transplant process. Students learn about organ allocation policies by deciding which of two matching patients should receive a donated kidney. Students then learn that members of Diana's family have offered to be potential living donors and must determine who should donate their kidney to Diana based on blood type and tissue

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type. Students then practice laparoscopic and general surgery techniques and investigate the members of the transplant team involved along the transplant path. Students conclude the lesson by investigating the similarities and differences between kidney transplants and heart transplants.

Lesson 4.4 Building a Better Body

The goal of this lesson is for students to investigate some of the technologies researchers are exploring as they strive to replace damaged organs, including xenotransplantation and tissue engineering. Students investigate how these technologies work and then construct an argument from the perspective of different stakeholders arguing over whether further research for these interventions should be banned. In the final activities, students have the chance to reflect on everything they have explored in this course. They think about how science is changing the ability of humans to survive in the face of illness and injury and use what they learned during the course to design their own version of a superhuman. As they review the Smith family tree, students reflect on the role medical interventions play in preventing, diagnosing, and treating disease. Finally, students consider their own career aspirations.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial plating
- Micropipetting
- DNA extraction
- Restriction enzyme digest
- DNA gel electrophoresis
- Protein gel electrophoresis
- Hydrophobic Interaction Chromatography (HIC)
- Bacterial transformation

Clinical Skills

- Karyotyping
- Quantitative Enzyme-linked Immunosorbent Assay (ELISA) analysis
- Interpretation of audiograms
- Blood typing
- Tissue typing

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Thermal cycler

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

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Course Topics

- Over-arching Themes
  - Homeostasis
  - Biomedical science careers
  - Bioethics
  - Design process
  - Interrelationship between body systems and health/disease
  - Current and future medical internations
- Infectious Disease
  - Epidemiology
  - Bioinformatics/DNA sequence analysis
  - Antibiotic mode of action and antibiotic resistance
  - Bacterial transduction, transformation, and conjugation
  - Physics of sound and anatomy and physiology of the ear
  - Hearing loss and audiograms
  - Cochlear implant technology
  - Vaccine production and mechanism
- Innovative Medicine
  - Prenatal screenings
  - Gene therapy
  - Reproductive technology
  - Xenotransplantation and tissue engineering
- Molecular Biology
  - Recombinant DNA technology and genetic engineering
  - DNA microarrays
  - Restriction Fragment Length Polymorphisms (RFLP) and marker analysis
  - Single Nucleotide Polymorphisms (SNPs) and pharmacogenetics
  - Biomanufacturing of human proteins
- Cancer Genetics, Diagnostics, and Treatment
  - Diagnostic imaging
  - Histology
  - Statistical analysis
  - Biofeedback therapy
  - Prosthetic limb technology
  - Nanomedicine
  - Clinical trials
- Organ Transplant
  - End Stage Renal Disease
  - Organ allocation policies and organ transplant
  - Laparoscopic surgical techniques
  - Antigen/antibody interactions
  - Pedigree construction/analysis

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PLTW Standards Connection
Medical Interventions

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Medical Interventions connects to standards in the following:

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Common Core State Standards for Mathematics

Making Inferences and Justifying Conclusions

Make Inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.2

Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.3

Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RL.9-10.4

Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.5

Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.6

Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RL.9-10.7

Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's Landscape with the Fall of Icarus).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.RL.9-10.8

(Not applicable to literature)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.9-10.9

Analyze how an author draws on and transforms source material in a specific work (e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RL.9-10.10

By the end of grade 9, read and comprehend literature, including stories, dramas, and poems, in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.2

Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.3

Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RI.9-10.4

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.RI.9-10.5

Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.6

Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.9-10.7

Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.8

Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.9

Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail"), including how they address related themes and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.9-10.10

By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.W.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.C

Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.A

Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.B

Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.D

Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.3.E

Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.9-10.9.A

Apply grades 9–10 Reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]").

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.9-10.9.B

Apply grades 9–10 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Writing

CCSS.ELA-LITERACY.W.9-10.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.A

Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.B

Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.C

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.9-10.1.D

Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.SL.9-10.2

Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.3

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.9-10.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.1.A

Use parallel structure.*

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.A

Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.B

Use a colon to introduce a list or quotation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Knowledge of Language

CCSS.ELA-LITERACY.L.9-10.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.3.A

Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.L.9-10.4.B

Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.C

Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5

Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5.A

Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.5.B

Analyze nuances in the meaning of words with similar denotations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.9-10.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RH.9-10.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.3

Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RH.9-10.4

Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.5

Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.6

Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author’s claims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.9-10.9

Compare and contrast treatments of the same topic in several primary and secondary sources.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RH.9-10.10

By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.6

Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.9-10.9

Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.9-10.10

By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.3

(See note; not applicable as a separate requirement)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.9-10.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.2

Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.3

Analyze the impact of the author’s choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RL.11-12.4

Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RL.11-12.5

Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.6

Analyze a case in which grasping a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RL.11-12.7

Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.8

(Not applicable to literature)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.9

Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RL.11-12.10

By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RI.11-12.2

Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.3

Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RI.11-12.4

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.5

Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.6

Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness or beauty of the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RI.11-12.8

Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.RI.11-12.9

Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RI.11-12.10

By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.A

Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.C

Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.D

Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.W.11-12.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.A

Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.B

Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.C

Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.D

Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.3.E

Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.W.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.W.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9.A

Apply grades 11–12 Reading standards to literature (e.g., “Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.W.11-12.9.B

Apply grades 11–12 Reading standards to literary nonfiction (e.g., “Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]”).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Range of Writing

CCSS.ELA-LITERACY.W.11-12.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.11-12.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.A

Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.B

Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.C

Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.1.D

Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.2

Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.SL.11-12.3

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.11-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.SL.11-12.6

Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.1.A

Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.1.B

Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Common Core State Standards for English Language Arts

Knowledge of Language

CCSS.ELA-LITERACY.L.11-12.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.3.A

Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.B

Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.C

Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.5

Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.L.11-12.5.A

Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.5.B

Analyze nuances in the meaning of words with similar denotations.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.2.A

Observe hyphenation conventions.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.11-12.1

Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.3

Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Common Core State Standards for English Language Arts

Craft and Structure

CCSS.ELA-LITERACY.RH.11-12.4

Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.5

Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.6

Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RH.11-12.8

Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RH.11-12.9

Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RH.11-12.10

By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.5

Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.RST.11-12.6

Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.D

Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

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CCSS.ELA-LITERACY.WHST.11-12.3

(See note; not applicable as a separate requirement)

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Range of Writing

CCSS.ELA-LITERACY.WHST.11-12.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

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Next Generation Science Standards

From Molecules to Organisms: Structures and Processes

HS.LS1.1

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

HS.LS1.3

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS1.6

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

Heredity: Inheritance and Variation of Traits

HS.LS3.1

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.2

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

HS.LS3.3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

Disciplinary core ideas

LS1.A From Molecules to Organisms: Structures and Processes - Structure and Function

• Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

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Next Generation Science Standards

• All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1), (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

LS3.A Heredity: Inheritance and Variation of Traits - Inheritance of Traits

• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA . All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

LS4.A Biological Evolution: Unity and Diversity - Evidence of Common Ancestry and Diversity

• Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

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Next Generation Science Standards

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions
  - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.
  - that arise from examining models or a theory, to clarify and/or seek additional information and relationships.
  - to determine relationships, including quantitative relationships, between independent and dependent variables.
  - to clarify and refine a model, an explanation, or an engineering problem.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

- Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☐ Unit 4

- Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☐ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

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Next Generation Science Standards

- Apply techniques of algebra and functions to represent and solve scientific and engineering problems.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.)

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

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Next Generation Science Standards

• Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☐ Unit 1 ☐ Unit 2 ☐ Unit 3 ☑ Unit 4

• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☑ Unit 1 ☐ Unit 2 ☐ Unit 3 ☐ Unit 4

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

• Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Crosscutting Concepts

Patterns

• Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system.

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Next Generation Science Standards

Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

- Systems can be designed to cause a desired effect.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

- Changes in systems may have various causes that may not have equal effects.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Systems and System Models

- Systems can be designed to do specific tasks.

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Stability and Change

- Feedback (negative or positive) can stabilize or destabilize a system.

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National Consortium for Health Science Education

Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology - Describe the organization of the human body and directional terms.

1.1.1 a

Identify levels of organization

- Cellular
- Chemical
- Organ
- Organsim
- System
- Tissue

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Hematopoiesis
  - Mineral storage
  - Muscle attachment and movement
  - Ossification
  - Structure and support

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Infection protection
  - Sensory organ
  - Temperature regulation
  - UV light protection
  - Vitamin D production

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Distinguish blood components
  - Identify cardiovascular organs
  - Label the parts of the heart
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Cardiac conduction system
  - Transports nutrients, waste, antibodies, hormones, and gases

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Movement of lymph fluid
  - Provide protection against disease

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

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1.1.2 g

Nervous

- Structures of the nervous system
  - Differentiate CNS and PNS
  - Differentiate sympathetic and parasympathetic
  - Identify organs of the nervous system
  - Identify structures of the special sense organs
- Functions of the nervous system
  - Movement
  - Processing
  - Sensation

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Controls metabolism
  - Production of hormones
  - Regulation of body processes
  - Regulates growth, development, and maturation

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 i

Digestive

- Structures of the digestive system
  - Differentiate between alimentary and accessory organs
  - Identify digestive organs in sequence
- Functions of the digestive system
  - Absorption of nutrients
  - Chemical and mechanical digestion
  - Excretion of waste

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1.1.2 j

Urinary

- Structures of the urinary system
  - Identify gross and microscopic anatomy of the kidney
  - Identify urinary organs
- Functions of the urinary system
  - Homeostatic balance
  - Process of urine formation
  - Urine composition

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

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Diseases and Disorders -

1.2.1

Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders, including, but not limited to the following:

- Anxiety
- Arthritis
- Asthma
- Bipolar Disorder
- Cancer
- Cataracts
- Concussion / Traumatic Brain Injury (TBI)
- Cystic Fibrosis
- Diabetes
- Dementia
- Depression
- Gastric ulcer
- Hepatitis
- Hypertension
- Melanoma
- Muscular dystrophy
- Myocardial infarction
- Sexually Transmitted Infection (STI)
- Stroke / Cerebrovascular Accident (CVA)
- Tuberculosis
- Urinary Tract Infection (UTI)

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene editing
- Gene testing
- Gene therapy
- Immunizations
- Immunotherapy
- Stem cell research

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Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system
- Centi-
- Deci-
- Kilo-
- Milli-
- Micro-

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.3.1 b

Mathematical
- Addition / Subtraction
- Average
- Fractions
- Multiplication / Division
- Percentages
- Ratios

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

1.3.1 c

Conversions
- Height (inches/meters)
- Household measurements (Tbsp/tsp/cup/oz)
- Length (inches/meters)
- Temperature (F/C)
- Volume (ml/cc)
- Weight/mass (pounds/grams)

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

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Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Reflecting
- Silence
- Summarizing

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Concepts of Effective Communication - Identify common barriers to communication.

2.1.2 a

Physical disabilities

- Aphasia
- Developmental level
- Hearing loss
- Impaired vision

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

2.1.2 b

Psychological barriers

- Attitudes
- Bias
- Prejudice
- Stereotyping

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

Concepts of Effective Communication

2.1.3

Distinguish between subjective and objective information.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

2.1.5

Modify communication to meet the needs of the patient/client and to be appropriate to the situation.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Medical Terminology

2.2.1

Use common roots, prefixes, and suffixes to communicate information.

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Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

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Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Employability Skills

4.2.1

Apply employability/soft skills in healthcare.

- Chain of command
- Communication Skills
- Customer service
- Decision making
- Emotional Intelligence
- Flexible
- Organization
- Problem Solving
- Scope of practice
- Time Management
- Work Ethic

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Career Decision-making

4.3.1

Research levels of education, credentialing requirements, and employment trends in health professions.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

4.3.2

Distinguish differences among careers within a health science pathway.

- Biotechnology research and development
- Diagnostic services
- Health informatics
- Support services
- Therapeutic services

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Foundation Standard 6: Ethics Understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment.

Ethical Practice

6.1.1

Differentiate between ethical and legal issues impacting healthcare.

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☑ Unit 4

6.1.2

Identify ethical issues and their implications related to healthcare.

- Ethics committee
- Euthanasia
- Gene editing
- Immunizations
- In vitro fertilization
- Organ donation/transplantation
- Scope of practice

☐ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

6.2.1

Discuss religious, social, and cultural values as they impact healthcare.

- Ageism
- Ethnicity
- Gender
- Race
- Religion

☑ Unit 1 ☑ Unit 2 ☐ Unit 3 ☐ Unit 4

Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens

- Bacteria
- Fungi
- Parasites
- Protoza
- Viruses

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7.1.1 b

Describe characteristics of microorganisms
- Aerobic
- Anaerobic
- Non-pathogenic
- Pathogenic

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7.1.1 c

Recognize chain of infection

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.1 d

Describe mode of transmission
- Common vehicle (air, food, water)
- Direct
- Healthcare-associated infections (nosocomial)
- Indirect
- Opportunistic
- Vectors

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
- Antisepsis
- Disinfection
- Sanitization
- Sterile technique
- Sterilization

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 b

Standard precautions
- Environmental cleaning
- Gloving
- Handwashing
- Personal Protective Equipment (PPE)

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7.1.2 c

Isolation precautions
• Transmission-based contact

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7.1.2 d

Bloodborne pathogen precautions

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

7.1.2 e

Vaccinations

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☑ Unit 4

Personal Safety

7.2.2

Demonstrate principles of body mechanics during patient care.
• Ambulating
• Lifting
• Positioning

☐ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

7.4.2

Comply with safety signs, symbols, and labels.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.1

Evaluate roles and responsibilities of healthcare team members.

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8.1.2

Identify characteristics of effective teams.

- Collaboration
- Defined roles
- Effective communication
- Effective leadership
- Measurable processes and outcomes
- Mutual respect
- Shared goals

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics

- Focused and driven
- Interpersonal skills
- Motivates and inspires
- Organized and balanced

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 b

Types

- Autocratic
- Democratic
- Laissez faire

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

8.2.2 c

Roles

- Communicates vision
- Leads change
- Manages accountability

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Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.
• Communicate assertively
• Gather the facts
• Mediate disputes
• Negotiate resolutions
• Set clear expectations

☑ Unit 1 ☑ Unit 2 ☑ Unit 3 ☑ Unit 4

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote self-care behaviors of health and wellness.
- Exercise
- Nutrition
- Relationships
- Sleep habits
- Stress management
- Weight control

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

9.1.3

Describe public health strategies for prevention of disease.
- Community health education outreach programs
- Immunizations
- Medical, dental, and mental health screenings
- Routine physical exams
- Self-care behaviors

☑ Unit 1 ☐ Unit 2 ☑ Unit 3 ☐ Unit 4

9.1.4

Investigate complementary and alternative health practices as they relate to wellness and disease prevention.
- Eastern medicine
- Holistic medicine
- Homeopathic medicine
- Manipulative medicine

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs in both normal and abnormal ranges - including but not limited to:

- Blood pressure
- Height and weight
- Oxygen saturation
- Pain
- Pulse
- Respirations
- Temperature

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You are about to embark on detailed missions in science and medicine. Apply all you have learned in the BMS pathway to solve problems, design solutions, and complete each medical mission.

In PLTW Biomedical Innovation (BI), students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

In this capstone course, students are asked to apply what they have learned in the previous three courses to solve unique problems in science, medicine, and healthcare. Students work systematically through required problems before completing optional directed problems or independent work. Each problem is staged as a mission — a unique set of tasks the students must work through to achieve their desired objective. Students are presented with each problem in a Mission File — a document that includes a case brief, a list of completion tasks, links to available resources, as well as a reflection section. Working through the missions not only exposes students to current issues in biomedical science but also provides skills-based instruction in research and experimentation — tools students will use to design innovative solutions to real-world problems. Students use what they learn in these missions as they develop and implement their independent project at the end of the year. A teacher may use additional resources in the community — the guidance of other teachers in the school, the advice of scientists or biomedical professionals, or the knowledge presented in scientific literature to help students achieve each goal.

The following is a summary of the units of study that are included in the course for the academic year. Course content is designed with strong connections to multiple state and national standards. Activities, projects, and problems are provided to the teacher in the form of student-ready handouts, teacher notes, and supplementary materials, including resource documents, student response sheets, and presentations.

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BI Unit Summary

Problem 1	Design of an Effective Emergency Room
Problem 2	Exploring Human Physiology
Problem 3	Design of a Medical Innovation
Problem 4	Investigating Environmental Health
Problem 5	Combating a Public Health Issue
Problem 6	Molecular Biology in Action (Optional)
Problem 7	Forensic Autopsy (Optional)
Problem 8	Independent Project (Optional)

Problem 1: Design of an Effective Emergency Room

In this problem, students apply their knowledge of emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions to analyze the workings of an emergency room and discuss inefficiencies that may hinder appropriate clinical care. Student teams work collaboratively to design a more efficient emergency medicine delivery system. As students work through their designs, they review research methods, practice effective presentation skills, and learn project management techniques.

Design of an Effective Emergency Room Lesson Summary

Lesson 1.1	Design of an Effective Emergency Room

Lesson 1.1

In this lesson, students focus on biomedical problems related to clinical care. Hospitals and emergency care centers strive to provide quality care to all who enter, but time is of the essence. Timely patient care can make the difference between life and death. The first mission of the course is to design an emergency department that takes efficient patient care to the next level. Using knowledge they have gleaned in the previous courses regarding emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions, students analyze the workings of an emergency room, discuss inefficiencies, and work with a team to design a more efficient emergency medicine delivery system. As students work through a solution, they also review research techniques and proper documentation of sources, practice presentation skills, and discuss project management.

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Problem 2: Exploring Human Physiology

In this problem, students build upon what they know about the research process to design, conduct, and analyze an experimental study. Students choose a question relating to one or more body systems that they are interested in studying and work with a team to investigate and answer that question. As students work through the experimental process, they review and expand what they know about experimental design, collection of data, statistical analysis of data, and the presentation of data.

Exploring Human Physiology Lesson Summary

Lesson 2.1 Exploring Human Physiology

Lesson 2.1

Whether trying to learn more about the functioning of the human body and the cause of disease, investigating new diagnostic procedures, or testing new or better treatment options, the biomedical sciences rely on scientific research. Scientific research is the systematic method of finding answers to testable questions and making observations for the purpose of learning new facts or testing the application of theories.

In this mission, students learn about the variety of research study designs available and how to set up and conduct valid and reliable studies. Students investigate the various ways in which data can be manipulated, explore what to look for when evaluating data presented by others, critique scientific data presented in popular media, and compare such data with scientific data presented in scientific journals. Students learn one process that scientists use to statistically analyze data and then use this process to analyze the results of a scientific investigation. Finally, students use everything they have learned to design, conduct, and analyze an experimental study relating to one or multiple body systems that they are interested in studying.

Problem 3: Design of a Medical Innovation

In this problem, students review the diseases and disorders, as well as the corresponding medical interventions, they have investigated in the previous courses, and propose a new or better medical device, pharmaceutical, surgical procedure, or genetic intervention. Students work with a team to build a prototype, model, or schematic of the intervention as well as develop a marketing plan for the product. As students work through this problem, they review the design process, complete a literature review, and further practice effective presentation skills.

Design of a Medical Innovation Lesson Summary

Lesson 3.1 Design of a Medical Innovation

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Lesson 3.1
Whether it is creating a product from scratch or improving a current design, biomedical professionals work to create the specialized products that save lives and make patients safer and more comfortable. In this lesson, students work through a design process to create or improve a medical innovation. Students investigate the evolution of various biomedical products, brainstorm ideas for a new biomedical product or for a way to improve an existing product, and evaluate solutions of the past and present. Students explore possible design solutions, select the best approach, and develop a design proposal. Finally, students showcase their designs with a model, prototype, or schematic and create a marketing plan to pitch their product to potential investors.

Problem 4: Investigating Environmental Health

In this problem, students explore how substances or chemicals in the environment impact human health. Students investigate a disease cluster in a fictional family and assess the activities of the individuals for environmental risks. Students test water samples for the presence of contaminants that could be detrimental to human health and use molecular biology techniques to identify specific microorganisms. Students explore the field of toxicology and design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. Students then compile a comprehensive environmental health profile and action plan for their local area.

Investigating Environmental Health Lesson Summary

Lesson 4.1	Investigating Environmental Health

Lesson 4.1
Pollution or contamination in the environment can impact the incidence of disease and affect overall quality of life. In this lesson, students investigate various aspects of environmental health. They are presented with a fictional family who are all showing gastrointestinal symptoms caused by something in their environment. Through this case, students identify environmental health concerns and toxins and identify potential exposures in their own daily lives. Students test a local water sample as well as simulated well water from the case for the presence of coliforms and E. coli. Students then isolate DNA from three different bacterial cultures and perform PCR to detect which bacterial strain present in the water is making the family sick.

Students study the relationship between exposure and illness using a case study involving lead poisoning. They design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. They use their results to produce a dose-response curve and relate this graph to the overall effect of the selected chemical. In the final problem, students compile a comprehensive environmental health profile for their local area. They use publicly available databases, as well as personal contacts and visits, to uncover possible sources of environmental

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contamination in the community and to assess risk and level of exposure to people, wildlife, and environmental resources. Students use their compiled information to design an action plan to increase awareness, monitor resources or individuals in the community, improve conditions, and ensure a clean and safe environment.

Problem 5: Combating a Public Health Issue

In this problem, students draw on information they have learned in the previous courses about public health, epidemiology, and disease diagnosis to work through one of two epidemiology studies. In each study, students analyze data to define the outbreak, generate a hypothesis by diagnosing the patients' symptoms and identifying the disease pathogen, design and analyze an epidemiological study to test the hypothesis, and outline a plan for initiating control and prevention measures. Students then identify a local, national, or global public health crisis and write a mini-grant proposal, based on the National Institutes of Health grant structure, outlining a plan with intervention strategies. As students work through this problem, they review evidence analysis, review the design process and methodology, and analyze study data to evaluate risk.

Combating a Public Health Issue Lesson Summary

Lesson 5.1	Combating a Public Health Issue

Lesson 5.1

Students play the role of epidemiologists, dedicated medical professionals at the heart of the public health field, as they monitor the health of populations and search for patterns in disease. Students investigate one of two mystery illnesses. They evaluate patient diagnostic test results to identify the mystery illness, assess evidence to deduce the source of the illness, design and analyze an epidemiological study to test the proposed source, and plan control and prevention efforts to limit future cases of the mystery illness. In this problem, students investigate major health issues in their local area, across the United States, and around the globe. They evaluate what types of interventions would address these health issues and begin to identify where they feel a comprehensive public health plan would have the greatest impact. The proposed intervention plan should target an infectious disease, a chronic illness, a specific injury or set of injuries, a mental illness, or any other pressing health concern and focus on the treatment, prevention, research, or education efforts surrounding the chosen health issue. Students present the plan in the form of a grant proposal.

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Problem 6: Molecular Biology in Action (Optional)

In this problem, students complete a multi-step, long-term molecular biology experiment. Students design and work through a protocol to construct and clone recombinant DNA. They perform DNA ligation and bacterial transformation, as well as restriction analysis of the completed plasmid. Alternatively, students work through a more in-depth DNA cloning and sequencing project. This laboratory investigation provides students with the opportunity to isolate plant DNA, perform ligation and bacterial transformation, purify a plasmid, submit DNA for sequencing, and present all work to GenBank, the NIH genetic sequence database, for publication. As students work through either of these projects, they learn new laboratory skills, practice laboratory troubleshooting techniques, and review proper protocol for research notebook documentation.

Molecular Biology in Action Lesson Summary

Lesson 6.1	Molecular Biology in Action

Lesson 6.1

In the previous BMS courses, students investigated and practiced many of the laboratory techniques of biotechnology and molecular biology. In this problem, students have a chance to build upon these skills as they complete one of two long-term projects. Both projects allow students to assemble a recombinant plasmid as they ligate, or link, DNA from two different sources. Students then analyze the results of this ligation through both transformation and restriction analysis. The second project, described in Problem 6.1.3, asks students to take the process one step further. They purify the plasmid, sequence the gene of interest, analyze gene data using bioinformatics databases, and submit final work to GenBank, the NIH genetic sequence database, for publication.

Before beginning either wet lab portion of the problem, students review what they have learned about restriction enzymes. They complete preliminary logic puzzles to explore the process of ligation and demonstrate how digestion with restriction enzymes, and subsequent gel electrophoresis of the digestion results, can identify specific ligation products. As students work through either laboratory project, they learn new skills, practice laboratory troubleshooting techniques, and review proper protocol for research notebook documentation.

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Problem 7: Forensic Autopsy (Optional)

In this problem, students work as medical experts to investigate mysterious death cases. First, as forensic pathologists, students examine a fetal pig using the same protocol as a human autopsy. Second, students draw on information they have learned in the previous courses about human body systems to design a fictional death case. Students showcase the clues left behind in the body and tell the story of how the person died through medical documents, including an autopsy report and medical history forms. Students are finally tasked with solving another group's proposed case.

Forensic Autopsy Lesson Summary

Lesson 7.1	Forensic Autopsy

Lesson 7.1

In this lesson, students assume the role of a forensic pathologist to perform an autopsy on a fetal pig, an animal whose anatomy, both internal and external, is very similar to human anatomy. They examine the fetal pig and note any abnormalities using the same protocol as a human autopsy, including examination of the tissues, organs, systems, and body fluids. Students then create a fictitious death scenario and showcase the clues left behind in the body to tell the story of how the fictional person died through an autopsy report, medical history forms, and other documents of their choosing. Student groups then exchange scenarios and are tasked with solving each other's mysteries.

Problem 8: Independent Project (Optional)

In this problem, students work independently to determine an area of interest in the biomedical sciences and work on a long-term open-ended problem. Students use skills learned in the previous courses as well as the previous problems to help them complete their project. Student work includes completing a literature review, writing and carrying out the methodology for their project, analyzing the results, making adjustments as needed, and finally presenting the results of their work to an adult audience. Students may work with mentors or advisors from a university, hospital, physician's office, or industry partner to help guide them as they complete their work.

Independent Project Lesson Summary

Lesson 8.1	Independent Project

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Lesson 8.1

This lesson provides students the opportunity to complete an independent project of their choice. Students are challenged to apply the skills and knowledge they have learned throughout their biomedical science coursework, especially their time and project management skills. Projects could include a series of experiments to answer a question, planning a community event related to biomedical science, prototyping a medical or healthcare device, drawing blueprints for a new hospital or doctor's office design, or completing an internship.

Each project will result in the creation of a product. The choice of project will determine the product. For example, if a student chooses to do a series of experiments, the product could be a laboratory report or a research poster. A student who completes an internship may make a multimedia presentation of the experience. A community event might be the product of a student who wants to inform people about healthy living habits or about a specific illness. Just as the choice of the project is up to you and the student, so is the choice of the product.

Students will review the mission reflections they wrote for the previous lessons, brainstorm topics, and do background research about a topic they choose. They will use their research to write a formal proposal for their project. These will be submitted to you for approval. You and the student will agree on intermediate milestones and products that will be submitted to you. This will allow you to monitor the student's progress on the project. Upon completion of the project, the student will submit a completed product, a written report, and a portfolio, and will present an oral report to a professional audience.

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Course resumes showcase the technical skills students obtain in each PLTW course. Each resume outlines the computational skills, analytical skills, and knowledge acquired in the course. Course Resumes also detail student experience with tools, software, lab work, and engineering design. The detailed skills listed within course resumes illustrate the immediate, applicable contributions that students can make within a workplace.

Laboratory Skills

- Aseptic technique
- Bacterial plating
- Micropipetting
- Restriction enzyme digestion
- DNA gel electrophoresis
- Multiplex Polymerase Chain Reaction (PCR)
- DNA ligation
- Bacterial transformation
- Restriction analysis of plasmids

Equipment and Software Proficiencies

- Microsoft Office (Excel, Word, PowerPoint)
- Vernier probes and sensors
- Data Acquisition Software (Vernier Logger Pro)
- Microscope
- Thermal cycler

Scientific Experimentation Skills

- Design and conduct reliable scientific experiments
- Analyze and interpret laboratory data
- Statistical analysis of data, including t-tests
- Construct graphs (by hand and using graphing software)
- Interpolate and extrapolate data from a graph
- Draw conclusions based on experimental data
- Thoroughly and clearly communicate results and conclusions both orally and in writing

Professional Skills

- Group collaboration
- Planning and organizing
- Time management
- Problem-solving
- Technical writing
- Verbal and written communication
- Decision-making
- Creative thinking

Course Topics

- Homeostasis
- Biomedical science careers
- Design process
- Emergency room efficiency
- Scientific research
- Design and marketing of a medical innovation
- Literature review
- Environmental health and environmental contamination
- Water quality testing
- Dose-response of chemicals or medications
- Epidemiologic studies
- Grant proposals
- Public health planning and policy
- Construction and cloning of recombinant DNA
- Autopsy and determination of cause of death

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PLTW Standards Connection
Biomedical Innovation

Connections to Standards in Biomedical Science

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Biomedical Innovation connects to standards in the following:

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Common Core College and Career Readiness Anchor Standards

Reading

Key Ideas and Details

CCSS.ELA-LITERACY.CCRA.R.1

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.CCRA.R.3

Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [x] Problem 7 [x] Problem 8

Craft and Structure

CCSS.ELA-LITERACY.CCRA.R.4

Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- [x] Problem 1 [x] Problem 2 [ ] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

CCSS.ELA-LITERACY.CCRA.R.5

Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

- [x] Problem 1 [x] Problem 2 [ ] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

CCSS.ELA-LITERACY.CCRA.R.6

Assess how point of view or purpose shapes the content and style of a text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [ ] Problem 4
- [ ] Problem 5 [ ] Problem 6 [ ] Problem 7 [ ] Problem 8

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Common Core College and Career Readiness Anchor Standards

Integration of knowledge and Ideas

CCSS.ELA-LITERACY.CCRA.R.7

Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.CCRA.R.8

Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.R.9

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.CCRA.R.10

Read and comprehend complex literary and informational texts independently and proficiently.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Writing

Text Types and Purposes

CCSS.ELA-LITERACY.CCRA.W.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core College and Career Readiness Anchor Standards

CCSS.ELA-LITERACY.CCRA.W.3

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Production and distribution of Writing

CCSS.ELA-LITERACY.CCRA.W.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.6

Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.CCRA.W.7

Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.CCRA.W.8

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.CCRA.W.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

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Common Core College and Career Readiness Anchor Standards

Range of Writing

CCSS.ELA-LITERACY.CCRA.W.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.CCRA.SL.1

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 1: Academic Foundation: Understand human anatomy, physiology, common diseases and disorders, and medical math principles.

Human Anatomy and Physiology

1.1.1 a

Identify basic levels of organization of the human body
a. Chemical
b. Cellular
c. Tissue
d. Organs
e. Systems
f. Organism

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

Human Anatomy and Physiology - Identify basic structures and describe functions of human body systems.

1.1.2 a

Skeletal

- Structures of the skeletal system
  - Distinguish between axial and appendicular skeletons
  - Describe long bone anatomy
  - Identify joint types and movement
  - Name and classify all bones (206)
- Functions of the skeletal system
  - Structure and support
  - Muscle attachment and movement
  - Mineral storage
  - Hematopoiesis

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 b

Muscular

- Structures of the muscular system
  - Identify types of muscle tissue
  - Identify major muscle groups of neck, shoulder, chest, abdomen, back, arms, and legs
- Functions of the muscular system
  - Body movement
  - Posture
  - Protection

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 c

Integumentary

- Structures of the integumentary system
  - Identify integumentary components
  - Label the layers of skin
- Functions of the integumentary system
  - Vitamin D production
  - Sensory organ
  - Infection protection
  - Temperature regulation
  - UV light protection

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 d

Cardiovascular

- Structures of the cardiovascular system
  - Identify cardiovascular organs
  - Label the parts of the heart
  - Distinguish blood components
- Functions of the cardiovascular system
  - Blood flow through the heart and body
  - Transports nutrients, waste, antibodies, hormones, and gases
  - Cardiac conduction system

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 e

Lymphatic / Immune

- Structures of the lymphatic system
  - Identify lymphatic organs
- Functions of the lymphatic system
  - Provide protection against disease
  - Movement of lymph fluid

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 f

Respiratory

- Structures of the respiratory system
  - Identify respiratory organs
- Functions of the respiratory system
  - Gas exchange

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 g

Structures of the nervous system

- Identify organs of the nervous system
- Identify structures of the special sense organs

- Functions of the nervous system
  - Sensation
  - Movement
  - Processing

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 h

Endocrine

- Structures of the endocrine system
  - Identify endocrine glands
- Functions of the endocrine system
  - Production of hormones
  - Regulation of body processes
  - Controls metabolism
  - Regulates growth, development, and maturation

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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1.1.2 i

Digestive

- Structures of the digestive system
  - Identify digestive organs in sequence
  - Differentiate between alimentary and accessory organs
- Functions of the digestive system
  - Chemical and mechanical digestion
  - Absorption of nutrients
  - Excretion of waste

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 j

Urinary

- Structures of the urinary system
  - Identify urinary organs
  - Identify gross and microscopic anatomy of the kidney
- Functions of the urinary system
  - Process of urine formation
  - Urine composition
  - Homeostatic balance

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

1.1.2 k

Reproductive

- Structures of the reproductive system
  - Identify female reproductive organs
  - Identify male reproductive organs
- Functions of the reproductive system
  - Formation of gametes
  - Production of hormones

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☑ Problem 7 ☐ Problem 8

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National Consortium for Health Science Education

Diseases and Disorders

1.2.2

Describe biomedical therapies as they relate to the prevention, pathology, and treatment of disease.

- Gene testing
- Gene therapy
- Cloning
- Stem cell research

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Medical Mathematics - Demonstrate competency using basic math skills and mathematical conversions as they relate to healthcare.

1.3.1

Metric system

- Kilo-
- Centi-
- Deci-
- Milli-
- Micro-

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

1.3.1 b

Mathematical

- Average
- Ratios
- Fractions
- Percentages
- Addition / Subtraction
- Multiplication / Division

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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1.3.1 c

Conversions

- Height (inches/meters)
- Weight/mass (pounds/grams)
- Length (inches/meters)
- Volume (ml/cc)
- Temperature (F/C)
- Household measurements (Tbsp/tsp/cup/oz)

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Medical Mathematics

1.3.2

Demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 2: Communications Demonstrate methods of delivering and obtaining information, while communicating effectively.

Concepts of Effective Communication

2.1.1

Model verbal and nonverbal therapeutic communication.

- Active listening
- Silence
- Summarizing
- Reflecting

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Concepts of Effective Communication

2.1.3

Distinguish between subjective and objective information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

2.1.5

Modify communication to meet the needs of the patient/client and be appropriate to the situation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Written Communication Skills

2.3.1

Use proper elements of written and electronic communication (spelling, grammar, and formatting).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

2.3.2

Prepare examples of technical and informative writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 4: Employability Skills Use employability skills to enhance employment opportunities and job satisfaction.

Employability Skills

4.2.1

Apply employability skills in healthcare.
- Chain of command
- Communication Skills
- Decision making
- Flexible
- Organization
- Problem Solving
- Scope of practice
- Time Management
- Work Ethic

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Employability Preparation

4.4.1

Develop components of a personal portfolio.
- Letter of introduction
- Resume
- Sample Projects
- Writing Sample
- Work-based Learning Documentation
- Oral Report
- Community Service / Service Learning
- Credentials
- Technology Skills
- Leadership Examples

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Foundation Standard 7: Safety Practices Identify existing and potential hazards to clients, co-workers, and self. Employ safe work practices and follow health and safety policies and procedures to prevent injury and illness.

Infection Control - Explain principles of infection transmission.

7.1.1 a

Identify classifications of pathogens
• Bacteria
• Fungi
• Parasites
• Protozoa
• Viruses

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 b

Describe characteristics of microorganisms
• Aerobic
• Anaerobic
• Non-pathogenic
• Pathogenic

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 c

Recognize chain of infection

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.1 d

Describe mode of transmission
• Common vehicle (air, food, water)
• Direct
• Healthcare-associated infections (nosocomial)
• Indirect
• Opportunistic
• Vectors

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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National Consortium for Health Science Education

Infection Control - Differentiate methods of controlling the spread and growth of pathogens.

7.1.2 a

Asepsis
• Sanitization
• Antisepsis
• Disinfection
• Sterile technique
• Sterilization

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 b

Standard precautions
• Handwashing
• Gloving
• Personal Protective Equipment (PPE)
• Environmental cleaning

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 c

Isolation precautions
• Transmission-based contact

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 d

Bloodborne pathogen precautions

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.1.2 e

Vaccinations

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Personal Safety

7.2.1

Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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7.2.2

Demonstrate principles of body mechanics during patient care.
• Ambulating
• Lifting
• Positioning

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

7.2.3

Demonstrate and apply the use of personal protective equipment (PPE).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.3.1

Apply safety techniques in the work environment.
• Ergonomics
• Safe operation of equipment
• Patient/client/employee safety measures

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Common Safety Hazards

7.4.1

Observe all safety standards related to the occupational exposure to hazardous chemicals standard (safety data sheets [SDS]).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

7.4.2

Comply with safety signs, symbols, and labels.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 8: Teamwork Identify roles and responsibilities of individual members as part of the healthcare team.

Healthcare Teams

8.1.2

Identify characteristics of effective teams.
• Defined roles
• Common purpose
• Effective communication
• Effective leadership
• Measurable processes and outcomes
• Mutual respect
• Shared goals

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation

8.2.1

Recognize methods for building positive team relationships.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation - Analyze attributes and attitudes of an effective leader.

8.2.2 a

Characteristics
• Focused and driven
• Interpersonal skills
• Motivates and inspires
• Organized and balanced

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

8.2.2 b

Types
• Autocratic
• Democratic
• Laissez faire

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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8.2.2 c

Roles
• Communicates vision
• Leads change
• Manages accountability

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Team Member Participation

8.2.3

Apply effective techniques for managing team conflict.
• Communicate assertively
• Set clear expectations
• Gather the facts
• Mediate disputes
• Negotiate resolutions

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Foundation Standard 9: Health Maintenance Practices
Differentiate between wellness and disease. Promote disease prevention and model healthy behaviors.

Healthy Behaviors

9.1.1

Promote behaviors of health and wellness.
• Exercise
• Nutrition
• Relationships
• Sleep habits
• Stress management
• Weight control

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

9.1.3

Describe strategies for prevention of disease.
• Community health education outreach programs
• Immunizations
• Medical, dental, and mental health screenings
• Routine physical exams
• Stress management

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Foundation Standard 10: Technical Skills
Apply and demonstrate technical skills and knowledge common to health career specialties.

Technical Skills

10.1.1

Demonstrate procedures for measuring and recording vital signs including the normal ranges.
• Blood pressure
• Temperature
• Oxygen saturation
• Pain
• Pulse
• Respirations

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core State Standards for Mathematics

Interpreting Functions

Analyze Functions Using Different Representations

CCSS.MATH.CONTENT.HSF.IF.C.7

Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.7.A

Graph linear and quadratic functions and show intercepts, maxima, and minima.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.7.B

Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.8

Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.8.A

Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSF.IF.C.9

Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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Common Core State Standards for Mathematics

Building Functions

Build a Function That Models a Relationship Between Two Quantities

CCSS.MATH.CONTENT.HSF.BF.A.1

Write a function that describes a relationship between two quantities.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Linear, Quadratic, and Exponential Models

Construct and Compare Linear, Quadratic, and Exponential Models and Solve Problems

CCSS.MATH.CONTENT.HSF.LE.A.2

Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Expressing Geometric Properties with Equations

Use Coordinates to Prove Simple Geometric Theorems Algebraically

CCSS.MATH.CONTENT.HSG.GPE.B.6

Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Modeling with Geometry

Apply Geometric Concepts in Modeling Situations

CCSS.MATH.CONTENT.HSG.MG.A.3

Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Interpreting Categorical and Quantitative Data

Summarize, Represent, and Interpret Data on a Single Count or Measurement Variable

CCSS.MATH.CONTENT.HSS.ID.A.1

Represent data with plots on the real number line (dot plots, histograms, and box plots).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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CCSS.MATH.CONTENT.HSS.ID.A.2

Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.ID.A.4

Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Interpret Linear Models

CCSS.MATH.CONTENT.HSS.ID.C.8

Compute (using technology) and interpret the correlation coefficient of a linear fit.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.ID.C.9

Distinguish between correlation and causation.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

Making Inferences and Justifying Conclusions

Make inferences and Justify Conclusions From Sample Surveys, Experiments, and Observational Studies

CCSS.MATH.CONTENT.HSS.IC.B.3

Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.MATH.CONTENT.HSS.IC.B.6

Evaluate reports based on data.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

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Using Probability to Make Decisions

Use Probability to Evaluate Outcomes of Decisions

CCSS.MATH.CONTENT.HSS.MD.B.7

(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Common Core State Standards for English Language Arts

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.9-10.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RL.9-10.2

Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.9-10.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.A

Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.C

Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.9-10.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Range of Writing

CCSS.ELA-LITERACY.W.9-10.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.9-10.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.1.B

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.2.C

Spell correctly.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Knowledge of Language

CCSS.ELA-LITERACY.L.9-10.3

Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.3.A

Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.9-10.4.A

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.9-10.4.D

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.9-10.1

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.9-10.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Craft and Structure

CCSS.ELA-LITERACY.RH.9-10.4

Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.9-10.7

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.9-10.9

Compare and contrast treatments of the same topic in several primary and secondary sources.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.9-10.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.2

Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☑ Problem 7 ☐ Problem 8

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Common Core State Standards for English Language Arts

Craft and Structure

CCSS.ELA-LITERACY.RST.9-10.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.RST.9-10.5

Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.6

Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.9-10.7

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

CCSS.ELA-LITERACY.RST.9-10.8

Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RST.9-10.9

Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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Common Core State Standards for English Language Arts

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.9-10.1

Write arguments focused on discipline-specific content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.A

Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.B

Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.C

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.9-10.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.A

Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.B

Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.D

Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.9-10.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.9-10.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.9-10.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.9-10.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading Informational Text

Key Ideas and Details

CCSS.ELA-LITERACY.RI.11-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.11-12.7

Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Writing

Text Types and Purpose

CCSS.ELA-LITERACY.W.11-12.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.1.E

Provide a concluding statement or section that follows from and supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2

Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.A

Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.W.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.C

Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.W.11-12.2.E

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.11-12.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.11-12.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.L.11-12.2.B

Spell correctly.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.11-12.6

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Reading History/Social Studies

Key Ideas and Details

CCSS.ELA-LITERACY.RH.11-12.1

Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.8

Evaluate an author’s premises, claims, and evidence by corroborating or challenging them with other information.

☑ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.RH.11-12.9

Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Reading Science and Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.2

Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.3

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [x] Problem 6 [x] Problem 7 [x] Problem 8

Craft and Structure

CCSS.ELA-LITERACY.RST.11-12.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

- [ ] Problem 1 [x] Problem 2 [x] Problem 3 [ ] Problem 4
- [ ] Problem 5 [x] Problem 6 [ ] Problem 7 [x] Problem 8

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [ ] Problem 6 [ ] Problem 7 [x] Problem 8

CCSS.ELA-LITERACY.RST.11-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

- [x] Problem 1 [x] Problem 2 [x] Problem 3 [x] Problem 4
- [x] Problem 5 [x] Problem 6 [x] Problem 7 [x] Problem 8

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CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.11-12.10

By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Writing History/Social Studies, Science, and Technical

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.11-12.1

Write arguments focused on discipline-specific content.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.A

Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.B

Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.C

Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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CCSS.ELA-LITERACY.WHST.11-12.1.D

Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.1.E

Provide a concluding statement or section that follows from or supports the argument presented.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.A

Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.B

Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.C

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.2.E

Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.11-12.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.6

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.WHST.11-12.7

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.8

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

CCSS.ELA-LITERACY.WHST.11-12.9

Draw evidence from informational texts to support analysis, reflection, and research.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Range of Writing

CCSS.ELA-LITERACY.WHST.11-12.10

Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

- [x] Problem 1
- [x] Problem 2
- [x] Problem 3
- [x] Problem 4
- [x] Problem 5
- [ ] Problem 6
- [ ] Problem 7
- [x] Problem 8

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Next Generation Science Standards

Ecosystems: Interactions, Energy, and Dynamics

HS.LS2.7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Biological Evolution: Unity and Diversity

HS.LS4.6

Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Earth and Human Activity

HS.ESS3.1

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

HS.ESS3.4

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Engineering Design

HS.ETS1.1

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

HS.ETS1.2

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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Next Generation Science Standards

HS.ETS1.3

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Disciplinary core ideas

ETS1.A Engineering Design - Defining and Delimiting Engineering Problems

• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

• Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)

☐ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

ETS1.B Engineering Design - Developing Possible Solutions

• When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

• Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS1-6)

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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Next Generation Science Standards

LS2.A Ecosystems: Interactions, Energy, and Dynamics - Interdependent Relationships in Ecosystems

• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HSLS2-2)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

LS3.B Heredity: Inheritance and Variation of Traits - Variation of Traits

• Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

LS4.C Biological Evolution: Unity and Diversity - Adaptation

• Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5), (HS-LS4-6)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

ESS2.D Earth's Systems - Weather and Climate

• Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HSESS3-6)

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Science and Engineering Practice

Practice 1 - Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

• Evaluate a question to determine if it is testable and relevant.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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Next Generation Science Standards

• Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of a design.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical, and/or environmental considerations.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 2 Developing and Using Models
Modeling in 9-12 builds on K-8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

• Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Design a test of a model to ascertain its reliability.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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- Develop a complex model that allows for manipulation and testing of a proposed process or system.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 3 Planning and Carrying Out Investigations
Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.

- Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

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Practice 4 Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

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Practice 5 Using Mathematics and Computational Thinking
Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Practice 6 Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

- Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

Practice 7 Engaging in Argument from Evidence

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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• Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence, challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining additional information required to resolve contradictions.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☑ Problem 6 ☑ Problem 7 ☑ Problem 8

• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge and student-generated evidence.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Practice 8 Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9-12 builds on K-8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

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- Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible. Communicate scientific and/or technical information or ideas (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4
☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Crosscutting Concepts

Patterns

- Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system.

☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☑ Problem 4
☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Mathematical representations are needed to identify some patterns.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Empirical evidence is needed to identify patterns.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

Cause and Effect: Mechanism and Prediction

- Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☑ Problem 4
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- Systems can be designed to cause a desired effect.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- Changes in systems may have various causes that may not have equal effects.

☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Scale, Proportion, and Quantity

- In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4

☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Patterns observable at one scale may not be observable or exist at other scales.

☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Systems and System Models

- A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4

☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

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- Systems can be designed to do specific tasks.
  - ☑ Problem 1 ☑ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

- When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.
  - ☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.
  - ☑ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.
  - ☐ Problem 1 ☑ Problem 2 ☐ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

Structure and Function

- The way an object is shaped or structured determines many of its properties and functions.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☐ Problem 8

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8

Stability and Change

- For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.
  - ☑ Problem 1 ☐ Problem 2 ☑ Problem 3 ☐ Problem 4
  - ☐ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

- Much of science deals with constructing explanations of how things change and how they remain stable.
  - ☐ Problem 1 ☑ Problem 2 ☑ Problem 3 ☑ Problem 4
  - ☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☑ Problem 8

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- Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.
  - ☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
  - ☑ Problem 5 ☐ Problem 6 ☐ Problem 7 ☑ Problem 8
- Systems can be designed for greater or lesser stability.
  - ☐ Problem 1 ☐ Problem 2 ☐ Problem 3 ☑ Problem 4
  - ☑ Problem 5 ☑ Problem 6 ☐ Problem 7 ☐ Problem 8

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INCLUDES

- Course framework
- Sample exam questions
- Scoring guidelines

AP® Cybersecurity

COURSE AND EXAM DESCRIPTION

Effective
Fall 2026

AP® Career Kickstart™
AP courses that build professional career skills

AP® Cybersecurity

COURSE AND EXAM DESCRIPTION

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What AP® Stands For

Thousands of Advanced Placement teachers have contributed to the principles articulated here. These principles are not new; they are, rather, a reminder of how AP already works in classrooms nationwide. The following principles are designed to ensure that teachers' expertise is respected, required course content is understood, and that students are academically challenged and free to make up their own minds.

1. AP stands for clarity and transparency. Teachers and students deserve clear expectations. The Advanced Placement Program makes public its course frameworks and sample assessments. Confusion about what is permitted in the classroom disrupts teachers and students as they navigate demanding work.
2. AP is an unflinching encounter with evidence. AP courses enable students to develop as independent thinkers and to draw their own conclusions. Evidence and the scientific method are the starting place for conversations in AP courses.
3. AP opposes censorship. AP is animated by a deep respect for the intellectual freedom of teachers and students alike. If a school bans required topics from their AP courses, the AP Program removes the AP designation from that course and its inclusion in the AP Course Ledger provided to colleges and universities. For example, the concepts of evolution are at the heart of college biology, and a course that neglects such concepts does not pass muster as AP Biology.
4. AP opposes indoctrination. AP students are expected to analyze different perspectives from their own, and no points on the AP Exam are awarded for agreement with any specific viewpoint. AP students are not required to feel certain ways about themselves or the course content. AP courses instead develop students' abilities to assess the credibility of sources, draw conclusions, and make up their own minds.

   As the AP English Literature course description states: "AP students are not expected or asked to subscribe to any one specific set of cultural or political values, but are expected to have the maturity to analyze perspectives different from their own and to question the meaning, purpose, or effect of such content within the literary work as a whole."
5. AP courses foster an open-minded approach to the histories and cultures of different peoples. The study of different nationalities, cultures, religions, races, and ethnicities is essential within a variety of academic disciplines. AP courses ground such studies in primary sources so that students can evaluate experiences and evidence for themselves.
6. Every AP student who engages with evidence is listened to and respected. Students are encouraged to evaluate arguments but not one another. AP classrooms respect diversity in backgrounds, experiences, and viewpoints. The perspectives and contributions of the full range of AP students are sought and considered. Respectful debate of ideas is cultivated and protected; personal attacks have no place in AP.
7. AP is a choice for parents and students. Parents and students freely choose to enroll in AP courses. Course descriptions are available online for parents and students to inform their choice. Parents do not define which college-level topics are suitable within AP courses; AP course and exam materials are crafted by committees of professors and other expert educators in each field. AP courses and exams are then further validated by the American Council on Education and studies that confirm the use of AP scores for college credits by thousands of colleges and universities nationwide.

The AP Program encourages educators to review these principles with parents and students so they know what to expect in an AP course. Advanced Placement is always a choice, and it should be an informed one. AP teachers should be given the confidence and clarity that once parents have enrolled their child in an AP course, they have agreed to a classroom experience that embodies these principles.

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About AP

The Advanced Placement® Program (AP®) enables willing and academically prepared students to pursue college-level studies—with the opportunity to earn college credit, advanced placement, or both—while still in high school. Through AP courses in more than 40 subjects, each culminating in a challenging exam, students learn to think critically, construct solid arguments, and see many sides of an issue—skills that prepare them for college and beyond. Taking AP courses demonstrates to college admission officers that students have sought the most challenging curriculum available to them, and research indicates that students who score a 3 or higher on an AP Exam typically experience greater academic success in college and are more likely to earn a college degree than non-AP students. Each AP teacher's syllabus is evaluated and approved by faculty from some of the nation's leading colleges and universities, and AP Exams are developed and scored by college faculty and experienced AP teachers. Most four-year colleges and universities in the United States grant credit, advanced placement, or both on the basis of successful AP Exam scores—more than 3,300 institutions worldwide annually receive AP scores.

AP Course Development

In an ongoing effort to maintain alignment with best practices in college-level learning, AP courses and exams emphasize challenging, research-based curricula aligned with higher education expectations.

Individual teachers are responsible for designing their own curriculum for AP courses, selecting appropriate college-level readings, assignments, and resources. This course and exam description presents the content and skills that are the focus of the corresponding college course and that appear on the AP Exam. It also organizes the content and skills into a series of units that represent a sequence found in widely adopted college textbooks and that many AP teachers have told us they follow in order to focus their instruction. The intention of this publication is to respect teachers' time and expertise by providing a roadmap that they can modify and adapt to their local priorities and preferences.

Enrolling Students: Access, Opportunity, and Readiness

The AP Program welcomes all students willing to challenge themselves with college-level coursework and career preparation. We strongly encourage educators to invite students into AP classes, including students from ethnic, racial, socioeconomic, geographic, or other groups not broadly participating in a school's AP program. We believe that readiness for AP is attainable, and that educators can expand readiness by opening access to Pre-AP course work. We commit to support educators and communities in their efforts to make AP courses widely available, advancing students in their plans for college and careers.

Offering AP Courses: The AP Course Audit

The AP Program unequivocally supports the principle that each school implements its own curriculum that will enable students to develop the content understandings and skills described in the course framework.

While the unit sequence represented in this publication is optional, the AP Program does have a short list of curricular and resource requirements that must be fulfilled before a school can label a course "Advanced Placement" or "AP." Schools wishing to offer AP courses must participate in the AP Course Audit, a process through which AP teachers' course materials are reviewed by college faculty. The AP Course Audit was created to provide teachers and administrators with clear guidelines on curricular and resource requirements for AP courses and to help colleges and universities validate courses marked "AP" on students' transcripts. This process ensures that AP teachers' courses meet or exceed the curricular and resource expectations that college and secondary school faculty have established for college-level courses.

The AP Course Audit form is submitted by the AP teacher and the school principal (or designated administrator) to confirm awareness and understanding of the curricular and resource requirements. A syllabus or course outline, detailing how course requirements are met, is submitted by the AP teacher for review by college faculty.

Please visit the **AP Course Audit** website for more information to support the preparation and submission of materials for the AP Course Audit.

How the AP Program Is Developed

The scope of content for an AP course and exam is derived from an analysis of hundreds of syllabi and course offerings of colleges and universities. Using this research and data, a committee of college faculty and expert AP teachers work within the scope of the corresponding college course to articulate what students should know and be able to do upon the completion of the AP course. The resulting course framework is the heart of this course and exam description and serves as a blueprint of the content and skills that can appear on an AP Exam.

The AP Test Development Committees are responsible for developing each AP Exam, ensuring the exam questions are aligned to the course framework. The AP Exam development process is a multiyear endeavor; all AP Exams undergo extensive review, revision, piloting, and analysis to ensure that questions are accurate, fair, and valid, and that there is an appropriate spread of difficulty across the questions.

Committee members are selected to represent a variety of perspectives and institutions (public and private, small and large schools and colleges), and a range of gender, racial/ethnic, and regional groups. A list of contributors for each subject is available on **AP Central®**.

Throughout AP course and exam development, College Board gathers feedback from various stakeholders in both secondary schools and higher education institutions. This feedback is carefully considered to ensure that AP courses and exams are able to provide students with a college-level learning experience and the opportunity to demonstrate their qualifications for advanced placement and/or college credit.

How AP Exams Are Scored

The exam scoring process, like the course and exam development process, relies on the expertise of both AP teachers and college faculty. While multiple-choice questions are scored by machine, the free-response questions and through-course performance assessments, as applicable, are scored by thousands of college faculty and expert AP teachers. Most are scored at the annual AP Reading, while a small portion is scored online. All AP Readers are thoroughly trained, and their work is monitored throughout the Reading for fairness and consistency. In each subject, a highly respected college faculty

member serves as Chief Faculty Consultant and, with the help of AP Readers in leadership positions, maintains the accuracy of the scoring standards. Scores on the free-response questions and performance assessments are weighted and combined with the results of the computer-scored multiple-choice questions, and this raw score is converted into a composite AP score on a 1–5 scale.

AP Exams are **not** norm referenced or graded on a curve. Instead, they are criterion-referenced, which means that every student who meets the criteria for an AP score of 2, 3, 4, or 5 will receive that score, no matter how many students that is. The criteria for the number of points a student must earn on the AP Exam to receive scores of 3, 4, or 5—the scores that research consistently validates for credit and placement purposes—include:

- The number of points successful college students earn when their professors administer AP Exam questions to them.
- Performance that researchers have found to be predictive of an AP student succeeding when placed into a subsequent higher-level college course.
- The number of points college faculty indicate, after reviewing each AP question, that they expect is necessary to achieve each AP grade level.

Using and Interpreting AP Scores

The extensive work done by college faculty and AP teachers in the development of the course and exam and throughout the scoring process ensures that AP Exam scores accurately represent students' achievement in the equivalent college course. Frequent and regular research studies establish the validity of AP scores as follows:

AP Score	Credit Recommendation	College Grade Equivalent
5	Extremely well qualified	A
4	Well qualified	A-, B+, B
3	Qualified	B-, C+, C
2	Possibly qualified	n/a
1	No recommendation	n/a

While colleges and universities are responsible for setting their own credit and placement policies, most private colleges and universities award credit and/or advanced placement for AP scores of 3 or higher. Additionally, most states in the U.S. have adopted statewide credit policies that ensure college credit for scores of 3 or higher at public colleges and universities. To confirm a specific college's AP credit/ placement policy, use the search engine available on the **AP Credit Policy Search** page.

BECOMING AN AP READER

Each June, thousands of AP teachers and college faculty members from around the world gather for seven days in multiple locations to evaluate and score the free-response sections of the AP Exams. Ninety-eight percent of surveyed educators who took part in the AP Reading say it was a positive experience.

There are many reasons to consider becoming an AP Reader, including opportunities to:

- **Bring positive changes to the classroom:** Surveys show that the vast majority of returning AP Readers—both high school and college educators—

make improvements to the way they teach or score because of their experience at the AP Reading.

- **Gain in-depth understanding of AP Exam and AP scoring standards:** AP Readers gain exposure to the quality and depth of the responses from the entire pool of AP Exam takers and thus are better able to assess their students' work in the classroom.
- **Receive compensation:** AP Readers are compensated for their work during the Reading. Expenses, lodging, and meals are covered for Readers who travel.
- **Score from home:** AP Readers have online distributed scoring opportunities for certain subjects. Check the **AP Reader** site for details.
- **Earn Continuing Education Units (CEUs):** AP Readers earn professional development hours and CEUs that can be applied to PD requirements by states, districts, and schools.

HOW TO APPLY

Visit the **Become an AP Reader** site for eligibility requirements and to start the application process.

About AP Career Kickstart

AP Career Kickstart courses provide high schools a new set of AP offerings that prepare students for high-skill, high-growth careers through:

- Instruction in both technical and professional skills
- Emphasis on hands-on learning grounded in authentic scenarios
- Alignment to career and technical education (CTE) and industry standards
- Opportunity to earn an employer-endorsed credential upon achieving a qualifying exam score

Students often recognize the benefits of career exploration while they are still in high school, but many lack access to quality career-focused programs that lead to in-demand jobs. With a proven record of delivering high-quality educational opportunities at scale, the Advanced Placement Program is building AP Career Kickstart courses to ensure nationwide access to outstanding career education that today is only available in some communities.

How AP Career Kickstart Courses Are Developed

Every AP course is designed—and regularly updated—to include current data, evidence, and findings in each discipline. AP courses include the content and skills most frequently taught in introductory college courses, so that students who earn qualifying scores on AP Exams can be placed into upper-division college courses with a strong foundation for success.

AP Career Kickstart courses are built in partnership with industry advisors, higher education faculty, high school educators, and career and technical education (CTE) leaders. These advisors are engaged to evaluate research; recommend course skills, scope, and sequence; and review the course framework and the AP Exam.

Credit and Placement

The AP Program engages faculty from colleges and universities to ensure that AP Career Kickstart courses reflect the academic rigor of introductory college courses in the discipline. Students with qualifying AP Exam scores can earn credit or placement in required or elective courses at colleges and universities.

Credentials and Industry Recognition

The AP Program partners with industry leaders to ensure the course skills align with employer demand for core requirements in high-growth, high-demand jobs. Along with the potential to earn college credit, students with qualifying scores on the AP Exam will earn the AP Career Kickstart Employer-Endorsed Credential. Created in partnership with industry experts, AP Career Kickstart Credentials accelerate students' progress toward in-demand careers and align with the needs of employers, college-level coursework, and secondary CTE programs.

Students can leverage AP Career Kickstart Credentials in their efforts to further their postgraduation plans.

- For students who are considering moving directly to employment after graduation, AP Career Kickstart Credentials can support their applications to internships, apprenticeships, and part- and full-time employment.
- For students who plan to go on to higher education after graduation, two-year and four-year colleges use AP Exam scores to award credit and facilitate placement into associated programs of study.
- Students can list their AP Career Kickstart Credentials on résumés and post them to career-oriented social media platforms.
- After earning AP Career Kickstart Credentials, students are well positioned to earn "stackable" postsecondary and employer-endorsed credentials throughout their education and professional development.

AP Resources and Supports

By completing a simple activation process at the start of the school year, teachers and students receive access to a robust set of classroom resources.

AP Classroom

AP Classroom is a dedicated online platform designed to support teachers and students throughout their AP experience. The platform provides a variety of powerful resources and tools to provide yearlong support to teachers, offering opportunities to give and get meaningful feedback on student progress.

UNIT GUIDES

Appearing in this publication and on AP Classroom, these planning guides outline all required course content and skills, organized into commonly taught units. Each unit guide suggests a sequence and pacing of content, scaffolds skill instruction across units, organizes content into topics, and provides tips on taking the AP Exam.

LESSON PLANS

Lesson Plans provided by the AP Program are designed to facilitate strong, relevant classroom learning experiences. They give teachers concrete, hands-on lessons that connect learning to authentic, professionally relevant experiences and help students build practical skills while engaging with course content. They serve as professional learning tools to support educator growth and as classroom-ready exemplars that demonstrate relevant, engaging, and standards-aligned instruction.

PROFESSIONAL SKILLS

Professional skills are best developed through meaningful, collaborative work in which students take ownership, solve authentic problems, and practice communication, teamwork, and critical thinking. These skills prepare students to work effectively with others and adapt to real workplace challenges.

PRACTICE TESTS

Full-length practice tests are available on AP Classroom. Full-length practice tests are timed like real tests, except you can move forward from one section to the next before time expires. Students who test with accommodations can select their accommodation when setting up the practice test to see how it will work on test day. Full-length practice tests are scored. After students complete a practice test in Bluebook, their scores will be available on the My Practice section of AP Classroom.

REPORTS

Reports provides teachers with a one-stop shop for student results on practice tests. Teachers can view class trends and see where students struggle with content and skills that will be assessed on the AP Exam. Students can view their own progress over time to improve their performance before the AP Exam.

CLASS SECTION SETUP AND ENROLLMENT

- Teachers and students sign into or create their College Board accounts.
- Teachers confirm that they have added the course they teach to their AP Course Audit account and have had it approved by their school's administrator.
- Teachers or AP coordinators, depending on who the school has decided is responsible, set up class sections so students can access AP resources and have exams ordered on their behalf.
- Students join class sections with a join code provided by their teacher or AP coordinator.
- Students will be asked for additional information upon joining their first class section.

Instructional Model

Integrating AP resources throughout the course can help students develop skills and conceptual understandings. The instructional model outlined below shows possible ways to incorporate AP resources into the classroom.

Plan

Teachers may consider the following approaches as they plan their instruction before teaching each unit.

- Review the overview at the start of each **unit guide** to identify skills and conceptual understanding for each unit.
- Use the **Unit at a Glance** table to identify related topics that build toward a common understanding and then plan appropriate pacing for students.

Teach

When teaching, supporting resources could be used to build students' conceptual understanding and mastery of skills.

- Use the topic pages in the **unit guides** to identify the required content.
- Integrate the content with a skill, considering any appropriate scaffolding.
- Use the available resources, including **unit scenarios**, to bring a variety of authentic experiences into the classroom.

Assess

Teachers can measure student understanding of the content and skills explored in the unit and provide actionable feedback to students.

- Within each lesson, offer brief, formative assessments to check student understand and inform your next instructional move.
- After teaching each topic, offer a formative assessment to check student understanding and provide just-in-time feedback.
- At the end of each unit, create additional practice opportunities that will provide feedback to students on areas where they need to focus.

About the AP Cybersecurity Course

AP Cybersecurity trains students in the field and aligns closely with standard first-year collegiate cybersecurity courses. Students explore defense-in-depth strategies and learn to address specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, applications, and data. Developed in partnership with college faculty and industry leaders, this yearlong course aligns with the NICE Workforce Framework.

AP Career Kickstart, a Group of AP Courses

The "Career Kickstart" designation is awarded to AP courses developed not just with colleges to qualify high school students for college credit but also with industry leaders and employers to equip students with the skills needed for specific careers.

College Course Equivalent

The AP Cybersecurity course is designed to be the equivalent of a one-semester college introduction to cybersecurity course.

Prerequisites

There are no specific course prerequisites for AP Cybersecurity. Students should be motivated and willing to work both individually and in teams on college-level projects. AP Cybersecurity is designed to serve as a foundational course that aligns with multiple Programs of Study within Career and Technical Education (CTE) Digital Technology Pathways.

Legal and Professional Norms for the Practice of Cybersecurity

By its nature, cybersecurity relates to the storage, processing, and transmission of sensitive data (e.g., proprietary corporate data, financial data, health care data, educational data). To fulfill their responsibilities, cybersecurity professionals frequently have elevated permissions on devices and access to sensitive data. For this reason, there are norms for the practice of cybersecurity that guide cyber professionals in using their permission, access, and tools to secure and protect systems, data, organizations, and individuals.

Instructors should share and review with students examples of norms from professional cybersecurity organizations (e.g., ISC2) and governmental organizations (e.g., the UK Cyber Security Council) so students understand why these norms exist as well as the importance of following them.

In addition to professional norms, many types of data and sectors of industry are regulated by laws. Specific legal requirements vary by country, but the United States, United Kingdom, and European Union have laws relating to collecting, storing, processing, and transmitting data:

- Personally identifiable information (PII) (including biometric data like voice recordings, fingerprints, and face scans)

- Protected health information (PHI)
- Student education records
- Financial records and transactions

The security of some types of data is mandated by industry regulation. For example, the security of credit card payment data is regulated by the Payment Card Industry Data Security Standard (PCI DSS).

Instructors are expected to introduce students to these laws, industry-specific regulations, and professional norms throughout the duration of the course, integrating them into appropriate topics.

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AP CYBERSECURITY



Course Framework

Introduction

AP Cybersecurity is a broad introduction to the field of cybersecurity that aligns closely with a standard first-year college introductory cybersecurity course. Students learn about common threats and vulnerabilities and how those combine to create risk. Students study the ways that individuals and organizations manage risk and how risk can be mitigated through a defense-in-depth strategy. Students explore specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, and data and applications. Throughout the course, students consider the impact of cybersecurity on individuals, organizations, societies, and governments.

Unit scenarios for each unit in the cybersecurity framework offer authentic cybersecurity situations and are designed to connect the knowledge and skills students gain in each unit to relevant, real-world applications. The scenarios in Unit 1 are relevant to personal security in everyday life, while the scenarios in Units 2–5 are derived from common tasks employees perform in cybersecurity jobs. Each scenario is paired with relevant student activities. The scenarios were developed in partnership with teachers from the AP community to share ways that they approach teaching some of the topics in each unit. These scenarios are offered to support hands-on, career-connected instruction. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

Each unit includes between one and five scenarios that highlight professional career situations that require the use of the skills and course content within that unit. Each scenario is aligned with the topics and learning objectives for that unit. For units with multiple scenarios, each one can be used independently, providing teachers with multiple instructional options: using one or more scenarios with all students or dividing the scenarios across different students within the class.

Course Framework Components

Overview

This course framework provides a clear and detailed description of the course requirements necessary for student success. The framework specifies what students must know, be able to do, and understand to qualify for college credit and/or placement.

The course framework includes two essential components:

(1) COURSE SKILLS

Cybersecurity skills, including collaboration, are critical to the deep understanding and application of cybersecurity knowledge and practice. Students should develop and use these skills throughout the course.

(2) COURSE CONTENT

The course content is organized into units that reflect key domains of cybersecurity knowledge and practice. These units comprise the content and skills colleges and universities typically expect students to be proficient in to qualify for college credit and/or placement. Units 1–5 introduce students to security and present knowledge and skills needed to secure spaces, secure networks, secure devices, and secure applications and data.

Cybersecurity Skills

	Skill Category 1	Skill Category 2	Skill Category 3	Skill Category 4
	Analyze Risk Evaluate risk to organizational assets.	**Mitigate Risk** Implement protective and deterrent security controls.	**Detect Attacks** Implement detection methods, monitor systems, and analyze evidence.	**Collaborate** Work with others and AI to accomplish a task.
Communicating concepts Explain key cybersecurity concepts.	1.A Identify, with and without the support of AI, vulnerabilities, threats, and attack methods, and explain how they generate risk.	2.A Identify security controls, and explain how they mitigate risks.	3.A Identify methods for monitoring systems, and explain how they detect attacks.	4.A Develop clear, shared team objectives related to a cybersecurity task.
Investigating problems Explore the parameters of a problem to plan for solutions.	1.B Determine ways adversaries exploit vulnerabilities to compromise an asset.	2.B Determine layered security controls that address vulnerabilities.	3.B Determine strategies and methods to detect attacks.	4.B Determine clear roles and responsibilities for members of a team working to accomplish a cybersecurity task.
Assessing impacts Evaluate impacts on systems.	1.C Evaluate, with and without the support of AI, the likelihood and impact of risks.	2.C Evaluate, with and without the support of AI, the impact of protective risk-management strategies.	3.C Evaluate the impact of threat detection methods.	4.C Implement AI as a collaboration tool individually and as a group.
Enacting solutions Apply and communicate solutions.	1.D Document, with and without the support of AI, the likelihood and impact of risks.	2.D Implement and log mitigations with and without the support of AI.	3.D Detect and classify cyberattacks by analyzing digital evidence with and without the support of AI.	4.D Complete assigned work to accomplish a collaborative cybersecurity task.

Course Content

This course framework provides a clear and detailed description of course requirements necessary for student success. The framework specifies what students should know and be able to do, with a focus on understanding, identifying, protecting against, and remediating common threats and vulnerabilities through a defense-in-depth strategy across a variety of domains including physical spaces, computer networks, devices, and data and applications. The framework emphasizes the impact of cybersecurity on individuals, organizations, governments, and societies.

Units

There are five units in AP Cybersecurity. Pacing recommendations at the unit level and on the Course at a Glance table provide suggestions for how to teach the required course content. The suggested class periods are based on a schedule in which the class meets five days a week for 45 minutes each day. While these recommendations have been made to aid in planning, adjust the pacing based on student needs, alternate schedules (e.g., block scheduling), or individual schools' academic calendars.

Topics

Each unit is divided into teachable segments called topics. The topic pages (starting on page 33) contain all required content for each topic. Topics typically require 2-8 class periods of instruction. Teachers are not obligated to teach the topics in the suggested sequence listed in each unit. However, to receive authorization to label this course "Advanced Placement," all topics must be included in the course.

Course at a Glance

Plan

The Course at a Glance provides a useful visual organization of the AP Cybersecurity components, including:

- Sequence of units, along with suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit.

Teach

COURSE SKILLS

1 Analyze Risk
2 Mitigate Risk
3 Detect Attacks
4 Collaborate

Assess

At the end of each topic and unit, assess students' understanding of the content and skills and provide them with actionable feedback.

UNIT 1

Introduction to Security

~10
CLASS PERIODS

Skill		Topic
1	1.1	Understanding Social Engineering
1, 2	1.2	Suspicious Website Logins
1, 2	1.3	Best Practices for Public Networks
1, 2	1.4	AI-Based Cybersecurity Attacks
2, 3	1.5	Leveraging AI in Cyber Defense

UNIT 2

Securing Spaces

~21
CLASS PERIODS

Skill		Topic
1, 2	2.1	Cyber Foundations
1	2.2	Physical Vulnerabilities and Attacks
2	2.3	Protecting Physical Spaces
3	2.4	Detecting Physical Attacks

UNIT 3

Securing Networks

~26
CLASS PERIODS

Skill		Topic
1	3.1	Network Vulnerabilities and Attacks
2	3.2	Protecting Networks: Managerial Controls and Wireless Security
2	3.3	Protecting Networks: Segmentation
2	3.4	Protecting Networks: Firewalls
3	3.5	Detecting Network Attacks

UNIT 4

Securing Devices

~23
CLASS PERIODS

Skill		Topic
1	4.1	Device Vulnerabilities and Attacks
2	4.2	Authentication
2	4.3	Protecting Devices
3	4.4	Detecting Attacks on Devices

UNIT 5

Securing Applications and Data

~30
CLASS PERIODS

Skill		Topic
1	5.1	Application and Data Vulnerabilities and Attacks
2	5.2	Protecting Applications and Data: Managerial Controls and Access Controls
2	5.3	Protecting Stored Data with Cryptography
2	5.4	Asymmetric Cryptography
2	5.5	Protecting Applications
3	5.6	Detecting Attacks on Data and Applications

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AP CYBERSECURITY

Unit Guides

Introduction

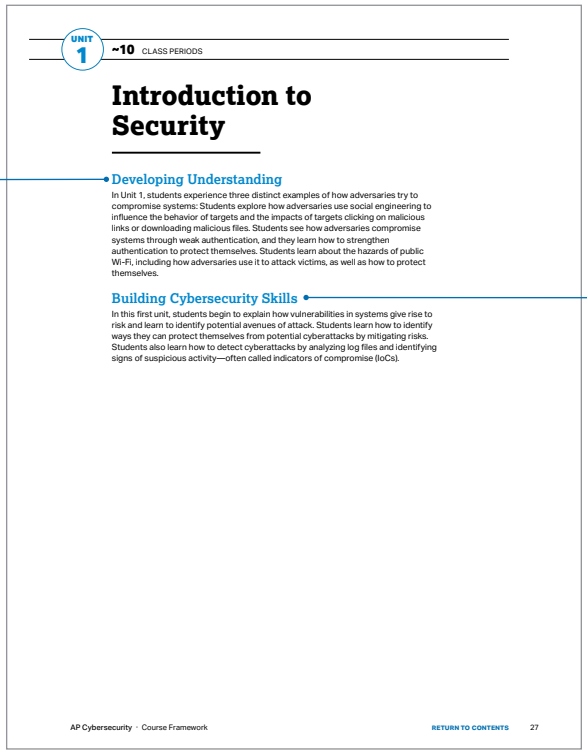
Developed in partnership with industry leaders, college faculty, and experienced high school educators, these guides offer teachers helpful guidance in building students' skills and content knowledge.

This unit structure respects AP teachers' time by providing one possible sequence that can be adopted or modified, rather than having to be built from scratch.

Using the Unit Guides

Unit Openers

Developing Understanding provides an overview that contextualizes and situates the key content of the unit within the scope of the course.



UNIT 1 ~10 CLASS PERIODS

Introduction to Security

Developing Understanding

In Unit 1, students experience three distinct examples of how adversaries try to compromise systems: Students explore how adversaries use social engineering to influence the behavior of targets and the impacts of targets clicking on malicious links or downloading malicious files. Students see how adversaries compromise systems through weak authentication, and they learn how to strengthen authentication to protect themselves. Students learn about the hazards of public Wi-Fi, including how adversaries use it to attack victims, as well as how to protect themselves.

Building Cybersecurity Skills

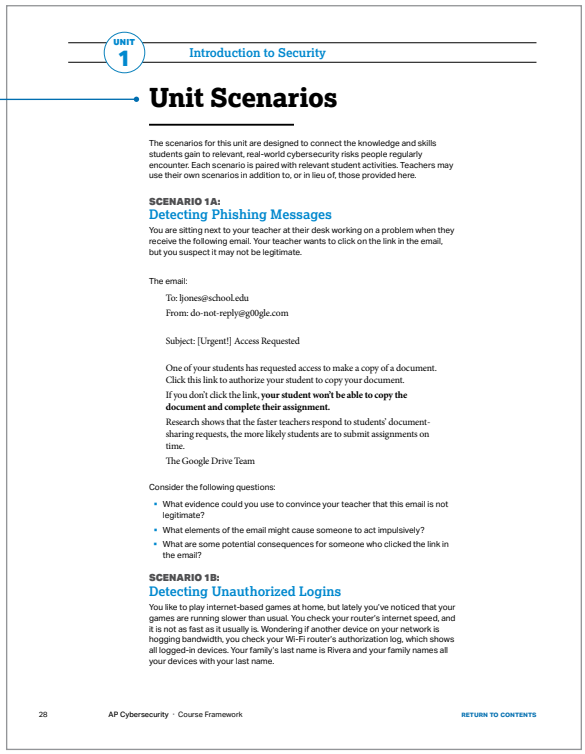
In this first unit, students begin to explain how vulnerabilities in systems give rise to risk and learn to identify potential avenues of attack. Students learn how to identify ways they can protect themselves from potential cyberattacks by mitigating risks. Students also learn how to detect cyberattacks by analyzing log files and identifying signs of suspicious activity—often called indicators of compromise (IoCs).

AP Cybersecurity · Course Framework RETURN TO CONTENTS 27

Building Cybersecurity Skills describes specific subskills within the course skills that are appropriate to focus on in that unit.

Unit Scenarios

Unit scenarios are designed to connect the knowledge and skills students gain to relevant, real-world applications. They are paired with applicable student activities. Teachers may use their own scenarios in addition to, or in lieu of, the scenarios provided.



UNIT 1 Introduction to Security

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to relevant, real-world cybersecurity risks people regularly encounter. Each scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 1A:
Detecting Phishing Messages

You are sitting next to your teacher at their desk working on a problem when they receive the following email. Your teacher wants to click on the link in the email, but you suspect it may not be legitimate.

The email:

To: ljones@school.edu
From: do-not-reply@g00gle.com

Subject: [Urgent!] Access Requested

One of your students has requested access to make a copy of a document. Click this link to authorize your student to copy your document.
If you don't click the link, **your student won't be able to copy the document and complete their assignment.**
Research shows that the faster teachers respond to students' document-sharing requests, the more likely students are to submit assignments on time.
The Google Drive Team

Consider the following questions:

- What evidence could you use to convince your teacher that this email is not legitimate?
- What elements of the email might cause someone to act impulsively?
- What are some potential consequences for someone who clicked the link in the email?

SCENARIO 1B:
Detecting Unauthorized Logins

You like to play internet-based games at home, but lately you've noticed that your games are running slower than usual. You check your router's internet speed, and it is not as fast as it usually is. Wondering if another device on your network is hogging bandwidth, you check your Wi-Fi router's authorization log, which shows all logged-in devices. Your family's last name is Rivera and your family names all your devices with your last name.

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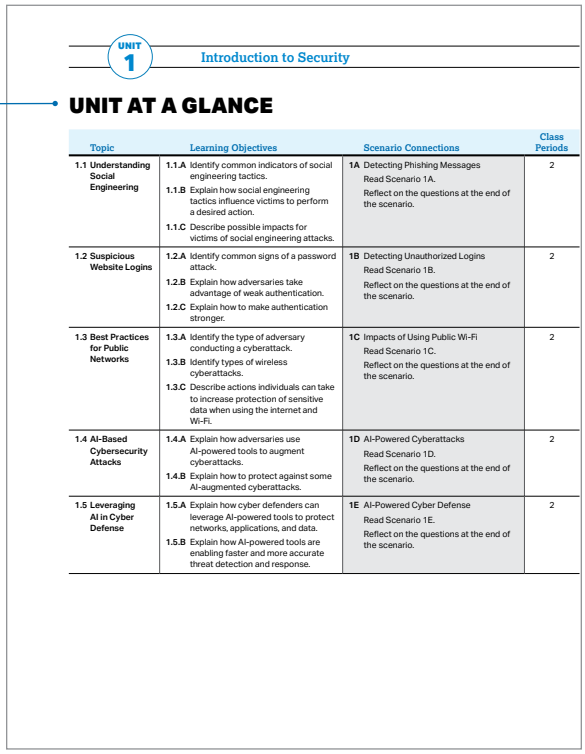
Unit at a Glance

Unit at a Glance shows the topics, learning objectives, and connections to unit scenarios for each topic.

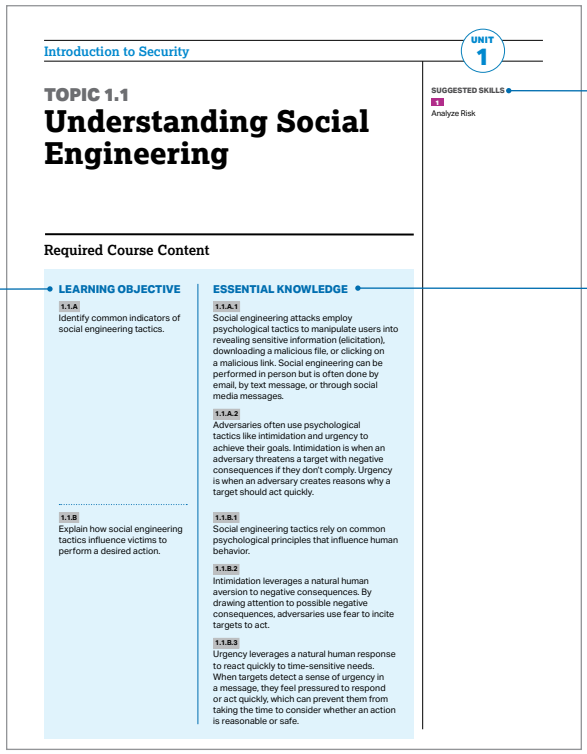


UNIT 1 Introduction to Security

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
1.1 Understanding Social Engineering	**1.1.A** Identify common indicators of social engineering tactics. **1.1.B** Explain how social engineering tactics influence victims to perform a desired action. **1.1.C** Describe possible impacts for victims of social engineering attacks.	**1A** Detecting Phishing Messages Read Scenario 1A. Reflect on the questions at the end of the scenario.	2
1.2 Suspicious Website Logins	**1.2.A** Identify common signs of a password attack. **1.2.B** Explain how adversaries take advantage of weak authentication. **1.2.C** Explain how to make authentication stronger.	**1B** Detecting Unauthorized Logins Read Scenario 1B. Reflect on the questions at the end of the scenario.	2
1.3 Best Practices for Public Networks	**1.3.A** Identify the type of adversary conducting a cyberattack. **1.3.B** Identify types of wireless cyberattacks. **1.3.C** Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.	**1C** Impacts of Using Public Wi-Fi Read Scenario 1C. Reflect on the questions at the end of the scenario.	2
1.4 AI-Based Cybersecurity Attacks	**1.4.A** Explain how adversaries use AI-powered tools to augment cyberattacks. **1.4.B** Explain how to protect against some AI-augmented cyberattacks.	**1D** AI-Powered Cyberattacks Read Scenario 1D. Reflect on the questions at the end of the scenario.	2
1.5 Leveraging AI in Cyber Defense	**1.5.A** Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data. **1.5.B** Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	**1E** AI-Powered Cyber Defense Read Scenario 1E. Reflect on the questions at the end of the scenario.	2

Topic Pages



Introduction to Security — UNIT 1

TOPIC 1.1

Understanding Social Engineering

SUGGESTED SKILLS
1
Analyze Risk

Required Course Content

LEARNING OBJECTIVE

1.1.A
Identify common indicators of social engineering tactics.

1.1.B
Explain how social engineering tactics influence victims to perform a desired action.

ESSENTIAL KNOWLEDGE

1.1.A.1
Social engineering attacks employ psychological tactics to manipulate users into revealing sensitive information (elicitation), downloading a malicious file, or clicking on a malicious link. Social engineering can be performed in person but is often done by email, by text message, or through social media messages.

1.1.A.2
Adversaries often use psychological tactics like intimidation and urgency to achieve their goals. Intimidation is when an adversary threatens a target with negative consequences if they don't comply. Urgency is when an adversary creates reasons why a target should act quickly.

1.1.B.1
Social engineering tactics rely on common psychological principles that influence human behavior.

1.1.B.2
Intimidation leverages a natural human aversion to negative consequences. By drawing attention to possible negative consequences, adversaries use fear to incite targets to act.

1.1.B.3
Urgency leverages a natural human response to react quickly to time-sensitive needs. When targets detect a sense of urgency in a message, they feel pressured to respond or act quickly, which can prevent them from taking the time to consider whether an action is reasonable or safe.

Suggested skills offer one or more recommended skills to pair with the topic.

Learning objectives define what a student should be able to do with content knowledge.

Essential knowledge statements describe the knowledge required to perform the learning objective.

Exam Overview

Sample multiple-choice questions serve as examples of the types of questions that may appear on the AP Exam.

Sample Exam Questions

The sample exam questions that follow illustrate the relationship between the course framework and the AP Cybersecurity Exam and serve as examples of the types of questions that appear on the exam. After the sample questions is a table that shows which skill, learning objective(s), unit, and essential knowledge statement(s) each question assesses. The table also provides the answers to the multiple-choice questions.

Section I: Multiple-Choice Questions

The following are examples of the kinds of multiple-choice questions found on the exam.

1. A cybersecurity analyst recently completed a review of a hotel's security. Consider the following information from their report.
   - The hotel's Wi-Fi extends to the parking area, allowing outsiders potential access to the network.
   - Open network ports in the conference center connect to the hotel's internal network and could enable spoofing of a legitimate device.
   - Guest feedback tablets in the lobby use a shared Wi-Fi network, exposing
   - nonsensitive customer satisfaction data.
   - Model numbers of printers and the firmware versions the printers are running are visible on the internal network, revealing some information about devices on the network.

   Which of the following risks would the cybersecurity analyst most likely document as a high risk?

   (A) The hotel's Wi-Fi extending to the parking area
   (B) Open network ports in the conference center
   (C) Guest feedback tablets using a shared Wi-Fi network
   (D) The model numbers of printers and the firmware versions the printers are running being visible

A sample free-response question serves as an example of the type of question that may appear on the AP Exam.

22. A hospital's security manager has implemented an automated network security tool with the following functions.
    - The tool analyzes network traffic for signs of malicious activity so the security team can quickly spot potential threats.
    - The tool generates an alert when suspicious or malicious traffic is detected because the hospital wants to be notified right away if an attack is attempted.
    - The tool does not take direct action to block or stop the traffic itself because the hospital wants administrators to decide how to respond to threats.

    Which of the following security systems did the security manager implement?

    (A) Data loss prevention system
    (B) Network intrusion prevention system
    (C) Network intrusion detection system
    (D) Security information and event management system

Section II: Free-Response Question

The following is an example of the free-response question found on the exam.

Device Security Analysis

The following sources all come from the same device and are captured in a risk assessment for this device.

Source 1

The device's IP address is 192.168.1.10.

Device Firewall Settings

Rule Number	Action	Source	Destination	Direction	Port Number	Protocol
1	Deny	172.45.66.184	192.168.1.10	Inbound	22	SSH
2	Allow	ALL	192.168.1.10	Inbound	21	FTP
3	Allow	ALL	192.168.1.10	Inbound	80	HTTP
4	Allow	ALL	192.168.1.10	Inbound	445	SMB
5	Allow	ALL	192.168.1.10	Inbound	443	HTTPS
6	Allow	ALL	192.168.1.10	Inbound	22	SSH
7	Allow	172.45.66.184	192.168.1.10	Inbound	3306	MySQL
8	Allow	ALL	192.168.1.10	Inbound	3389	RDP
9	Allow	192.168.1.50	192.168.1.10	Inbound	5900	VNC
10	Deny	ALL	ALL	Inbound	ALL	ALL

AP CYBERSECURITY

UNIT 1

Introduction to Security



~10
CLASS PERIODS

UNIT 1 ~10 CLASS PERIODS

Introduction to Security

Developing Understanding

In Unit 1, students experience three distinct examples of how adversaries try to compromise systems: Students explore how adversaries use social engineering to influence the behavior of targets and the impacts of targets clicking on malicious links or downloading malicious files. Students see how adversaries compromise systems through weak authentication, and they learn how to strengthen authentication to protect themselves. Students learn about the hazards of public Wi-Fi, including how adversaries use it to attack victims, as well as how to protect themselves.

Building Cybersecurity Skills

In this first unit, students begin to explain how vulnerabilities in systems give rise to risk and learn to identify potential avenues of attack. Students learn how to identify ways they can protect themselves from potential cyberattacks by mitigating risks. Students also learn how to detect cyberattacks by analyzing log files and identifying signs of suspicious activity—often called indicators of compromise (IoCs).

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to relevant, real-world cybersecurity risks people regularly encounter. Each scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 1A:
Detecting Phishing Messages

You are sitting next to your teacher at their desk working on a problem when they receive the following email. Your teacher wants to click on the link in the email, but you suspect it may not be legitimate.

The email:

> To: ljones@school.edu
>
> From: do-not-reply@g00gle.com
>
> Subject: [Urgent!] Access Requested
>
> One of your students has requested access to make a copy of a document. Click this link to authorize your student to copy your document.
>
> If you don't click the link, **your student won't be able to copy the document and complete their assignment.**
>
> Research shows that the faster teachers respond to students' document-sharing requests, the more likely students are to submit assignments on time.
>
> The Google Drive Team

Consider the following questions:

- What evidence could you use to convince your teacher that this email is not legitimate?
- What elements of the email might cause someone to act impulsively?
- What are some potential consequences for someone who clicked the link in the email?

SCENARIO 1B:
Detecting Unauthorized Logins

You participate in an online game that allows users to create and manage virtual teams. One day, you discover that some of your previous choices have been modified without your knowledge. You check the account activity section, which lists each time the account was accessed. You normally log in to the website on weekends and evenings, when you're not in school. A portion of the list of logins follows.

Website Logins

Entry	Date/Time	Device IP Address
1	Saturday April 18 10:43	208.104.29.211
2	Sunday April 19 20:51	208.104.29.211
3	Tuesday April 21 18:34	208.104.29.211
4	Wednesday April 22 11:13	142.54.195.17
5	Saturday April 25 13:21	208.104.29.211
6	Sunday April 26 21:18	208.104.29.211
7	Monday April 27 10:07	142.54.195.17
8	Wednesday April 29 19:12	208.104.29.211

Consider the following questions:

- What types of information does this log contain?
- What patterns do you notice in this log?
- What entries in the log are suspicious and why?

SCENARIO 1C:
Verifying Network Authenticity

You go to your neighborhood coffee shop and try to connect to the shop's Wi-Fi network. You are redirected to a captive portal that requires you to provide some information before allowing you to access the wireless network. This captive portal has options for you to authenticate yourself by using your account credentials for popular online platforms. You select one and enter your login credentials for that platform, and you are granted access to the wireless network.

You open your streaming music service to play some music, and start studying for an upcoming test. While you are taking notes from your textbook, you notice that your music has stopped playing. When you check your streaming music service, you realize you have been logged out. When you try to log back in, the service says that your password is invalid.

You notice a sign on the wall that says "Login to our free Wi-Fi network: Sunshine Coffee Wi-Fi", but you remember joining a network called "Guest Wi-Fi". You accidentally joined a network set up by an adversary to trick customers.

When you logged into the "Guest Wi-Fi" network, you were redirected to a fake captive portal, set up by an adversary, where you supplied your login credentials for a popular online platform. By submitting your credentials on the adversary's fake portal, they were able to capture your username and password. The adversary then used those credentials to log in to other services you had linked to the same platform, including your music service, and change your password. This locked you out of your account.

Consider the following questions:

- How could you have avoided joining the malicious network in this scenario?
- What are the benefits and hazards of using one platform to log in to multiple online services?

SCENARIO 1D:
AI-Powered Cyberattacks

Sitting at home one day, you receive a call from a relative who is frantic, asking questions quickly: "Are you okay? Did you get the money I sent? How did you end up in so much trouble?"

First, you calm them down and tell them you're fine. Then you ask them to explain what they're talking about. They say that you called them earlier from jail, claiming you had been arrested for stealing and needed bail money. They wired the money just as you instructed. You explain to them that you were never arrested, you haven't left home all day, and you never called them. They've been scammed, but they insist that it was you calling them. They say it sounded exactly like you.

What Really Happened?

You have a social media account where you post short videos of yourself. Two weeks ago, you got a friend request on that platform. The friend request came from someone with a name similar to a kid at your school. Figuring it was them, you accepted the request. That person was actually an adversary pretending to be someone from your school. The adversary was able to scrape enough samples of your voice from your social media posts to feed into an AI tool that clones voices. The adversary used social media to find your relative and called them using the voice-cloning tool pretending to be you. They created a fake story about being caught stealing, being in jail, and needing bail money wired to them.

Consider the following questions:

- Do you know all your online connections (on social media and gaming platforms) in real life? Do you know that they are who they claim to be?
- Have you heard of adversaries trying to impersonate someone to get money out of a relative?
- How could you help protect relatives from becoming a victim of a scheme like this?

SCENARIO 1E:
AI-Powered Cyber Defense

The company you work for is developing a new web application that will allow customers to place orders in an online system. The application automatically accesses the company's warehouse inventory database to display current item availability to customers. When a customer purchases an item through the web portal, the application updates the database to remove the item(s) the customer purchased.

Before launching this new website, you ask an AI-powered tool to review the code and flag any potential security vulnerabilities. The AI tool flags several instances where a user input field is being fed directly into database requests as vulnerabilities. Adversaries could take advantage of those parts of the application to learn more about what is in the company's warehouse and possibly modify the database in unintended ways.

The AI tool recommends several fixes to the code that would validate and sanitize user input before passing commands to the database. You share these recommendations with the software development team, who review the code changes and update the code with appropriate suggestions. The application is then pushed to a testing environment before being deployed.

Consider the following questions:

- What are some potential advantages and disadvantages of using an AI-powered tool to review application code?
- Why is it important for the development team to review the changes to the application code before implementing them?
- Are there times when you use AI-powered tools to help you review your work?

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
1.1 Understanding Social Engineering	**1.1.A** Identify common indicators of social engineering tactics. **1.1.B** Explain how social engineering tactics influence victims to perform a desired action. **1.1.C** Describe possible impacts for victims of social engineering attacks.	**1A Detecting Phishing Messages** ▪ Read Scenario 1A. ▪ Reflect on the questions at the end of the scenario.	2
1.2 Suspicious Website Logins	**1.2.A** Identify common signs of a password attack. **1.2.B** Explain how adversaries take advantage of weak authentication. **1.2.C** Explain how to make authentication stronger.	**1B Detecting Unauthorized Logins** ▪ Read Scenario 1B. ▪ Reflect on the questions at the end of the scenario.	2
1.3 Best Practices for Public Networks	**1.3.A** Identify the type of adversary conducting a cyberattack. **1.3.B** Identify types of wireless cyberattacks. **1.3.C** Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.	**1C Impacts of Using Public Wi-Fi** ▪ Read Scenario 1C. ▪ Reflect on the questions at the end of the scenario.	2
1.4 AI-Based Cybersecurity Attacks	**1.4.A** Explain how adversaries use AI-powered tools to augment cyberattacks. **1.4.B** Explain how to protect against some AI-augmented cyberattacks.	**1D AI-Powered Cyberattacks** ▪ Read Scenario 1D. ▪ Reflect on the questions at the end of the scenario.	2
1.5 Leveraging AI in Cyber Defense	**1.5.A** Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data. **1.5.B** Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	**1E AI-Powered Cyber Defense** ▪ Read Scenario 1E. ▪ Reflect on the questions at the end of the scenario.	2

TOPIC 1.1
Understanding Social Engineering

SUGGESTED SKILLS

1

Analyze Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.1.A Identify common indicators of social engineering tactics.	**1.1.A.1** Social engineering attacks employ psychological tactics to manipulate users into revealing sensitive information (elicitation), downloading a malicious file, or clicking on a malicious link. Social engineering can be performed in person but is often done by email, by text message, or through social media messages. **1.1.A.2** Adversaries often use psychological tactics like intimidation and urgency to achieve their goals. Intimidation is when an adversary threatens a target with negative consequences if they don't comply. Urgency is when an adversary creates reasons why a target should act quickly.
1.1.B Explain how social engineering tactics influence victims to perform a desired action.	**1.1.B.1** Social engineering tactics rely on common psychological principles that influence human behavior. **1.1.B.2** Intimidation leverages a natural human aversion to negative consequences. By drawing attention to possible negative consequences, adversaries use fear to incite targets to act. **1.1.B.3** Urgency leverages a natural human response to react quickly to time-sensitive needs. When targets detect a sense of urgency in a message, they feel pressured to respond or act quickly, which can prevent them from taking the time to consider whether an action is reasonable or safe.

1.1.C
Describe possible impacts for victims of social engineering attacks.

1.1.C.1
Victims may give an adversary personal information that could lead to impersonation, such as name, phone number, address, workplace, pets' names, or birthdate. These types of information, and information like them, are often used on websites as challenge questions to verify a user's identity.

1.1.C.2
Victims may give an adversary secure information like a one-time password (OTP) or authentication login code, which could allow an adversary to log in to a service as the victim.

1.1.C.3
Victims may download malware or click a link that that installs malware on their device, steals information from their web browser, or directs them to a website where their login credentials can be captured by an adversary.

TOPIC 1.2
Suspicious Website Logins

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.2.A Identify common signs of a password attack.	**1.2.A.1** In an online password attack, adversaries try logging in to a device or service using common passwords, common password patterns, or stolen passwords. **1.2.A.2** Signs of an online password attack include: ▪ Many failed attempts to log in over a short duration ▪ Login attempts at unusual times ▪ Login attempts from unknown devices
1.2.B Explain how adversaries take advantage of weak authentication.	**1.2.B.1** Many people use common patterns when creating passwords, such as: ▪ Starting a password with one or two words, adding a two-digit number (often signifying a year), and putting a special character at the end ▪ Including the names of family or pets in their passwords ▪ Including personally significant dates in their passwords **1.2.B.2** Adversaries often construct a dictionary of possible passwords based on personal information gathered about a target (e.g., birthday, anniversary, names of pets and family) and use an automated tool to submit potential passwords.

1.2.C
Explain how to make authentication stronger.

1.2.C.1
Users should create passwords that are long, random, and unique. A password manager can be used to generate and store strong passwords, or a user may create long, unique passphrases for their accounts.

1.2.C.2
When creating passwords, users should avoid names, dates, or other personally meaningful words or numbers.

1.2.C.3
When available, users should enable multifactor authentication (MFA), which will require the user to provide extra proof of identity—such as a one-time code—in addition to the password as an extra layer of security.

TOPIC 1.3

Best Practices for Public Networks

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.3.A Identify the type of adversary conducting a cyberattack.	1.3.A.1 Adversaries can be classified by their skill levels. ▪ Low-skilled adversaries rely on malicious cyber tools created by others that can be purchased online. The tools they use exploit known vulnerabilities. ▪ High-skilled adversaries have the capacity to create new malicious cyber tools or modify existing ones to adapt to new defensive techniques and tools. They also have the capacity to discover undocumented vulnerabilities, known as zero days. 1.3.A.2 Adversaries have a variety of motivations, including greed, desire for recognition, dedication to a cause, revenge, politics, or beliefs.
1.3.B Identify types of wireless cyberattacks.	1.3.B.1 In an evil twin attack, an adversary sets up their own wireless access point (WAP) with a service set identifier (SSID) similar or identical to a target network; the adversary's network is called the evil twin. Victims of this attack could select to unknowingly connect to the evil twin, allowing the adversary to capture their network traffic. The adversary cannot read traffic that uses an encrypted protocol like HTTPS.

1.3.B
Identify types of wireless cyberattacks.

1.3.B.2
In a jamming attack, an adversary floods an area with a strong electromagnetic (EM) signal in the same frequency range as the wireless network, which prevents legitimate traffic between the access point (AP) and users. This type of attack that prevents users from accessing resources is called a denial of service (DoS) attack.

1.3.B.3
In a war driving attack, adversaries try to detect wireless network beacons while driving or walking around a target. If a wireless signal is detected, the adversary can gather information about the type of wireless network used and find areas where the wireless signal extends outside the physical building.

1.3.C
Describe actions individuals can take to increase protection of sensitive data when using the internet and Wi-Fi.

1.3.C.1
Individuals should verify that the name of any wireless network they join exactly matches the name of the network they intend to join.

1.3.C.2
Most internet protocols are encrypted to protect network traffic. However, individuals may consider the sensitivity of their data in choosing whether to join unencrypted Wi-Fi networks to protect vulnerable data such as DNS queries.

1.3.C.3
Individuals may consider using a virtual private network (VPN), which encrypts all their traffic to the VPN operator's system. Although this action prevents a service provider from viewing traffic, the VPN provider can view the traffic.

TOPIC 1.4

AI-Based Cybersecurity Attacks

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.4.A Explain how adversaries use AI-powered tools to augment cyberattacks.	1.4.A.1 Adversaries can use AI-powered tools that leverage existing voice and image samples of a person to create a digital avatar of that person. The use of these technologies enables adversaries to impersonate someone over the phone or even on a video call, which can lead to financial loss or the sharing of sensitive or private information. As more organizations adopt voice-based authentication, the impact of voice-impersonation has a larger potential impact. 1.4.A.2 Adversaries can use generative AI tools, like large language models (LLMs), to create convincing phishing messages in any target language. Because traditional phishing messages are sometimes written by non-native speakers of the target's language, unnatural language is a feature that has been used to distinguish phishing messages from legitimate messages. However, with AI tools, adversaries can now craft phishing messages in any language that read as though they were written by a native speaker. 1.4.A.3 Adversaries can craft prompts that extract secure or sensitive information from LLMs. Secure or sensitive information in LLMs can come from user input and the large data sets used to train LLMs.

1.4.A Explain how adversaries use AI-powered tools to augment cyberattacks.	**1.4.A.4** Adversaries can publish websites or modify existing websites to contain false information so that the false information will be included in the training sets for LLMs, causing the LLMs to repeat the false information. **1.4.A.5** Adversaries can perform reconnaissance on a target using AI-powered tools that scan the internet to gather information posted on social media and public websites. **1.4.A.6** Adversaries can use AI-enhanced coding tools to help them write new malware, modify existing application code to perform malicious activities, or to find vulnerabilities in large code bases.
1.4.B Explain how to protect against some AI-augmented cyberattacks.	**1.4.B.1** Shared secrets with close friends and relatives that can be used to verify each other's identities should be established. A secret word or phrase known only to two parties can be used to authenticate identities in high-stakes situations. **1.4.B.2** Multifactor authentication (MFA) should be enabled. If an adversary clones a target's voice to access a system with voice authentication, requiring a second authentication factor could prevent an adversary from gaining access to accounts. **1.4.B.3** Personal or sensitive data should not be entered into any AI-powered tools, such as chatbots or virtual assistants. Some AI-powered tools feed user input back into the model to provide continuous training. Adversaries could extract data that users have included in prompts. **1.4.B.4** Output from AI-powered tools should be carefully evaluated. Verify information from AI-powered tools using reputable, stable, non-AI-based sources.

TOPIC 1.5

Leveraging AI in Cyber Defense

SUGGESTED SKILLS

2 Mitigate Risk

3 Detect Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
1.5.A Explain how cyber defenders can leverage AI-powered tools to protect networks, applications, and data.	1.5.A.1 AI tools can review current security configurations, like firewall rules and access controls, and recommend more secure options. Recommendations should always be checked by a knowledgeable security technician before being implemented. 1.5.A.2 AI-powered tools can analyze application code to identify vulnerabilities and recommend mitigations. Recommendations should always be reviewed by a knowledgeable programmer before being implemented. 1.5.A.3 AI-powered tools can suggest rules for automated detection systems. Detection rules should always be reviewed by a knowledgeable detection engineer before being added to a system.
1.5.B Explain how AI-powered tools are enabling faster and more accurate threat detection and response.	1.5.B.1 Of the millions of digital events that happen on networks daily, some likely represent an adversary conducting malicious activity. Humans cannot carefully examine all those events to identify the malicious activity. 1.5.B.2 AI-powered tools can be trained to quickly analyze digital events and sort the events that are likely malicious activity from those that are harmless.

1.5.B
Explain how AI-powered tools are enabling faster and more accurate threat detection and response.

1.5.B.3
AI-powered tools can be programmed to alert human cybersecurity personnel when likely malicious activity is detected or to take specific corrective actions based on the type of malicious activity detected.

1.5.B.4
AI-powered tools enable threat-detection and response teams to catch malicious activity and intervene quickly to prevent loss, harm, damage, and destruction to digital infrastructure and data.

AP CYBERSECURITY

UNIT 2

Securing Spaces



~21
CLASS PERIODS

Securing Spaces

Developing Understanding

In this unit, students focus on securing a physical location. Adversaries that can gain physical access to a device are often able to bypass many of the technical controls that protect the device and the data on it. Thus, securing the physical space is a critical first layer of defense and a concrete way for students to develop adversarial thinking skills and begin to identify vulnerabilities, threats, attacks, and mitigations. Students consider how physical spaces might be breached by adversaries, how to detect physical breaches, how to select devices to prevent or deter an adversary, and how to place those devices to maximize their usefulness.

Building Cybersecurity Skills

This unit focuses on an aspect of security that is concrete and is present in students' everyday lives. By leveraging the fact that students move through different spaces (e.g., their home, the school building, a bank) that are secured in a variety of ways, teachers can connect the concepts of vulnerabilities, threats, and risk to students' experiences. Students begin assessing and managing risk in this familiar domain while they practice selecting security controls based on the principles from Unit 1. Finally, students consider how to select controls to detect physical breaches and evaluate the impact of those controls.

Unit Scenario

The scenario for this unit is designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenario is paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, the one provided here.

SCENARIO 2A:
Securing Xtensr Labs

You work on the physical security team at Xtensr Research Labs. Xtensr is buying a smaller research company in the same town to expand their operations. You have been tasked with conducting a physical vulnerability assessment of the new lab.

You will:

- Review the building plans and current security controls for this new lab and identify physical vulnerabilities
- Assess the risk from the vulnerabilities identified
- Recommend physical security controls to mitigate these vulnerabilities
- Recommend the placement of monitoring equipment to detect physical security breaches

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
2.1 Cyber Foundations	**2.1.A** Identify social engineering attacks. **2.1.B** Identify types of adversaries. **2.1.C** Describe the phases of a cyberattack. **2.1.D** Describe the risk assessment process. **2.1.E** Identify strategies for managing risk. **2.1.F** Identify types of security controls. **2.1.G** Explain why a defense-in-depth security strategy is necessary to optimally protect an organization.		8
2.2 Physical Vulnerabilities and Attacks	**2.2.A** Identify common physical attacks. **2.2.B** Explain how threats can exploit common physical vulnerabilities to cause loss, damage, disruption, or destruction to assets. **2.2.C** Assess and document risks from physical vulnerabilities.	**2A Securing Xtensr Labs** ▪ Review physical plans to identify physical vulnerabilities. ▪ Assess the risk from the vulnerabilities identified.	5
2.3 Protecting Physical Spaces	**2.3.A** Identify managerial controls related to physical security. **2.3.B** Determine mitigation strategies for risks from physical vulnerabilities.	**2A Securing Xtensr Labs** ▪ Recommend physical security controls to mitigate the risks identified in Topic 2.2.	4
2.4 Detecting Physical Attacks	**2.4.A** Identify ways security controls can detect physical attacks. **2.4.B** Determine effective placement of security controls for detecting physical attacks. **2.4.C** Apply detection techniques to identify physical attacks.	**2A Securing Xtensr Labs** ▪ Recommend the placement of monitoring equipment for detecting physical security breaches.	4

SUGGESTED SKILLS

1 Analyze Risk

2 Mitigate Risk

TOPIC 2.1
Cyber Foundations

Required Course Content

LEARNING OBJECTIVE

2.1.A
Identify social engineering attacks.

ESSENTIAL KNOWLEDGE

2.1.A.1
Social engineers use psychological tactics to manipulate targets into taking a desired action.

2.1.A.2
Pretexting is when adversaries create a believable reason to contact a target.

2.1.A.3
Authority is when adversaries impersonate someone with power over a target or pretend to relay instructions from that person.

2.1.A.4
Intimidation is when adversaries state negative consequences if demands aren't met.

2.1.A.5
Consensus is when adversaries create social pressure by making a target believe everyone else is doing a desired action.

2.1.A.6
Scarcity is when adversaries create a sense of limited availability.

2.1.A.7
Familiarity is when adversaries pretend to be or know someone close to a target to establish trust.

2.1.A.8
Urgency is when adversaries create a deadline that requires quick action by a target to avert negative consequences.

2.1.B
Identify types of adversaries.

2.1.B.1
Script kiddies are low-skilled adversaries who use tools developed by others without understanding how the tools work. They are often motivated by greed or a desire for recognition.

2.1.B.2
Hacktivists are motivated by social, political, or personal causes. They compromise computers and networks to support their cause or stop perceived harm, believing their goals justify their illegal methods.

2.1.B.3
Insider adversaries are unique threats because they have legitimate credentials and access to systems and data. They can be recruited by malicious third parties and can be motivated by greed or revenge.

2.1.B.4
Cyberterrorists are motivated by politics or beliefs and seek to disrupt entire communities, regions, or nations through cyberattacks (e.g., attacking a power grid, water treatment plant, or other civil infrastructure). They can act independently or on behalf of governments or criminal organizations.

2.1.B.5
Transnational criminal organizations seek financial gain primarily by deploying ransomware and stealing corporate intellectual property (IP) to sell in illegal markets.

2.1.C
Describe the phases of a cyberattack.

2.1.C.1
Cyberattacks aim to disrupt, harm, steal, or destroy devices, networks, or data. Adversaries work in phases, which may not all be used in every attack. The phases are:

i. Reconnaissance
ii. Initial access
iii. Persistence
iv. Lateral movement
v. Taking action
vi. Evading detection

2.1.C.2
In the reconnaissance phase of an attack, adversaries gather as much information as possible about their target, often using open source intelligence (OSINT), which is freely available information.

2.1.C
Describe the phases of a cyberattack.

2.1.C.3
In the initial-access phase of an attack, adversaries establish a foothold on the target's computer, often through social engineering or compromised or weak credentials.

2.1.C.4
After gaining access during an attack, adversaries establish persistence to maintain access without needing to regain it. They may use a command and control (C2) protocol to send commands to the device and receive output, often through malware like a remote access trojan (RAT) or rootkit.

2.1.C.5
In the lateral-movement phase of an attack, adversaries try to escalate their privileges by accessing computers and user accounts with elevated permissions to services and data.

2.1.C.6
In the taking-action phase of an attack, adversaries act on their objectives by collecting targeted data, exfiltrating it, and disrupting services or destroying data.

2.1.C.7
In the final phase of an attack, many adversaries try to evade detection by removing or editing log files and erasing other files they may have planted on devices (e.g., malware).

2.1.D
Describe the risk assessment process.

2.1.D.1
Risk occurs when a threat can exploit a vulnerability to compromise an asset.

2.1.D.2
An asset is anything valuable. Assets include financial resources, intellectual property, data, digital infrastructure, physical property, and reputation.

2.1.D.3
Risk assessment considers two factors:

- The likelihood of an attack against a specific vulnerability
- The severity of the projected damage from an attack against a specific vulnerability

2.1.D
Describe the risk assessment process.

2.1.D.4
The likelihood of a vulnerability being exploited depends on many factors, including:

- The value of the target: Adversaries are more likely to attack targets they perceive as valuable.
- The level of skill required to exploit the vulnerability (i.e., the difficulty): Vulnerabilities with well-documented exploits often require less skill and can be carried out by more adversaries.
- The motivation and capabilities of likely adversaries: Highly motivated and skilled adversaries are more likely to be able to perform more complex exploits.

2.1.D.5
The severity of an attack is often measured by financial cost, which can also include reputational and operational impacts.

ILLUSTRATIVE EXAMPLE
A hacktivist is passionate about illegal fishing practices supported by a local food production company. The main webpage of this food production company would be a high-value target for this hacktivist; defacing the webpage to expose the company's support of illegal fishing would provide no financial gain to the adversary, but would allow them to raise awareness about an issue that motivates them.

2.1.D.6
The result of a risk assessment can be quantitative or qualitative.

- Quantitative risk assessment assigns a numeric value to a vulnerability based on a numeric scale (e.g., 1–10) or quantifiable impact, which could be financial (e.g., a $10,000 annual risk).

ILLUSTRATIVE EXAMPLES

- Low, medium, high, severe
- Unlikely low impact, likely low impact, unlikely high impact, likely high impact

2.1.D.7
Risk assessment documentation should include:

- Vulnerable assets and their value
- Descriptions of likely threats to the assets
- Details of specific vulnerabilities for specific assets and how they would be exploited

2.1.D
Describe the risk assessment process.

- An explanation of the severity of damage (financial, operational, reputational, etc.) if a specific asset were compromised, and the likelihood of that compromise occurring
- A final rating, quantitative or qualitative, for each risk identified

ILLUSTRATIVE EXAMPLES
- Scaled score (e.g., 1–10)
- Monetary value (e.g., a $10,000 risk vs. a $100,000 risk)

2.1.E
Identify strategies for managing risk.

2.1.E.1
Once a risk has been identified and assessed, an organization has four options for managing that risk:

i. Avoid
ii. Transfer
iii. Mitigate
iv. Accept

2.1.E.2
Risk avoidance stops the activity that is generating the risk. If the activity is a critical part of an organization's mission or purpose, then avoidance is not possible.

2.1.E.3
Risk transference places the burden of the risk on another entity, such as an insurance company, a government, or consumers.

2.1.E.4
Risk mitigation implements security controls to reduce the likelihood or impact of a risk.

2.1.E.5
Residual risk is the risk that remains after an organization has gone through avoidance, transference, and mitigation. The residual risk is the level of risk that an organization is willing to accept. Risk acceptance acknowledges the fact that absolute security is unattainable.

2.1.E.6
To conserve financial resources and employee capacity, an organization will often favor solutions that are cost effective and easy to implement and maintain. Cost-effective solutions cost less to install and maintain than the expected loss from an attack.

2.1.F
Identify types of security controls.

2.1.F.1
Security controls address at least one of the following principles:

- Confidentiality ensures that only authorized individuals, systems, or processes can access data. Systems lacking confidentiality are vulnerable to data theft or destruction.
- Integrity ensures data are accurate and trustworthy. Systems lacking integrity are vulnerable to data manipulation.
- Availability ensures data and services are accessible to authorized individuals when needed. Systems lacking availability may experience unexpected downtime.

2.1.F.2
Security controls can be classified by type.

- Physical controls provide security in the physical space and include locks, fences, and cameras, bollards, and security guards.
- Technical controls provide security in the digital space and include firewalls, anti-malware software, and encryption.
- Managerial controls provide rules, guidelines, policies, and procedures that specify what security should be in place and include password policies, regular access reviews, and incident response plans (IRPs).

2.1.F.3
Security controls can be classified by function.

- Preventative controls address potential vulnerabilities with the goal of stopping an adversary from attacking and include locks and encryption.
- Detective controls help identify attacks when they occur and include intrusion detection systems (IDSs), cameras, and security incident and event management (SIEM) systems.
- Corrective controls fix problems and help restore systems to an operational state and include vulnerability patching, repairing a broken card reader, and intrusion prevention systems (IPSs).

2.1.G
Explain why a defense-in-depth security strategy is necessary to optimally protect an organization.

2.1.G.1
A defense-in-depth strategy, or layered defense, uses multiple types of security controls to protect sensitive data and systems.

2.1.G.2
A defense-in-depth strategy allows an organization to address different types of threats, each with a security control most suited to mitigate it.

2.1.G.3
A defense-in-depth strategy allows for resilience in data protection so when one security control is bypassed by an adversary, another security control may still prevent access to the data or system or limit the damage done to the data or system.

2.1.G.4
Layers in a defense-in-depth strategy can include human, physical, network, device, application, and data.

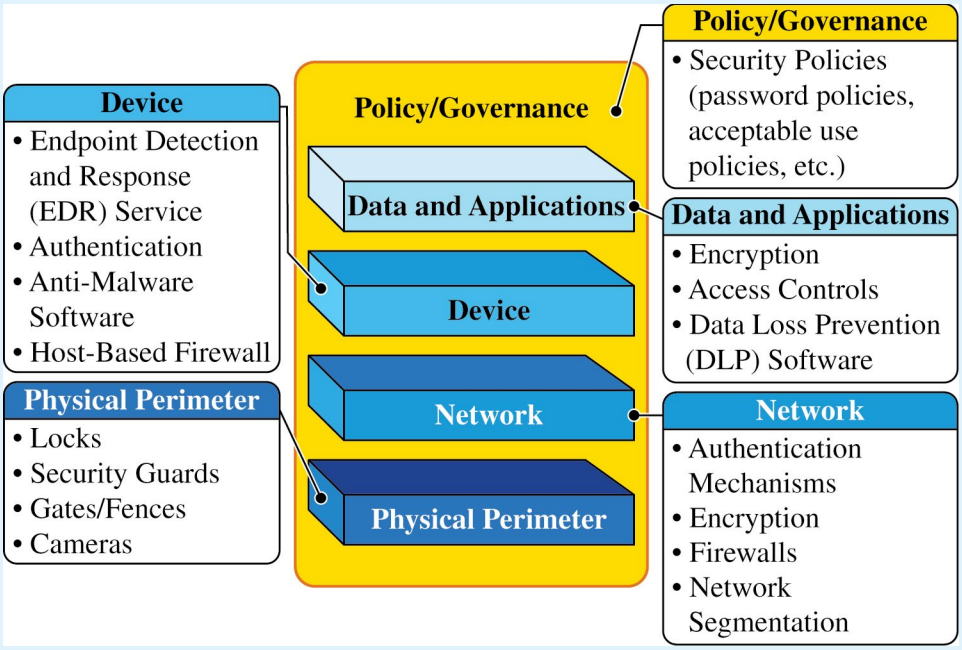


FIGURE 2.1: Defense in Depth

Defense in depth is a layered security strategy that implements protections and deterrence at different levels to make it more challenging for adversaries to compromise a computer, network, or data.

SUGGESTED SKILLS

1
Analyze Risk

TOPIC 2.2
Physical Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE

2.2.A
Identify common physical attacks.

ESSENTIAL KNOWLEDGE

2.2.A.1
Adversaries often use social engineering when conducting a physical attack.

2.2.A.2
Piggybacking is the name for an attack where an adversary uses social engineering to manipulate an authorized individual to grant the adversary access to a restricted area. Common piggybacking tactics include carrying something large to entice an authorized person to hold the door open, pretending to be an authorized person who has forgotten their access token, or pretending to be a maintenance person who needs to get into a certain area to perform an inspection or repair.

2.2.A.3
Tailgating is the name for an attack where an adversary gains unauthorized access to a restricted area by following close behind an authorized individual without that individual's awareness or knowledge.

2.2.A.4
Shoulder surfing is the name for an attack where an adversary watches as a user accesses sensitive information so the adversary can use it later. Sometimes adversaries use a camera to record the target accessing the sensitive information for later analysis.

2.2.A.5
Dumpster diving is the name for an attack where an adversary goes through a target's physical trash to look for information that could be used to help the adversary reach their goal.

2.2.A
Identify common physical attacks.

2.2.A.6
Card cloning is the name for an attack where an adversary makes a copy of an authorized user's access card so they can gain access to all the resources the user is authorized to access.

2.2.B
Explain how threats can exploit common physical vulnerabilities to cause loss, damage, disruption, or destruction to assets.

2.2.B.1
Threats include human adversaries seeking to cause harm or disruption as well as natural disasters. Natural disasters can cause physical damage or destruction to computers and data as well as disruption of digital services provided by computers.

2.2.B.2
Vulnerabilities are weaknesses or flaws that could allow an asset to be compromised. Common compromises include:

- Unauthorized access to sensitive data or restricted physical spaces
- Disruption of services
- Theft or destruction of digital or physical resources
- Unauthorized modification of data

2.2.B.3
When adversaries disrupt power to a device, the device and any services it provides become unavailable. To disrupt power, adversaries may damage fuses or breakers in an electrical box, unplug or cut electrical wiring, or damage power distribution systems like substations and transformers.

2.2.B.4
When adversaries gain access to an area with sensitive information, they can steal or copy sensitive information.

2.2.B.5
When adversaries gain physical access to a device and its ports, they can plug in a keylogger or external drive containing malware, which could allow them to collect data from a user or possibly even to gain control of the device. With direct physical access adversaries can also physically destroy a device, making the device itself, any data stored on it, and any services it provides unavailable.

Securing Spaces

2.2.C
Assess and document risks from physical vulnerabilities.

2.2.C.1
Physical access to devices can allow adversaries to bypass many technical controls and layers of security.

2.2.C.2
High risks from physical vulnerabilities arise when sensitive information or systems are exposed in physical spaces without sufficiently restricted and controlled access.

ILLUSTRATIVE EXAMPLE
A server that stores customer data is in a room with no lock which is accessed via an unmonitored hallway.

2.2.C.3
Moderate risks from physical vulnerabilities arise when a noncritical or nonsensitive part of an organization is left unprotected in a way that it could act as a foothold for an adversary to gain initial access to other resources.

ILLUSTRATIVE EXAMPLE
An office has a reception area beyond which access is controlled; the receptionist has a computer that connects to the office's internal wireless network and the computer has exposed USB ports.

2.2.C.4
Low risks from physical vulnerabilities arise when a vulnerable asset is of low value and the vulnerability is unlikely to be exploited.

ILLUSTRATIVE EXAMPLE
Employees in an office that requires badge access have laptop computers that they leave on their desks unattended when they all go to lunch together. The computers do not contain any sensitive information, but there are no cables securing the devices to the desks.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 2.3

Protecting Physical Spaces

Required Course Content

LEARNING OBJECTIVE

2.3.A

Identify managerial controls related to physical security.

ESSENTIAL KNOWLEDGE

2.3.A.1

Organizations should conduct employee security awareness training to educate employees about how they can contribute to the organization's security by:

- Detecting social engineering attempts like phishing
- Not badging other people into restricted areas
- Preventing device theft

2.3.A.2

Organizations should have a workstation security policy that outlines the measures necessary to protect a physical workplace. The policy may have tiers of workstation security based on the type of data handled at a workstation. Workstation policies often require:

- Locking devices before leaving workstations unattended to prevent unauthorized access
- Clearing sensitive documents off workstations before leaving them unattended (sometimes called a clean desk policy)
- Using a privacy screen filter or other physical barrier to prevent others from viewing information on the screen
- Connecting devices to surge protectors or uninterruptible power supplies (UPS)

Securing Spaces

2.3.B
Determine mitigation strategies for risks from physical vulnerabilities.

2.3.B.1
To determine a relevant control, a cyber defender considers how an adversary could take advantage of a vulnerability to attack a system and how to prevent, detect, or correct the attack.

2.3.B.2
Installing physical controls like fencing, gates, and bollards around a building can deter adversaries from trying to physically access an organization's buildings.

2.3.B.3
Locks on doors, server cabinets, and computers can prevent devices from being accessed or stolen.

2.3.B.4
Card readers can record which employee badges are being used to access different entries at specific times and deny access to unauthorized badges.

2.3.B.5
Access control vestibules and turnstiles can prevent an authorized person from intentionally or accidentally admitting an unauthorized person into a restricted area.

2.3.B.6
Organizations can disable USB ports to prevent external drives from loading malware onto a computer.

2.3.B.7
An uninterruptible power supply (UPS) provides a backup power source for a device in the event of a power outage. Organizations can also use power generators to provide power at a larger scale to a building or set of critical devices.

2.3.B.8
Organizations prioritize risk mitigations based on the severity of the risks and the cost of the recommended mitigations.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 2.4
Detecting Physical Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
2.4.A Identify ways security controls can detect physical attacks.	**2.4.A.1** Cameras can capture a visual record of an adversary's malicious activity. The feed from a camera should be recorded and monitored for maximum effect. Recordings can be especially helpful in after-incident investigations. **2.4.A.2** Security guards can monitor activity in an area and respond to suspicious activity once detected. **2.4.A.3** Motion sensors can alert security to movement in an area. **2.4.A.4** Employees that work in a physical space are often the first to notice the presence of an unauthorized person and can alert security.
2.4.B Determine effective placement of security controls for detecting physical attacks.	**2.4.B.1** When placing cameras, consideration should be given to visual coverage, angle, and the ability to be tampered with by an adversary. Consideration should also be given to what a camera in a specific area could capture an adversary doing and how that information would be helpful. Points of ingress and egress are often monitored by camera. **2.4.B.2** Motion sensors should be placed in areas where traffic is unexpected, like server rooms, or areas where sensitive materials are stored and few people have access. Motion sensors in high-traffic areas create many false alarms, making the alarms less likely to be taken seriously when there is a real security event.

2.4.B
Determine effective placement of security controls for detecting physical attacks

2.4.B.3
Locks should be placed on all entries to areas containing sensitive information or systems. For areas with particularly sensitive information or systems, an organization could use an access control vestibule at the entry point to prevent piggybacking or tailgating.

2.4.B.4
Security guards can be stationary or patrolling. Stationary guards can provide constant protection for a specific area, entrance, or high-value item. Patrolling guards are more difficult for an adversary to plan around and can create time pressure for an adversary. Placing stationary guards at places that funnel traffic (e.g., entry gates, main entrances or lobbies, and entrances to more secure access areas) can be highly effective, while patrolling guards are better suited for perimeters and exterior areas.

2.4.C
Apply detection techniques to identify physical attacks.

2.4.C.1
Cameras provide visual monitoring and a visual record of activity within a designated space. Cameras can be paired with facial recognition software that can provide alerts when unauthorized individuals enter controlled areas. Once a physical breach has been detected, defenders can use live and recorded camera footage to track an adversary's path and actions.

2.4.C.2
Motion detectors work best when paired with cameras. When a security alert is raised because a motion detector has been activated, defenders can use cameras to check the space visually and verify a physical security breach.

2.4.C.3
When employees are required to use an electronic badge to unlock a door to a restricted area, a sensor can record how long the door was open. In reviewing entry logs for the door, potential piggybacking or tailgating can be detected by doors being open for longer than normal lengths of time.

AP CYBERSECURITY

UNIT 3

Securing Networks



~26
CLASS PERIODS

UNIT 3 ~26 CLASS PERIODS

Securing Networks

Developing Understanding

Most digital devices are connected to other devices through a computer network. The transmission of data between devices creates new opportunities for adversaries, so defenders must think carefully about how networks are designed and how data is protected while in transit. In this unit, students learn about common network attacks and how to protect against them. Students study the benefits of network segmentation and learn how to place and configure firewalls to manage network traffic. They also learn how to analyze network log files to find possible indicators of compromise (IoCs).

Building Cybersecurity Skills

In Unit 3, students learn to apply their risk assessment skills in the domain of networking, identifying vulnerabilities and evaluating the likelihood and impact of a vulnerability being exploited to determine the risk. Students learn how to apply security controls to a network to help prevent and deter adversaries, and how to collect and analyze network data to detect attacks. Students also learn how automated tools, including AI, enable faster, more efficient detection of malicious activity on networks.

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 3A:
Protecting Patient Medical Data

You are a network security engineer at Adams County Hospital. Adams County Hospital maintains public servers that run a web application for patients to book appointments and pay bills and an internal file server that stores patient records (see network diagram). You need to determine the best placement for two new firewalls to protect these servers and then configure the servers to meet a set of specifications.

You will:

- Review the building plans and current security controls for this new lab and identify physical vulnerabilities
- Assess the risk from the vulnerabilities identified
- Recommend physical security controls to mitigate these vulnerabilities
- Recommend the placement of monitoring equipment to detect physical security breaches

SCENARIO 3B:
Configuring a Secure Wireless Network

In the aftermath of a natural disaster, as a network technician in the National Guard, you have been called up and asked to set up a secure wireless network at the local high school gymnasium, which has been converted to an emergency shelter, so that those who lost their homes in the disaster can have access to the internet to communicate with family and friends.

There is a satellite link that will provide the access to the internet. Your task is to determine the security features necessary to ensure that the network is safe to use. Your plan should include measures to detect possible malicious activity on the network that would compromise security or performance.

You will:

- Describe configurations to secure the wireless network
- Recommend a collection of detective controls to monitor the network and raise an alert for any potential malicious activity
- Describe the impact of the detective control recommendations

SCENARIO 3C:

Protecting a Network on a Naval Submarine

Submarines are a critical component in a modern navy. Modern submarines have sophisticated control mechanisms that are run by computers that communicate via a secure network. You are a network technician on a naval submarine, and you manage three LANs:

- A dedicated LAN for the weapons systems
- A secure LAN for official naval operations
- A LAN for crew to use for recreation

You will consider the various levels of security needed for each of these LANs and how best to protect each one. Then you will:

- Recommend security features for each LAN
- Use a diagram to demonstrate the recommended security features

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
3.1 Network Vulnerabilities and Attacks	**3.1.A** Identify common network attacks. **3.1.B** Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication. **3.1.C** Assess and document risks from network vulnerabilities.	**3A Protecting Patient Medical Data** ▪ Analyze the current network architecture and determine network vulnerabilities.	6
3.2 Protecting Networks: Managerial Controls and Wireless Security	**3.2.A** Identify managerial controls related to network security. **3.2.B** Configure wireless network security features.	**3B Configuring a Secure Wireless Network** ▪ Describe configurations to secure the wireless network.	3
3.3 Protecting Networks: Segmentation	**3.3.A** Identify techniques for segmenting a network. **3.3.B** Explain why network segmentation can increase network security.	**3C Protecting a Network on a Naval Submarine** ▪ Recommend security features for each LAN. ▪ Use a diagram to demonstrate the recommended security features.	2
3.4 Protecting Networks: Firewalls	**3.4.A** Identify types of network-based firewalls. **3.4.B** Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network. **3.4.C** Determine the effective placement of firewalls in a network. **3.4.D** Configure a firewall to manage the flow of network traffic.	**3A Protecting Patient Medical Data** ▪ Determine the type and placement of Firewalls A and B within the existing network. ▪ Configure Firewall A so that external traffic can securely communicate with the web server while blocking other types of nonrelevant, potentially malicious traffic. ▪ Configure Firewall B so that only employees on the internal network can access patient records on the file server. **3C Protecting a Network on a Naval Submarine** ▪ Recommend security features for each LAN. ▪ Use a diagram to demonstrate the recommended security features.	8
3.5 Detecting Network Attacks	**3.5.A** Identify types of automated security tools used to detect network attacks. **3.5.B** Explain how organizations can leverage artificial intelligence (AI) to enhance threat detection and response. **3.5.C** Determine a network detection method. **3.5.D** Evaluate the impact of a network detection method. **3.5.E** Apply detection techniques to identify indicators of network attacks by analyzing log files.	**3B Configuring a Secure Wireless Network** ▪ Recommend a collection of detective controls to monitor the network and raise an alert for any potential malicious activity. ▪ Describe the impact of the detective control recommendations.	7

TOPIC 3.1

Network Vulnerabilities and Attacks

SUGGESTED SKILLS

1

Analyze Risk

Required Course Content

LEARNING OBJECTIVE

3.1.A

Identify common network attacks.

ESSENTIAL KNOWLEDGE

3.1.A.1

The address resolution protocol (ARP) is used by a default gateway on a network to establish a table that pairs internet protocol (IP) addresses with media access control (MAC) addresses. An ARP poisoning attack is when an adversary sends falsified ARP packets to the default gateway to modify the table so that the adversary's device receives traffic intended for the target by linking the target's IP address to the adversary's MAC address. Faking a MAC address is called MAC spoofing. This is an example of an on-path attack (or man-in-the-middle attack), which is when an adversary interrupts a data stream between two parties, captures both parties' data, and copies or alters the data before sending them on. Both parties think they are communicating directly with each other, but instead they are each communicating with the adversary who is secretly intercepting their messages.

3.1.A.2

A MAC flooding attack is when an adversary sends the target switch many Ethernet frames, each with a different MAC address. This can force the switch into broadcast mode, and the adversary can then collect all of the frames on the network (because they are being broadcast), which could allow the adversary to access sensitive information. This is an example of eavesdropping (or sniffing), which is when an adversary captures data in transit and can record and copy the data.

3.1.A Identify common network attacks.	**3.1.A.3** A domain name system (DNS) poisoning attack is when an adversary pretends to be an authoritative name server (NS) and plants a fake DNS record on a DNS server to redirect browser traffic to a malicious website designed to steal credentials. This is an example of credential harvesting, which is when adversaries set up a fake login site that looks like a real one. Unsuspecting users enter their real credentials, which the adversaries capture and use. **3.1.A.4** A smurf attack attempts to overwhelm a network with Internet Control Message Protocol (ICMP) requests. It is a type of denial of service (DoS) attack, which makes a system or resource unavailable to authorized users. During a smurf attack, an adversary sends many ICMP requests with the victim's address to the network's broadcast address. The network's gateway then sends these requests to all devices on the network. Each device on the network replies to the victim's address, creating a flood of traffic that can block legitimate messages. When multiple devices attack the same target simultaneously, it's called a distributed denial of service (DDoS) attack.
3.1.B Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication.	**3.1.B.1** Adversaries can send malicious traffic into a network to flood it creating a DoS, to map the internal structure of the network, or to spoof a legitimate device. Networks without firewalls, or with improperly configured firewalls, are vulnerable to these types of attacks. **3.1.B.2** Adversaries that have compromised a device often attempt to leverage their access to compromise other devices on the local area network (LAN). **3.1.B.3** Adversaries that physically plug into a data port can gain access to a LAN through the switch port unless port security is enabled. This allows adversaries to launch DoS attacks or perform MAC flooding or MAC spoofing attacks.

3.1.B
Explain how adversaries can exploit network vulnerabilities to steal, disrupt, or destroy network communication.

3.1.B.4
Adversaries standing outside of physically secure spaces can pick up the signals and beacon frames from a wireless access point that is broadcasting outside the physical space. This allows them to gather information about the wireless network and to attempt eavesdropping and cryptographic attacks on it.

3.1.B.5
Adversaries can attempt to join networks to launch attacks from within the networks. Networks that do not authenticate devices and users make it easier for adversaries to join.

3.1.B.6
If there is an open network port, an adversary can plug a wireless access point into the port creating a rogue access point. The adversary could use this rogue access point to access the internal network wirelessly (maybe even from outside the physical space). This allows the adversary direct access to the LAN, bypassing any firewalls.

3.1.B.7
Adversaries can attempt to break wireless encryption and intercept, steal, or compromise data on a network.

3.1.C
Assess and document risks from network vulnerabilities.

3.1.C.1
Vulnerabilities on a network can lead to adversaries being able to intercept and alter data in transit, launch DoS attacks, or move laterally on a network to gain access to more sensitive or critical systems. Network vulnerabilities can constitute a risk to confidentiality, integrity, and availability.

3.1.C.2
There are automated vulnerability scanners that can check networks, devices, and applications for known vulnerabilities. These scanners produce a report that often includes the vulnerabilities detected, their severity, and mitigation recommendations.

3.1.C.3
Successfully exploiting a network vulnerability often requires advanced technical ability and knowledge. This can impact the likelihood of an exploit.

3.1.C
Assess and document risks from network vulnerabilities.

3.1.C.4
High risks from network vulnerabilities allow an adversary to easily have a significant impact by capturing network traffic, spoofing a legitimate device on the network, or launching a DoS attack.

ILLUSTRATIVE EXAMPLE
An organization has a single unsegmented internal network that is accessible via a wireless network with weak encryption, and on that network it has a server running its proprietary web-application.

3.1.C.5
Moderate risks from network vulnerabilities could include vulnerabilities that might give adversaries the ability to gain information about systems or devices on a network.

ILLUSTRATIVE EXAMPLE
An organization's external firewall is not configured to block external ICMP traffic.

3.1.C.6
Low risks from network vulnerabilities include vulnerabilities that would be difficult to exploit and would likely have minimal negative impacts on an organization.

ILLUSTRATIVE EXAMPLE
An organization has wireless access points that broadcast a beacon frame, which contains the network service set identifier (SSID) and the wireless encryption protocols.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 3.2

Protecting Networks: Managerial Controls and Wireless Security

Required Course Content

LEARNING OBJECTIVE

3.2.A

Identify managerial controls related to network security.

ESSENTIAL KNOWLEDGE

3.2.A.1

A router security policy will set forth a minimum configuration standard for routers on an organization's network and may include:

- Banning local user accounts (All router logins must use an approved authentication server.)
- Disabling unnecessary services (e.g., Telnet)
- Requiring a firewall (An organization may opt for a firewall device separate from the router.)

3.2.A.2

A switch security policy will set forth a minimum configuration standard for switches on an organization's network and may include:

- Banning local user accounts (All switch logins must use an approved authentication server.)
- Requiring port security to be enabled.
- Using MAC filtering

3.2.A.3

A virtual private network (VPN) policy will detail the minimum security requirements for employees using a VPN to access an organization's internal network, and it may include:

- A list of roles within the organization that are allowed to use a VPN to access the organization's internal network

3.2.A
Identify managerial controls related to network security.

- Authentication requirements for employees using a VPN (e.g., public/private key system or MFA)
- A prohibition against split tunneling (also called dual tunneling)

3.2.A.4
A wireless security policy will establish the minimum security requirements for wireless networks within an organization and may include:

- Requiring users to authenticate to the wireless network through an extensible authentication protocol (EAP) connected to an approved authentication server
- Requiring all wireless traffic to be encrypted using AES encryption with a minimum key length
- Disabling beacon frames on wireless access points

3.2.B
Configure wireless network security features.

3.2.B.1
Organizations can disable beacon frame broadcasting on wireless access points (WAPs) to make it harder for adversaries to find their wireless network and learn its basic properties.

3.2.B.2
Organizations can control the broadcast direction and signal strength of a WAP so the signal does not extend beyond the physical space the access point is meant to cover.

3.2.B.3
Organizations should enable strong wireless encryption protocols to ensure wireless frames are not readable by adversaries who might intercept them.

- WEP, WPS, and the original WPA wireless encryption protocols have known vulnerabilities and are insecure.
- WPA3 is currently the strongest wireless encryption algorithm.

3.2.B.4
Organizations can enable MAC filtering to prevent unauthorized devices from accessing the network, and they can require users to authenticate when joining a network.

TOPIC 3.3

Protecting Networks: Segmentation

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
3.3.A Identify techniques for segmenting a network.	3.3.A.1 Firewall zones and rules can be used to create a screened subnet (also known as a demilitarized zone, or DMZ)—a network segment that sits between public, external networks like the internet and internal, private networks. A screened subnet is typically is a lower security zone than the internal, private networks, and it typically holds an organization's publicly facing resources, separating them from the internal network.
	3.3.A.2 Subnetting can be used to create different subnets based on IP addressing. If a device is compromised by an adversary, subnets can contain a security breach to reduce the number of exposed devices.
	3.3.A.3 Switches can be used to create VLANs, which logically separate devices physically connected to central switches.
3.3.B Explain why network segmentation can increase network security.	3.3.B.1 Network segmentation refers to the process of dividing a network into smaller, isolated segments or subnetworks (subnets).
	3.3.B.2 Dividing a network into smaller subnets isolates network traffic, which can prevent attacks on one subnet from impacting devices on other subnets.

3.3.B
Explain why network segmentation can increase network security.

3.3.B.3
Network segmentation can allow for different security policies and controls to be applied to different segments of the network, allowing for higher security zones and lower security zones.

3.3.B.4
Port security on a switch can prevent MAC flooding by limiting the number of addresses assignable to any single switch port.

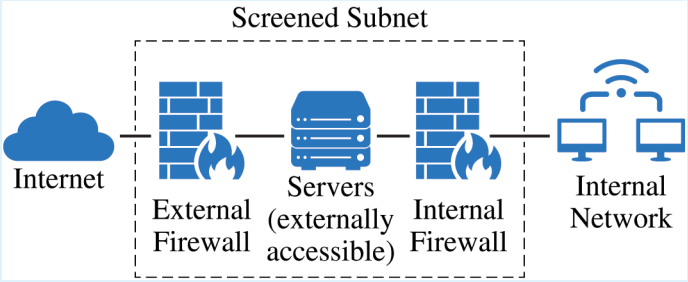


FIGURE 3.3: Screened Subnet (also referred to as DMZ)

A screened subnet, also known as a DMZ, is a part of a network that is behind a firewall but still externally accessible. Screened subnets often contain servers that host web applications or websites. Beyond the screened subnet is a second firewall that more strictly restricts access to the LAN behind it.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 3.4
Protecting Networks: Firewalls

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
3.4.A Identify types of network-based firewalls.	3.4.A.1 A firewall is used to allow or deny network traffic in or out of a network. The firewall itself is software that can be hosted on a standalone device or integrated into another network device, such as a router. 3.4.A.2 A stateless firewall filters traffic based on information in packet headers, such as IP addresses, ports, and protocols. 3.4.A.3 A stateful firewall (also known as dynamic packet filtering) tracks the state of network connections passing through the firewall and can filter according to connection-related rules in addition to the filtering done by a stateless firewall. This allows for more control over content allowed in and out of a network. 3.4.A.4 A next-generation firewall (NGFW) has both the capabilities of typical stateless and stateful firewalls and additional advanced features, such as intrusion prevention, deep packet inspection, and filtering by application type.
3.4.B Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network.	3.4.B.1 Network administrators create a set of rules, called an access control list (ACL), that a firewall uses to permit or deny inbound and outbound network traffic.

3.4.B Explain how a firewall uses an access control list to allow or deny traffic entering or leaving a network.	**3.4.B.2** ACL rules are checked in order and the first rule that matches the criteria will be executed for the specified data. **3.4.B.3** A typical ACL will specify the direction of traffic (inbound or outbound), the criterion to filter by (IP addresses, logical port, service, or application), and the action to take (permit or deny).
3.4.C Determine the effective placement of firewalls in a network.	**3.4.C.1** Each segment of a network should have a firewall to control the flow of data in and out of that segment. **3.4.C.2** Network segments may have different security needs based on the data and services within them. The level of security for each firewall can be set independently. **3.4.C.3** Each point of data ingress and egress between the internal network and the public internet should have a firewall.
3.4.D Configure a firewall to manage the flow of network traffic.	**3.4.D.1** The requirements for a firewall will specify what type of traffic from which sources or to which destinations should be allowed or denied. **3.4.D.2** Specific rules for a firewall can allow or deny inbound or outbound traffic based on source or destination port or IP address, service, protocol, or application. **ILLUSTRATIVE EXAMPLES** ▪ **`Allow inbound TCP port 22 from ALL;`** (this rule will allow all inbound TCP traffic with destination port 22, which is the designated port for the SSH protocol) ▪ **`Deny inbound TCP port 80 from 192.168.1.0/24;`** (this rule will deny inbound TCP traffic with destination port 80 from IP addresses in the 192.168.1.0-192.168.1.255 range)

3.4.D
Configure a firewall to manage the flow of network traffic.

3.4.D.3
Rules are implemented in order, and changing the order of a set of rules can change which traffic is allowed or denied. Consideration must be given to the precedence of filtering priorities when establishing the order of rules.

ILLUSTRATIVE EXAMPLES

This set of rules would allow SSH traffic and deny other inbound TCP traffic

- Rule 1: `ALLOW inbound TCP port 22 from ALL;`
- Rule 2: `DENY inbound TCP ALL from ALL;`

Reversing the order of those rules would deny all inbound TCP traffic including SSH traffic.

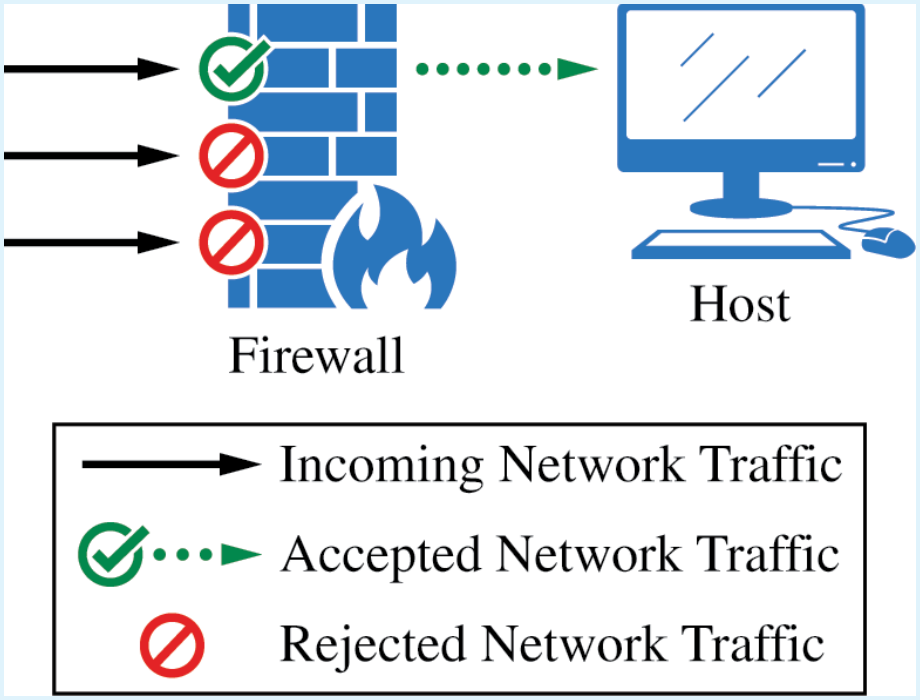


FIGURE 3.4: The Process of Firewalls

A firewall is used to admit or deny traffic entry into a network or host. Firewalls might use source IP addresses, destination IP addresses, or logical ports to filter traffic. This illustration depicts a firewall controlling incoming traffic. Note that firewalls can control traffic into, out of, and within a network.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 3.5
Detecting Network Attacks

Required Course Content

LEARNING OBJECTIVE

3.5.A
Identify types of automated security tools used to detect network attacks.

ESSENTIAL KNOWLEDGE

3.5.A.1
Automated detection tools analyze data collected from an organization's network and devices, such as switches and routers, servers, firewalls, and user computers. These data are often collected in a log file.

3.5.A.2
A network intrusion detection system (NIDS) is an automated tool that analyzes data to determine if malicious activity is taking place on a network. When an attack is detected, it generates an alert.

3.5.A.3
A network intrusion prevention system (NIPS) is an automated tool that, like an IDS, analyzes data to determine if malicious activity is taking place on a network. A NIPS can also mitigate or halt an attack by closing ports, blocking specific IP or MAC addresses, or rejecting specific protocols.

3.5.A.4
A security information and event management (SIEM) system collects and analyzes data from multiple sources (including firewalls, NIDS/NIPS, device logs, and application logs) to detect patterns that may indicate a cyberattack and raises an alert if a potential attack is detected. Security analysts investigate the alert to determine whether it represents a true threat and follow standard operating procedures to resolve or escalate the alert.

3.5.B Explain how organizations can leverage artificial intelligence (AI) to enhance threat detection and response.	**3.5.B.1** Computers log every action that users take. Firewalls, IDS, IPS, and other network sensors log all the traffic passing through various points in a network. A medium-sized organization's network is logging millions (or even tens of millions) of data points per day. Even a large team of humans is incapable of analyzing so much data. **3.5.B.2** Threat detection teams are creating AI algorithms to analyze large amounts of data and classify the data patterns as malicious or normal. **3.5.B.3** AI models for threat detection are based on probabilistic calculations; they report a percentage to indicate the likelihood that something is malicious. **3.5.B.4** Organizations determine their own thresholds for what percentage of likelihood of a threat results in an alert. If the threshold is set too high, real attacks may go undetected; if the threshold is too low, the security team will be overwhelmed with false alerts.
3.5.C Determine a network detection method.	**3.5.C.1** Volume of network traffic is a criterion for determining a detection method. Signature-based detection is more efficient for networks with high traffic volume. Signature-based detection compares detection data to a database of known indicators of compromise (IoCs), called signatures. Signature databases must be updated with IoCs for the latest attacks. Signature-based detection runs more quickly than anomaly-based detection. **3.5.C.2** Consistency of network traffic patterns is a criterion for determining a detection method. Anomaly-based detection is most effective on networks with consistent traffic patterns. Anomaly-based detection compares detection data to a baseline of recorded activity. Baselines must be recorded on uncompromised systems to establish expected data types and volumes. Anomaly-based detection triggers an alert or action when data types or volumes outside of a specified tolerance range are recorded. Anomaly-based detection relies on consistent patterns in network traffic to detect anomalous traffic patterns.

3.5.C
Determine a network detection method.

3.5.C.3
Degree of sensitivity or criticality of a network is a criterion for determining a detection method. Networks with more sensitive or critical data or services will likely consider a hybrid approach. Hybrid detection combines signature-based and anomaly-based detection. Hybrid detection is more expensive than using either signature- or anomaly-based detection alone, and hybrid-detection models generate more alerts.

3.5.C.4
Likelihood of novel attacks on a network is a criterion for determining a detection method. Signature-based detection cannot detect a new attack. When an organization suspects that adversaries are likely to attempt a new attack on a network, anomaly-based detection is the preferred method when the cost of hybrid detection is prohibitively high.

3.5.D
Evaluate the impact of a network detection method.

3.5.D.1
Speed of detection is a factor in evaluating the impact of a network detection method. Faster detection enables faster response. Signature-based detection methods are faster than anomaly-based detection methods, especially on networks with high traffic volume.

3.5.D.2
Cost is a factor in evaluating the impact of a network detection method. Detection tools and ongoing costs need to be within a budget. Anomaly-based detection systems require more expensive hardware to operate than signature based. Hybrid detection is the most expensive option because it combines both anomaly- and signature-based methods.

3.5.D.3
False positive rate is a factor in evaluating the impact of a network detection method. Signature-based detection has almost no false positives. Anomaly-based or hybrid detection will have higher false positive rates. Impacts of high false positive rates include:

- Time and resources are put toward investigating alerts for nonmalicious activity.
- Alert fatigue is a condition that occurs when responders get accustomed to false positives and take alerts less seriously because they assume alerts are false positives before investigating them.

3.5.D Evaluate the impact of a network detection method.	**3.5.D.4** False negative rate is a factor in evaluating the impact of a network detection method. A false negative occurs when an adversary can bypass a detection system. Signature-based detection systems are easier to bypass than anomaly-based or hybrid systems. False negatives can result in adversaries causing loss, harm, disruption, or destruction to data and systems.
3.5.E Apply detection techniques to identify indicators of network attacks by analyzing log files.	**3.5.E.1** Evil-twin attacks can be detected by regularly scanning for service set identifiers (SSIDs) that look suspicious or similar to local legitimate SSIDs. Signal triangulation can be used to locate and disable an access point broadcasting an evil-twin network. **3.5.E.2** Jamming attacks can be detected by recognizing that no wireless devices in a specific physical space are able to connect to a wireless network and by scanning for electromagnetic (EM) noise in the wireless range. **3.5.E.3** ARP poisoning attacks can be detected by monitoring network traffic for unusual ARP messages (particularly duplicate MAC address ARP packets) and checking the ARP table on the default gateway. **3.5.E.4** MAC flooding attacks can be detected by monitoring network traffic for an unexpected surge of Ethernet frames with different MAC addresses and checking the MAC address table on a switch. **3.5.E.5** DNS poisoning attacks are difficult to detect. However, if an organization's website experiences an abrupt and otherwise inexplicable drop in traffic, DNS records should be examined as a potential cause. **3.5.E.6** Smurf attacks can be detected by watching network traffic for a sudden increase in ICMP requests sent to the network's broadcast address.

3.5.E
Apply detection techniques to identify indicators of network attacks by analyzing log files.

3.5.E.7
Network-based IoCs are discovered when analyzing network traffic, often in the form of packet capture files. Indicators can be found in source and destination IP addresses, ports, and protocols. These can include:

- Connections to known malicious IP addresses
- Unauthorized network scans
- Unusual spikes or slow downs in network traffic
- Mismatched port-application traffic

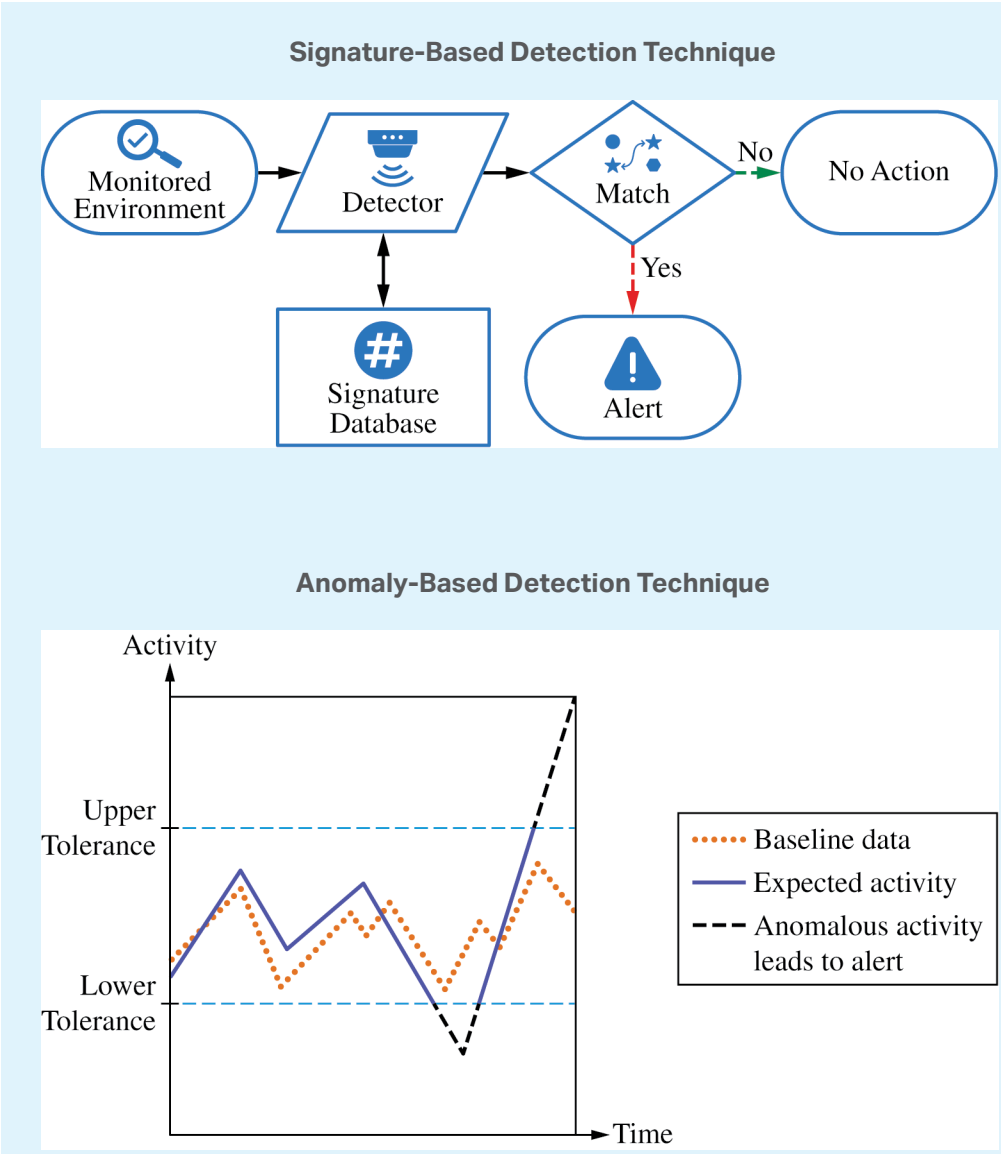


FIGURE 3.5: Signature-Based vs. Anomaly-Based Detection Techniques

Signature-based detection (top) showcases identification of known malware through digital signatures, relying on predefined patterns for efficient threat detection. Anomaly-based detection (bottom) demonstrates detection of new threats by analyzing deviations from normal behavior, identifying potential risks based on abnormal patterns. This enhances overall security measures.

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AP CYBERSECURITY

UNIT 4

Securing Devices



~23
CLASS PERIODS

UNIT 4 ~23 CLASS PERIODS

Securing Devices

Developing Understanding

Computer devices store, process, and transmit all the digital data in the world. Devices include computer systems and laptops, smart phones and tablets, and a range of items that have microcomputers installed in them, like washing machines and coffee makers—these are often called smart devices or IoT (Internet of Things) devices. In Unit 4, students learn about how systems authenticate users of devices and how adversaries attempt to impersonate legitimate users. Students come to understand how adversaries use malware to compromise devices and the importance of keeping devices updated and of using anti-malware software. Students also learn how to analyze log files for indicators of compromise (IoCs).

Building Cybersecurity Skills

As more everyday items incorporate embedded computers, device vulnerabilities and attacks are growing rapidly. In this unit, students learn to assess risk based on these new vulnerabilities. They learn how devices can be protected as another part of a defense-in-depth security strategy. Students also practice detecting attacks against devices by reviewing authentication logs for IoCs.

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 4A:
Designing Secure Connected Farm Equipment

You work as a security engineer for a company that manufactures internet-connected machinery for agricultural purposes (e.g., tractors, irrigation tools, and automated milking machines for dairy farms). These machines all have onboard computers that allow farmers to remotely control the devices. The computers are updated on an as-needed basis. Some of the machines use GPS to locate and maneuver themselves.

There have been reports of cyberattacks against farming equipment, and your boss has asked you to write a report detailing possible vulnerabilities with suggested mitigations to ensure that the machines your company produces are as safe as possible.

You will:

- Research how an adversary might take advantage of internet-connected farm equipment, and assess the risk from possible vulnerabilities
- Determine possible mitigation strategies to help secure the equipment
- Produce a report for your manager, summarizing your findings and making recommendations

SCENARIO 4B:
Configuring Authentication Settings

You are a junior system administrator at Aceshack, an engineering firm. A new desktop computer has been set up in a drop-in area of Aceshack's office for remote workers who are coming in just for the day. This new computer needs the security settings configured to comply with Aceshack's policies.

You will log on to this computer as an administrator and configure the local security settings related to the password and account-lockout policies.

SCENARIO 4C:
Analyzing Log Files for Indicators of Compromise

You are a forensic analyst for Dynamic, a local manufacturing company. Dynamic has separate networks for its offices and its manufacturing plants. Last month, there was a cyberattack against its business office network, but the adversaries were not able to compromise the manufacturing network. However, the security team has detected continued suspicious activity on the business network, and

they are concerned that the suspicious activity may stem from the original attack and may eventually lead to the manufacturing environment also being compromised. You have been asked to analyze the authentication logs for devices on the manufacturing network for signs of adversaries attempting to compromise the manufacturing plant.

You will:

- Review authentication logs for devices on the manufacturing network
- Identify any potential indicators of compromise (IoCs)
- Submit a report summarizing your findings and recommendations

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
4.1 Device Vulnerabilities and Attacks	**4.1.A** Identify types of computing devices. **4.1.B** Identify the type of malware used in a cyberattack. **4.1.C** Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction. **4.1.D** Assess and document risks from device vulnerabilities.	**4A Designing Secure Connected Farm Equipment** ▪ Research how an adversary might take advantage of internet-connected farm equipment, and assess the risk from possible vulnerabilities. ▪ Produce a report for your manager, summarizing your findings and making recommendations.	6
4.2 Authentication	**4.2.A** Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords. **4.2.B** Explain how password attacks exploit vulnerabilities. **4.2.C** Determine the type of authentication used to verify the identity of a user. **4.2.D** Configure login settings to make a device more secure.	**4B Configuring Authentication Settings** ▪ Configure the local security settings related to the password and account-lockout policies.	5
4.3 Protecting Devices	**4.3.A** Identify managerial controls related to device security. **4.3.B** Explain how anti-malware software can make a device more secure. **4.3.C** Explain why keeping a device's operating system and software updated makes it more secure. **4.3.D** Configure a host-based firewall.	**4A Designing Secure Connected Farm Equipment** ▪ Determine possible mitigation strategies to help secure the equipment.	5
4.4 Detecting Attacks on Devices	**4.4.A** Explain how to detect attacks against devices. **4.4.B** Determine controls for detecting attacks against a device. **4.4.C** Evaluate the impact of a device detection method. **4.4.D** Apply detection techniques to identify indicators of password attacks by analyzing log files.	**4C Analyzing Log Files for Indicators of Compromise** ▪ Review authentication logs for devices on the manufacturing network. ▪ Identify any potential IoCs. ▪ Submit a report summarizing your findings and recommendations.	7

SUGGESTED SKILLS

1

Analyze Risk

TOPIC 4.1
Device Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
4.1.A Identify types of computing devices.	4.1.A.1 Server computers are devices that provide one or more services to other computers (e.g., DNS, DHCP, FTP). Any computer can be a server, and in an enterprise environment servers typically have more processing power and storage than a personal computer. 4.1.A.2 Personal computers are devices that are designed to be used by one person for work or recreational purposes (e.g., word processing, graphic design, web browsing, and media production or viewing). These include desktop, laptop, and notebook computers. 4.1.A.3 Handheld computers (also called mobile computers or information appliances) are smaller than personal computers and run on battery power. These include tablets, smartphones, and wearable technology like smart watches. 4.1.A.4 Embedded computers are devices that are part of a machine. Embedded devices have specific instruction sets for interfacing with the specialized components of the machine they're embedded in. Embedded computers tend to be slower and cheaper than other computers and have minimal storage.

4.1.A
Identify types of computing devices.

4.1.A.5
Everyday devices with embedded computers are often called Internet of Things (IoT) devices. Embedded computers are found in transportation (e.g., cars, trains, and airplanes), devices that operate critical infrastructure (e.g., operating circuit breakers at electrical substations and pumps at water treatment plants), medical equipment (e.g., IV pumps, MRI scanners, pacemakers, and insulin pumps), and everyday devices like washing machines, coffee makers, and thermostats.

4.1.B
Identify the type of malware used in a cyberattack.

4.1.B.1
Malware is malicious software that can damage or destroy a device or network, or allow an adversary access to a device and the data on the device.

4.1.B.2
Malware is often used as a tool to accomplish part of an adversary's plan to achieve their ultimate goal(s). There are many types of malware, such as:

- Viruses are malware that must be activated by a user executing or opening a file.
- Worms spread from one computer to another without human interaction.
- Trojans are malware embedded in other software that seems harmless. Remote access trojans (RATs) provide an adversary with remote access to the target system.
- Ransomware encrypts a device's files, preventing the user from accessing files on the device. The ransomware typically presents the user with a screen demanding payment and promising to give the user a decryption key for their files if the user pays within a fixed amount of time.
- Spyware tracks a user's actions on a computer and sends information back to an adversary.
- A keylogger is software or hardware that logs the users keystrokes and sends the information back to the adversary. Adversaries can often extract usernames and passwords from keylogger data.
- Logic bombs are set to trigger their effect only when a specific set of conditions are met; the conditions can include time and date, specific type or version of the operating system, character set the computer is using, etc.

4.1.B
Identify the type of malware used in a cyberattack.

- A rootkit is sophisticated malware that gets into the target computer's operating system and can control nearly every aspect of the system, including making the rootkit itself invisible to detection.

4.1.B.3
While most malware is a file or a collection of files, fileless malware is malicious code that lives in RAM and uses legitimate programs already installed on a device to compromise it.

4.1.C
Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction.

4.1.C.1
Adversaries can develop exploits for known vulnerabilities in software (including operating systems). Devices with unpatched software are vulnerable to these exploits, which could allow an adversary to crash a system, view user actions, enable or disable various services or components on the device (e.g., turning on a webcam or microphone), or even take control of the device to issue their own commands including commands to steal or destroy information on the device.

4.1.C.2
Adversaries can take advantage of weak authentication requirements by guessing a user's password or using social engineering to get a user to divulge their password.

4.1.C.3
When systems don't have a password on the basic input output system (BIOS) or unified extensible firmware interface (UEFI), an adversary can boot a computer into a special mode (e.g., "recovery mode") that gives them higher-level privileges. Without BIOS or UEFI protection, adversaries can load their own operating system onto a device from an external drive and use specialized tools to alter or create user profiles, including changing user passwords.

4.1.C.4
Adversaries can load malware onto an external drive, and if autorun is enabled, then a device will run the malware when the external drive is inserted.

4.1.C.5
Adversaries can leverage open ports to connect to a device.

4.1.C
Explain how adversaries can exploit common device vulnerabilities to cause loss, damage, disruption, or destruction.

4.1.C.6
Adversaries can send malicious data to devices to disrupt them or attempt to take control of them. Devices that have no firewall (or a misconfigured firewall) cannot filter out this malicious data.

4.1.C.7
Adversaries often attempt to install malware on a device to disrupt or control it. Devices lacking anti-malware software are more vulnerable to this type of attack.

4.1.D
Assess and document risks from device vulnerabilities.

4.1.D.1
Risk from device vulnerabilities can come from unauthorized access or malware that allow an adversary to impersonate an authorized user, remotely control a device, encrypt a device's drive to ransom the data, or wipe a device's memory, destroying data or rendering the device inoperable. The level of risk varies depending on the criticality of the device or the services the device provides or data it stores.

4.1.D.2
High risks from device vulnerabilities involve potentially compromising sensitive data or critical operations.

ILLUSTRATIVE EXAMPLE
An organization has not installed the most recent update for their email server which included a patch for a known critical vulnerability.

4.1.D.3
Moderate risks from device vulnerabilities can arise from weak authentication requirements or from vulnerabilities that would be less likely to be exploited.

ILLUSTRATIVE EXAMPLE
A water treatment plant has embedded systems controlling pumps. The pumps can be remotely accessed via username and password for remote management for the plant, but the devices do not require multi-factor authentication (MFA).

4.1.D.4
Low risks from device vulnerabilities are typically related to vulnerabilities that, if exploited, would have little impact.

ILLUSTRATIVE EXAMPLE
An employee's laptop has telnet port 23 open.

TOPIC 4.2
Authentication

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

4.2.A

Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords.

ESSENTIAL KNOWLEDGE

4.2.A.1

A cryptographic hash function (also called a message digest function) is a mathematical algorithm that takes binary data of an arbitrary length, processes it according to a set of instructions, and outputs a fixed-length binary string called the hash (or checksum or message digest). Well known cryptographic hashes include:

- MD5
- SHA-1, SHA-256, SHA-512 (SHA stands for Secure Hash Algorithm)
- NTHash
- RIPEMD-160

4.2.A.2

An n-bit hash has 2^n possible outputs. The number of inputs is infinite, and so inevitably two different inputs will produce the same hash. This is called a collision.

4.2.A.3

Cryptographic hash functions have the following properties:

- Hashes are collision resistant; it is difficult to find two different inputs to the same hash function that produce the same output.
- Hashes have pre-image resistance; given a hash, it is infeasible to figure out the input that generated the hash.
- Hashes are repeatable; the same input will always produce the same hash.
- Hashes have a fixed length; the length in bits of the hash for a specific hash function is constant regardless of the size of the input.

4.2.A
Explain why hashes (also called hash outputs, checksums, message digests, or digests) are used to store passwords.

4.2.A.4
Adversaries try to compromise hashing functions by forcing collisions in their output. If an efficient algorithm exists to force a collision for a specific hash function, then that hash function will be deprecated (no longer used in secure settings). MD5 and SHA1 are examples of deprecated hash functions.

4.2.A.5
Password-based authentication services shouldn't store passwords in plaintext, so that if an adversary gains access to the user:password directory they won't immediately know the passwords for all users. Instead, user passwords should be hashed and the hash stored in a database. When a user enters their password, it is hashed, and the hash is compared to the hash stored on file. If the hashes match, then the user is authenticated.

4.2.A.6
If two users had the same password, then their passwords would have identical hashes in the user:password directory. To prevent this, a few random bits (called salt) are hashed with a user's password to generate the hash. Each user's salt is unique, so even if two users have the same password they will have a different password hash because they have different salt.

4.2.B
Explain how password attacks exploit vulnerabilities.

4.2.B.1
If an adversary can compromise the password of a legitimate user, and that user's organization has not enabled MFA or other authentication protections, then the adversary can act within that organization with all the access and rights available to the user.

4.2.B.2
Password attacks can be classified as online or offline.

- Online password attacks attempt user:password combinations in an active authentication portal.
- Offline password attacks have captured a user:password database and can run password attacks against the database on their own computer. This method bypasses any account lock out protections that may be in place.

4.2.B
Explain how password attacks exploit vulnerabilities.

4.2.B.3
Many users reuse the same passwords (or variations of the same password) for all the services and accounts they have, despite warnings not to. When an organization's user database is stolen, the usernames, emails, and passwords are sold to adversaries or posted online. Adversaries often begin an attempt to compromise an account by trying stolen or leaked credentials for a target individual.

4.2.B.4
Many users set passwords that are easy to guess, and adversaries will attempt to guess common passwords for a user's account. Password spraying is an attack where an adversary attempts a common password against many different user accounts.

4.2.B.5
Some services and devices (e.g., switches, routers, and IoT devices) are preconfigured with a default administrative user and password. Credential stuffing is an attack where an adversary attempts to gain access to these services or devices using common default credentials or account credentials that have been stolen.

4.2.B.6
Offline password attacks use automated hash-cracking tools to hash possible passwords and compare them against a captured hash. Although hashes can't be reversed, an adversary can use these tools to hash many potential passwords and compare them to the target hash. If an adversary finds a hash that matches, they can use the password that generated the hash to login to the user's account. Offline attacks include:

- Brute force attacks, where an adversary uses an automated tool to test all the potential passwords that a user could have
- Dictionary attacks, where an adversary uses an automated tool to test a list of common passwords

4.2.B.7
A rainbow table attack uses a list of common passwords to generate a rainbow table. A rainbow table is a table that contains each potential password and its hash. The table is then sorted by the hashes, and the adversary uses an automated tool to search the list of hashes for the captured hash. If the hashes match, then the adversary has found a password that generates the same hash, and the password will allow the adversary to login to the user's account.

4.2.C
Determine the type of authentication used to verify the identity of a user.

4.2.C.1
Authentication mechanisms are technical controls that verify the identity of a user to ensure that only authorized users access a system. The proof the user provides to identify themselves is called a factor. Common authentication factors include:

- Something the user knows (knowledge factor)
- Something the user has (possession factor)
- Something the user is (biometric factor)
- Somewhere the user is (location factor)

4.2.C.2
Knowledge factors can be passwords, PINs, or answers to preselected challenge questions. For a knowledge factor to be effective it needs to be something an adversary can't easily guess; however, knowledge factors that are difficult for an adversary to figure out can also be harder for a user to remember.

4.2.C.3
A possession factor is an object a user has that is unique to them, such as an access card, a bank card, a cell phone, or an authentication token. The more difficult it is for an adversary to obtain the object (or a copy of it), the more secure the possession factor is.

4.2.C.4
Biometric factors measure features of the human body and can include fingerprints, palm prints, facial recognition, iris or retina scans, or voice identification. Biometric factors are difficult for an adversary to duplicate because they are unique to an individual.

4.2.C.5
Location factors use information about Wi-Fi signals, GPS data, time zone settings, and even IP address information to make determinations about location. Rules can be established for allowing or denying access based on a location factor.

4.2.C.6
Multifactor authentication (MFA) is when a system uses more than one factor to authenticate a user. MFA is more secure than single-factor authentication because it requires the user to provide at least two separate factors of authentication.

4.2.D
Configure login settings to make a device more secure.

4.2.D.1
Requiring complexity in passwords is a login setting that can be configured. When enabled, users setting a new password must include at least one character from each character set. Passwords with characters from each character set are significantly harder for an adversary to crack than passwords that use characters from only one or two character sets. The main character sets often required are:

- Uppercase letters (A–Z)
- Lowercase letters (a–z)
- Numeric digits (0–9)
- Special characters (!"#$%&'()*+,-./:;<=>?@ [\ ] ^_ ` {|}~)

4.2.D.2
Requiring a minimum password length is a login setting that can be configured. This means that users must have at least a certain number of characters in their password. The longer and more complex a password is, the longer it will take a digital tool to crack the password.

4.2.D.3
Requiring a maximum password age is a login setting that can be configured. When configured, users will receive a prompt to change their password a certain number of days after their last password change, usually every 90 or 120 days. If a user's password has been compromised, changing it could prevent an adversary from gaining access to the user's account. However, some national standards recommend that organizations not require users to change their passwords on predefined intervals to discourage users from developing password patterns (e.g., PasswordFall2028).

4.2.D.4
Requiring the system to store a certain number of previous user passwords is a login setting that can be configured. This prevents a user from reusing a password. Many organizations store users' previous 5–10 password hashes to prevent reuse.

4.2.D.5
Requiring a lockout period after a certain number of invalid login attempts is a login setting that can be configured. This prevents an adversary from continuously randomly attempting wrong passwords. Many organizations lock a user's account after 3–5 invalid login attempts. The period of the lockout varies.

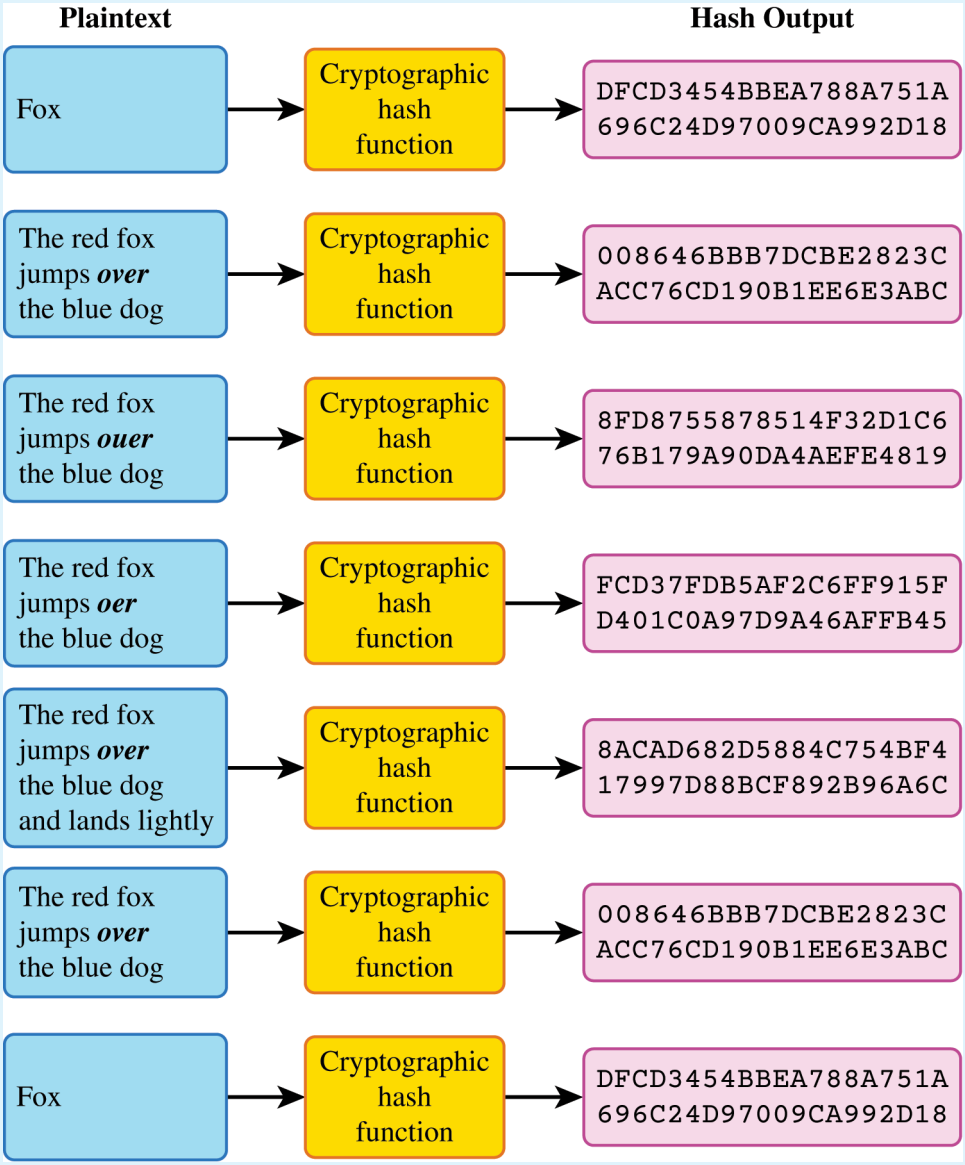

FIGURE 4.2A: The Cryptographic Hash Function

The purpose of a cryptographic hash function is to verify the integrity of data and to show that the data have not been altered. Here, notice that any misspelling, additional text, or changes to the input will completely alter the hash output (also known as the checksum, message digest, or digest). However, any inputs that are exactly the same—such as the first and last, and the second and sixth—result in the same exact digest. The cryptographic hash function is one-way, meaning that a user cannot derive the input from the digest.

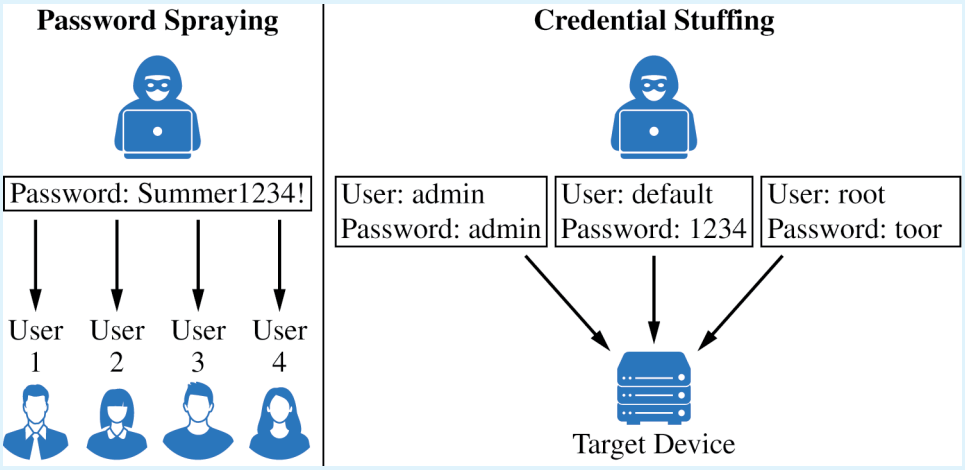

FIGURE 4.2B: Types of Password Attacks – Password Spraying vs. Credential Stuffing

Password spraying (left) depicts an attack method in which adversaries attempt a few commonly used passwords across many accounts to attempt to gain unauthorized access, exploiting weak password policies and practices. Credential stuffing (right) shows attempts to use common credentials from one service to access other accounts, highlighting the risk of using default or common usernames and passwords.

Adversary gets access to a database of hashed passwords.



Username	Password Hash
User 1	5aa910da8a49fd01d52e96843945c921
User 2	d386bc67675e9b6c5215dedf0b4b86a7
User 3	2c61ebff5a7f675451467527df66788d

Hashing algorithms cannot be reversed.

The adversary makes a table of all possible passwords and generates a hash for all of them. This is called a rainbow table. The adversary can search the rainbow table for the hashes that match those in the database.

Plaintext Password	Password Hash
tEsT987	d386bc671a3f9c1e7b42d8f05c6a9be
!2345	d386bc6720d7a4c9e2f1b6a5c8e3d9f
Password123	d386bc673b8e5f0c3a7d2e9b1c4a6d5
L0veC@t$	d386bc6759c1d5a7e0f3b8a2e4c6d9b
Summ3rFun!	d386bc67675e9b6c5215dedf0b4b86a7
B1rdW4tcher	d386bc6794f2a9d0c6e5b1a8d3c7e9f

Because the hash for User 2's password is the same as the hash for the string "Summ3rFun!", the adversary may be able to use this string as User 2's password to gain access to User 2's account.

FIGURE 4.2C: Types of Password Attacks – Rainbow Table Password Attack

The rainbow table (bottom table) contains precomputed hashes for many possible plaintext passwords, sorted alphanumerically. By comparing the hashed passwords from a compromised database (top table) against this table, an adversary can quickly find matching hashes and identify corresponding plaintext passwords. This illustrates the effectiveness of rainbow tables in recovering passwords from unsalted hash databases through hash comparison.

TOPIC 4.3

Protecting Devices

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

4.3.A

Identify managerial controls related to device security.

ESSENTIAL KNOWLEDGE

4.3.A.1

An acceptable use policy will describe the range of activities that are permissible, prohibited, or required by users on devices owned by an organization and may include:

- Prohibiting users from accessing specific websites or types of websites (e.g., social media or gaming)
- Requiring users to keep software updated
- Allowing users to connect peripheral devices
- Prohibiting users from connecting external drives or media

4.3.A.2

A password policy will detail the requirements for user passwords within an organization and may include:

- A minimum or maximum password length
- A minimum or maximum amount of time a user may keep the same password
- A prohibition of password reuse
- Rules for password construction (e.g., no dictionary words and character set requirements)
- A suggestion to use secure password management tools instead of writing passwords down

4.3.A Identify managerial controls related to device security.	**4.3.A.3** A software installation policy will describe what (if any) software users are allowed to install on their devices and usually also a process for users to request specialized software they may need to perform their role, and it may include: ▪ A prohibition against users installing software on their devices ▪ A process for users to request new software needed for their role ▪ A list of approved software for users
4.3.B Explain how anti-malware software can make a device more secure.	**4.3.B.1** Anti-malware software (sometimes called antivirus software) has tools to quarantine and remove malware that can corrupt, spy on, or destroy a system. Malware contains indicators that make it detectable; these indicators are called signatures. **4.3.B.2** Anti-malware software has a database of malware signatures. It periodically scans the files on a device and checks to see if any of the files match any of the signatures in its database. If there is a match, the software quarantines and removes the malicious files.
4.3.C Explain why keeping a device's operating system and software updated makes it more secure.	**4.3.C.1** When vulnerabilities in operating systems and software are found, the vendor or organization that maintains the operating system software will fix it and send an update. A small update is called a patch. **4.3.C.2** Ensuring that a computer's operating system and software applications are updated to the most recent version prevents adversaries from taking advantage of a known vulnerability.
4.3.D Configure a host-based firewall.	**4.3.D.1** Host-based firewalls allow or deny traffic into or out of a single device. This provides an extra layer of security in case a host is connected to a compromised network. **4.3.D.2** A host-based firewall is software that runs on a device and follows a set of rules (an ACL) like a network-based firewall. Firewall rules are implemented in order, applying the first rule that matches.

4.3.D
Configure a host-based firewall.

4.3.D.3
A host-based firewall can also block specified types of outbound traffic. Host-based firewalls should always block ports or services not needed for a given device.

ILLUSTRATIVE EXAMPLES
A host-based firewall is configured to block outbound FTP traffic. This prevents an adversary with remote access to the host from using FTP to exfiltrate a file to the adversary's server.

4.3.D.4
The rules for a host-based firewall can allow or deny traffic based on source or destination port or IP address, service, protocol, or application.

SUGGESTED SKILLS

3

Detect Attacks

TOPIC 4.4
Detecting Attacks on Devices

Required Course Content

LEARNING OBJECTIVE

4.4.A

Explain how to detect attacks against devices.

ESSENTIAL KNOWLEDGE

4.4.A.1

System processes and settings, login attempts, file download attempts, and user actions are logged by computing systems. These logs can be used to reconstruct circumstances leading up to and during a cyber incident.

4.4.A.2

An indicator of compromise (IoC) is evidence that an adversary has compromised a device or network.

4.4.A.3

Authentication logs (or auth logs) record every attempted login on a system. Analysis of authentication logs can reveal attempted attacks.

4.4.A.4

Host-based IoCs are discovered when analyzing logs and configuration settings. Indicators, such as the following, can be found in authentication logs, user activity logs, and system configuration files:

- Unusual files being created or modified
- Unexpected processes or services
- Unauthorized changes to system configuration settings
- Unauthorized software installation or update

4.4.A
Explain how to detect attacks against devices.

4.4.A.5
File-based IoCs are discovered when analyzing files on a device. Indicators are usually found in executable files and can include:

- Files whose hash matches known malware
- File names that are known to be created by a certain piece of malware
- File paths that are associated with malicious activity

4.4.A.6
Behavior-based IoCs are discovered when analyzing logs. Indicators can be found in authentication logs and access logs and can include:

- Multiple failed login attempts
- Unusual login times or locations
- Unauthorized attempts to access sensitive data
- Attempts to elevate user privileges on a system

4.4.B
Determine controls for detecting attacks against a device.

4.4.B.1
Performance is a criterion for determining a detection method. Detection tools use system memory and processing power and can impact the performance of a device. Anomaly-based detection tools use more system resources than signature-based tools. Signature-based detection is a better option for devices with less powerful system resources. Many embedded devices do not have enough system resources to run any detection tools on the device.

4.4.B.2
Cost is a criterion for determining a detection method. Organizations that purchase detection software need to consider the cost of purchasing enough software licenses for the number of devices they need to monitor. Some organizations purchase an endpoint detection and response (EDR) service from a third-party vendor. Although these services are expensive, they provide a holistic, unified approach to threat detection for an organization's devices; they typically include a centralized alert platform for monitoring possible attacks on devices.

4.4.B Determine controls for detecting attacks against a device.	**4.4.B.3** Sensitivity or criticality of the device is a criterion for determining a detection method. Devices that store or process sensitive information or provide critical services are more likely to be targeted by adversaries and benefit from a hybrid-detection model to offer maximum protection, when possible.
4.4.C Evaluate the impact of a device detection method.	**4.4.C.1** Speed and performance are factors in evaluating the impact of a detection method. Signature-based detection is faster than anomaly-based detection in general, and that effect is compounded on devices, which often lack the processing power to effectively run anomaly-based detection tools. Implementing resource-intensive detection tools on devices can degrade device performance. **4.4.C.2** Phase of the attack is a factor in evaluating the impact of a detection method. To carry out actions on a device, adversaries must first bypass a combination of physical- or network-layer protective, deterrent, and detective security controls. Detecting and stopping an attack at the device level can prevent adversaries from accessing sensitive data or disrupting critical services. **4.4.C.3** False positives versus ease of bypassing detection is a factor in evaluating the impact of a detection method. Most device-level detection tools are signature-based, and signature-based detection has a low rate of false positives. However, signature-based detection is easier for adversaries to bypass.
4.4.D Apply detection techniques to identify indicators of password attacks by analyzing log files.	**4.4.D.1** Online password attacks can be detected in authentication logs. A single user attempting many wrong passwords is an indicator of an online password attack. If a user:password hash database has been compromised, all the user passwords in the database should be considered insecure and all users should be forced to reset their passwords. **4.4.D.2** If an authorized user is logging in from a different location or IP address than expected, or at a different time than normal, this can be an indicator that the user's password has been compromised.

4.4.D
Apply detection techniques to identify indicators of password attacks by analyzing log files.

4.4.D.3
An indicator of password spraying is many users trying to log in within seconds of each other from one IP address or from unusual IP addresses.

4.4.D.4
An indicator of credential stuffing is a series of default user:password combinations being attempted on a device in quick succession, often from the same IP address.

4.4.D.5
Offline password attacks can't be detected, because the attack takes place on the adversary's computer.

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AP CYBERSECURITY

UNIT 5

Securing Applications and Data



~30
CLASS PERIODS

UNIT 5 ~30 CLASS PERIODS

Securing Applications and Data

Developing Understanding

Data is the foundation of the digital world. Every movie or song that is streamed, every website visited, and every financial transaction made online is recorded as digital data. Stealing, modifying, or denying access to data is often the end goal of an adversary. In this unit, students learn how adversaries commonly attack data and applications. Students learn how to set access controls to limit who has what type of access to data. They also learn how to use cryptography to protect the confidentiality and integrity of data both in storage and while it is being transmitted. Additionally, students learn how adversaries attack applications, what to look for in logs as evidence of an attack, and some mitigations that can help limit or stop an attack.

Building Cybersecurity Skills

In this final unit, students practice assessing risk to data and learn about the vulnerabilities and attacks particular to data. Students learn why some data are more valuable than others and how the perceived value of the data impacts their risk assessment. Students also learn how to protect data using tools like cryptography and access controls. Finally, students practice detecting attacks on data by reviewing logs for indicators of compromise (IoCs).

Unit Scenarios

The scenarios for this unit are designed to connect the knowledge and skills students gain to realistic workplace tasks. The scenarios are paired with relevant student activities. Teachers may use their own scenarios in addition to, or in lieu of, those provided here.

SCENARIO 5A:
Protecting Sensitive Data

As an employee on the security team of Vitahealth Solutions , a pharmaceutical company, you have been tasked with protecting the company's proprietary research and development (R&D) on its new product Strype. The directories and files that contain the research are on an air-gapped computer. Only members of the R&D team and select members of the IT team have access to that computer. Your task is to secure the research by setting the access controls for the directories and files.

You will log into the computer that contains the proprietary research and set access according to the following criteria:

- All members of the R&D team should have full access to the /RandD directory while other users should be able to access and read the directory.
- All members of the R&D team should have full access to the /RandD/Research directory while other users should have no access to the directory.
- Only the head researcher should have read, write, and execute access to the /RandD/Formula directory, the R&D team should have read and execute access, and everyone else should have no access.

SCENARIO 5B:
Sending Encrypted Messages

You are a security engineer working for LightningGrid, a utility company that owns power generating plants across the United States. You are working on a classified project with another security engineer at a plant on the other side of the country. It is critical that you and your colleague have a method for communicating securely. You need to use PGP encryption to set up a secure communication channel.

Your teacher will randomly pair you with another student who will be your partner for this scenario, and you will each represent one of the security engineers in the scenario. You will use PGP encryption to establish a secure digital communication channel with each other.

You will:

- Use a tool to generate an asymmetric key pair
- Share your public key with your partner
- Send your partner an encrypted secret message
- Receive and decrypt a secret message from your partner

UNIT AT A GLANCE

Topic	Learning Objectives	Scenario Connections	Class Periods
5.1 Application and Data Vulnerabilities and Attacks	**5.1.A** Explain how adversaries can exploit application and file vulnerabilities to cause loss, damage, disruption, or destruction. **5.1.B** Explain how application attacks exploit vulnerabilities. **5.1.C** Assess and document risks from application and data vulnerabilities.		5
5.2 Protecting Applications and Data: Managerial Controls and Access Controls	**5.2.A** Explain how the state or classification of data impacts the type and degree of security applied to that data. **5.2.B** Identify managerial controls related to application and data security. **5.2.C** Determine an appropriate access control model to protect applications and data. **5.2.D** Configure access control settings on a Linux-based system.	**5A Protecting Sensitive Data** ▪ Configure access control settings for directories and files.	7
5.3 Protecting Stored Data with Cryptography	**5.3.A** Explain how encryption can be used to protect files. **5.3.B** Apply symmetric encryption algorithms to encrypt and decrypt data.		4
5.4 Asymmetric Cryptography	**5.4.A** Determine the appropriate asymmetric key to use when sending or receiving encrypted data. **5.4.B** Explain why the length of a key impacts the security of encrypted data. **5.4.C** Apply asymmetric encryption algorithms to encrypt and decrypt data.	**5B Sending Encrypted Messages** ▪ Generate an asymmetric key pair. ▪ Encrypt a message and send it. ▪ Decrypt a received message.	5
5.5 Protecting Applications	**5.5.A** Identify the application security principles of secure by design and security by default. **5.5.B** Explain how user input sanitization protects applications.		2
5.6 Detecting Attacks on Data and Applications	**5.6.A** Explain how to detect attacks on data. **5.6.B** Determine controls for detecting attacks against applications or data. **5.6.C** Evaluate the impact of a method for detecting attacks against an application or data. **5.6.D** Identify whether a file has been altered by verifying its hash. **5.6.E** Apply detection techniques to identify and report indicators of application attacks by analyzing log files.		7

SUGGESTED SKILLS

1

Analyze Risk

TOPIC 5.1
Application and Data Vulnerabilities and Attacks

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
5.1.A Explain how adversaries can exploit application and file vulnerabilities to cause loss, damage, disruption, or destruction.	5.1.A.1 An adversary can read any unencrypted files if they have access to the device or drive storing the files. 5.1.A.2 Computers have standard users and administrative users. Administrative users have access to control system settings and can typically access any files or applications on a system. If regular users are given administrative privileges on a computer, and an adversary can compromise a user's account, then the adversary will have elevated privileges on the system. 5.1.A.3 When access control settings are weakly configured, many users often have permission to view and sometimes even edit files on a system. Adversaries can take advantage of weak access control settings to steal or destroy files or disrupt an application.
5.1.B Explain how application attacks exploit vulnerabilities.	5.1.B.1 Applications are programs that run instructions on computers; they are executable data. Some applications run locally on a user's computer, while other applications, like web applications, run on a server and are accessed by users through a network.

5.1.B
Explain how application attacks exploit vulnerabilities.

5.1.B.2
Many applications take user input through open-ended input fields where users can type characters (e.g., letters, numbers, punctuation). Developers should include user input checks in their application, such as numeric input when asked for a number of items, to ensure that the user input matches what is expected; the application should reject input outside of the expected parameters. This process of verifying that user input meets expected criteria before processing it is called data validation. Applications that fail to validate user input are vulnerable to injection-type attacks, where adversaries insert unexpected character strings in input fields to alter the behavior of a program.

5.1.B.3
Structured query language (SQL) is a computer language used to request information from databases and make changes to databases or entries in databases. Applications that query a database using unvalidated or unsanitized input from users are vulnerable.

5.1.B.4
An SQL-injection attack places SQL commands and control characters into a user-input field in an application, which can lead to a breach of confidentiality by causing the application to return more information than it should, or a breach of integrity by modifying or deleting data in the database.

5.1.B.5
Websites are written using hypertext markup language (HTML), and many websites use Javascript to create dynamic content on websites or web applications. Because Javascript commands run in the browser of the user visiting the website, those commands can access sensitive data stored in the browser like usernames, passwords, and cryptographic keys.

5.1.B.6
A cross site scripting (XSS) attack injects malicious code into a website that a user's browser then executes. The malicious code can be embedded in a link the user clicks (a Type I or Reflected XSS attack) or it can be inserted onto a website through a comment field, forum post, or visitor log, which would affect any user visiting that website (a Type II or Stored XSS attack).

5.1.B
Explain how application attacks exploit vulnerabilities.

5.1.B.7
When applications take user input, that input is written to a buffer. A buffer is a designated section of computer memory with a fixed size. If the amount of data the user enters exceeds the size of the buffer, it can overflow into adjacent memory locations and overwrite other parts of the computer's memory.

5.1.B.8
A buffer overflow attack feeds more data into memory than was allotted, which can cause a system to crash or to execute code outside the scope of a program's security policy, effectively allowing the adversary to perform unauthorized actions on a computer, such as accessing, modifying, or deleting files.

5.1.B.9
The files that run web applications are stored in directories on servers. When users access web applications, their browsers send GET requests using hypertext transfer protocol (HTTP). A GET request accesses a file somewhere in the filesystem of the server.

5.1.B.10
In a directory traversal attack, adversaries modify URLs and GET requests to attempt to access sensitive data (e.g., usernames and passwords) on a server's file system.

ILLUSTRATIVE EXAMPLE
A web server stores images for a website it hosts in the `/var/www/images/` directory. An adversary modifies a URL requesting an image to `../../../etc/passwd`. The `..` moves one directory up in the file system; so the three consecutive `..` returns the path to the root, and from there the adversary is attempting to access the `passwd` file that would return a list of all the authorized usernames on the device.

5.1.C
Assess and document risks from application and data vulnerabilities.

5.1.C.1
Data security risks can involve a compromise of confidentiality when unauthorized persons can access sensitive data, integrity when data can be manipulated or altered from its intended state, and availability when data can be destroyed or encrypted to prevent others from accessing it.

5.1.C
Assess and document risks from application and data vulnerabilities.

5.1.C.2
High risks from data vulnerabilities often involve highly sensitive data (e.g., data that is governed by laws or regulations) that could be compromised through a highly likely exploit.

ILLUSTRATIVE EXAMPLE
The company developing the next jet engine that will be used by the Air Force in its planes is storing the technical specifications for the engine on an unencrypted drive.

5.1.C.3
Moderate risks from data vulnerabilities often involve sensitive data not having strong enough encryption or strict enough access controls.

ILLUSTRATIVE EXAMPLE
A company stores its customers' PII in a spreadsheet, and the spreadsheet is encrypted using a small key.

5.1.C.4
Low risks from data vulnerabilities often involve less sensitive information being encrypted with shorter keys or having access controls that are not strict enough.

ILLUSTRATIVE EXAMPLE
An organization's CEO stores his private memos to his executive staff on a company share drive that is unencrypted and has no access controls.

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 5.2

Protecting Applications and Data: Managerial Controls and Access Controls

Required Course Content

LEARNING OBJECTIVE

5.2.A

Explain how the state or classification of data impacts the type and degree of security applied to that data.

ESSENTIAL KNOWLEDGE

5.2.A.1

Organizations implement specific security controls to comply with legal requirements based on the types of data they collect, store, process, and transmit.

5.2.A.2

Data can be classified by their state.

- Data at rest are stored on a drive. It is important to protect the physical drive storing the data from destruction or theft. Data at rest can also be encrypted so that if an adversary steals it, they can't immediately read the data.
- Data in transit are being sent from one device to another. If the data are being transferred over physical media (e.g., cables) it is important to protect the media. Data in transit can also be encrypted so that if an adversary intercepts it, they can't immediately read the data.
- Data in use are being processed by software or a person. Access controls can be used to limit who or what has the ability to use data in different ways (e.g., view or edit). Data must be unencrypted to be used.

5.2.A.3

Organizations often categorize data according to their sensitivity and prioritize a higher degree of security for more sensitive information.

5.2.A.4

Laws and regulations can require certain types of data to be stored, transmitted, and handled according to specific rules.

5.2.A
Explain how the state or classification of data impacts the type and degree of security applied to that data.

- Personally identifiable information (PII) is any data that allows someone to be identified and includes (but is not limited to): name, signature, phone number, address, biometric data (e.g., fingerprints), social security number, date of birth, and email address. The protection of this data is covered by many laws but most notably The Privacy Act of 1974 and for children under the age of 13 the Children's Online Privacy Protection Act of 1998.
- Protected health information (PHI) is any data related to an individual's health, treatment, payment for healthcare at any time and includes (but is not limited to): test results, treatment records, hospital records, doctor visit notes, and health provider payment records. The protection of PHI is included in the Health Insurance Portability and Accountability Act of 1996.
- Payment card information (PCI) is the data collected by organizations to process payments via cards (e.g., credit cards) and includes the following: name, account number, expiration date, address, and CVV code. The protection of this data is regulated by the Payment Card Industry Data Security Standard (PCI-DSS).

5.2.A.5
Organizations that collect regulated data will label them and have policies that comply with the legal or regulatory requirements for the safe storage, transmission, and handling of these data.

5.2.B
Identify managerial controls related to application and data security.

5.2.B.1
A cryptography policy will describe the acceptable encryption protocols and key parameters for an organization and may include:

- A list of encryption algorithms approved for specific uses
- Minimum or maximum key lengths
- Cryptographic key-generation requirements and parameters
- Cryptographic key-storage requirements

5.2.B
Identify managerial controls related to application and data security.

5.2.B.2
A web application security policy will outline the requirements and parameters for testing and mitigating web application vulnerabilities in an organization, and it may include:

- Parameters for when an application is subject to a security assessment
- Timelines for remediating vulnerabilities based on level of risk
- Parameters for how an application security assessment is to be carried out (e.g., using specific tools or according to specific frameworks)

5.2.C
Determine an appropriate access control model to protect applications and data.

5.2.C.1
Access control enforces which users or applications (called subjects) can access, modify, add, or remove (called operations) which files or applications (called objects). Access control models describe how to determine which subjects have what type of access to which objects.

5.2.C.2
Role-based access control (RBAC) assigns every subject to a role and defines which roles have which types of access to which objects.

ILLUSTRATIVE EXAMPLE
An example of a role at a company might be "accountant," and one type of object could be the payroll software. Role-based access could be used to ensure that only subjects who are assigned to the role of "accountant" have access to the payroll software object.

5.2.C.3
Rule-based access control (RuBAC) checks a set of rules to determine what type of access a subject should have for a specific object and then allows or denies types of access based on the rules. This access control model is typically layered on top of another access control model.

ILLUSTRATIVE EXAMPLE
There is a rule that prohibits subjects (even those who would normally have access) from accessing a certain database (the object) outside of local working hours. When a subject attempts to access the database, even if they are authorized to access it, they will be denied access if it is outside the time designated by the rule.

5.2.C
Determine an appropriate access control model to protect applications and data.

5.2.C.4
Discretionary access control (DAC) gives individual subjects the ability to set the type of access that other subjects have on objects they own. In DAC models some subjects are designated as administrators or super users, and they have the ability to override the access controls established by other subjects.

ILLUSTRATIVE EXAMPLE
Bob creates a file (an object) and decides to give Alice permission to edit the file, to give Frank permission to view the file only, and to deny everyone else access to the file altogether.

5.2.C.5
Mandatory access control (MAC) follows strict rules for which types of access each subject level has for objects that are above their level, at their level, or below their level. Subject and object levels are assigned by an external administrator.

5.2.C.6
The Bell-LaPadula model is a MAC model that is often used by governments and military organizations to control the security of information. This model has the following two important properties:

i. The Simple Security Property states that subjects may not read objects that are above their level.
ii. The * (Star) Security Property states that subjects may not write to objects below their level.

These rules taken together are often summarized as "write up, read down" (WURD).

5.2.C.7
The principle of least privilege is the idea that entities should be given exactly as much access as they need to perform their function and no more.

5.2.D
Configure access control settings on a Linux-based system.

5.2.D.1
Authorization is when an entity is granted permission to have a certain type of access to a resource. Access controls are put in place to control which users have what types of access to which data.

5.2.D
Configure access control settings on a Linux-based system.

5.2.D.2
There are three types of access to a file in Linux that can be set, and they always come in the following order:

i. Read access allows a user to view the contents of a file.
ii. Write access allows a user to make changes to a file.
iii. Execute access allows a user to run a binary file such as a program.

These are abbreviated **`rwx`**, respectively. If a user only has read and execute permissions (not write), then it would display as **`r-x`**. The **`-`** symbol indicates the absence of that permission.

5.2.D.3
There are three default entities for which permissions are set and always in this order: (1) the file owner, (2) the file group, and (3) all other users. The three sets are displayed with no spaces (e.g., **`rwxrwxrwx`**).

5.2.D.4
To view the current permission settings for a file, use the command **`ls -l`** , which will show the current settings for the default entities. If there is a **`+`** symbol at the end of the permissions, this means that other permissions have been set for that file and it can be viewed with the **`getfacl`** command.

5.2.D.5
To modify the permission settings for a file, use the **`chmod`** command. This command can be used with the numeric method or the symbolic method.

5.2.D.6
To use **`chmod`** in the numeric method the syntax is **`chmod ### filename.`**

Each of the three **`###`** represents one of the three entities mentioned above (the owner, the group, other nongroup users).

- The first **`#`** = the owner
- The second **`#`** = the group
- The third **`#`** = other nongroup users

The permission for each entity is determined by adding up the values for the types of access to be granted:

- **`0`** = no permissions
- **`1`** = execute
- **`2`** = write
- **`4`** = read

5.2.D
Configure access control settings on a Linux-based system.

Therefore **3** sets permission to write and execute, **5** sets permission to read and execute, **6** sets permission to read and write, and **7** sets permission to read, write, and execute.

ILLUSTRATIVE EXAMPLES

- The command **`chmod 750 test`** would set the permissions for the owner to read, write, and execute, for the group to read and execute, and for everyone else to no access at all.
- The command **`chmod 543 test`** would set the permissions for the owner to read and execute, for the group to read only, and for everyone else to write and execute.
- The command **`chmod 777 test`** would set the permissions for all three entities to read, write, and execute for the file test.

5.2.D.7

To use **`chmod`** in the symbolic method the syntax is **`chmod entity +(or –) permission filename.`**

The entities are the user owner, the group, and other nongroup users. Each entity is represented with a single letter.

- **`u`** = user owner
- **`g`** = group
- **`o`** = others
- **`a`** = all

Permission can be either added or removed to any combination of entities.

- **`+`** = add the permission
- **`–`** = remove the permission

The permissions that can be set are **`read, write,`** and **`execute.`**

- **`r`** = read
- **`w`** = write
- **`x`** = execute

Entities and permissions can be combined in a single command.

To add the read and execute permissions for the group and user owner for a file called **`testfile,`** the command would be **`chmod ug+rx testfile.`**

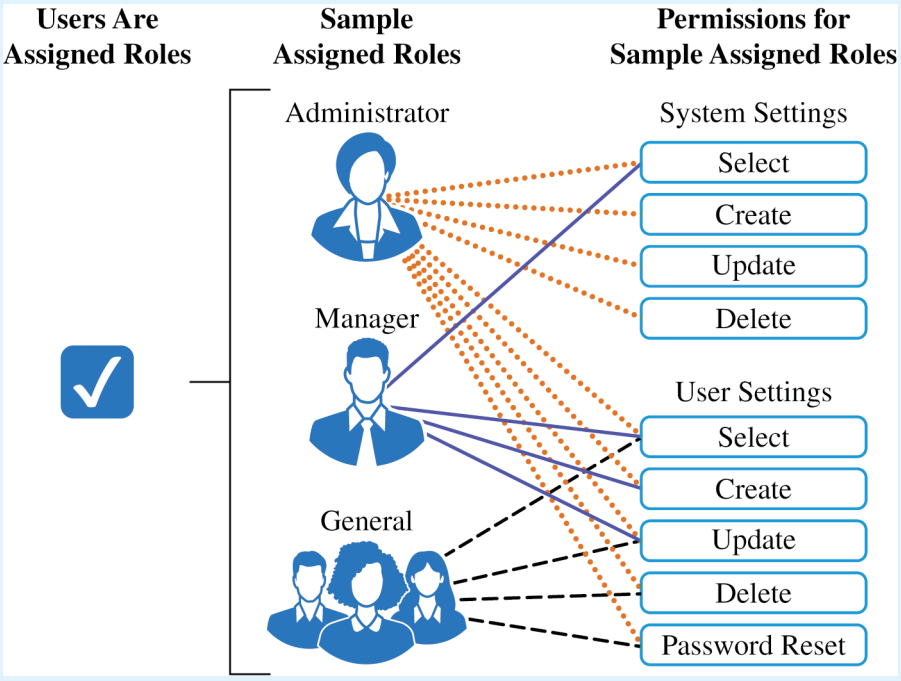

FIGURE 5.2A: Access Control Model – Role-Based Access Control (RBAC)

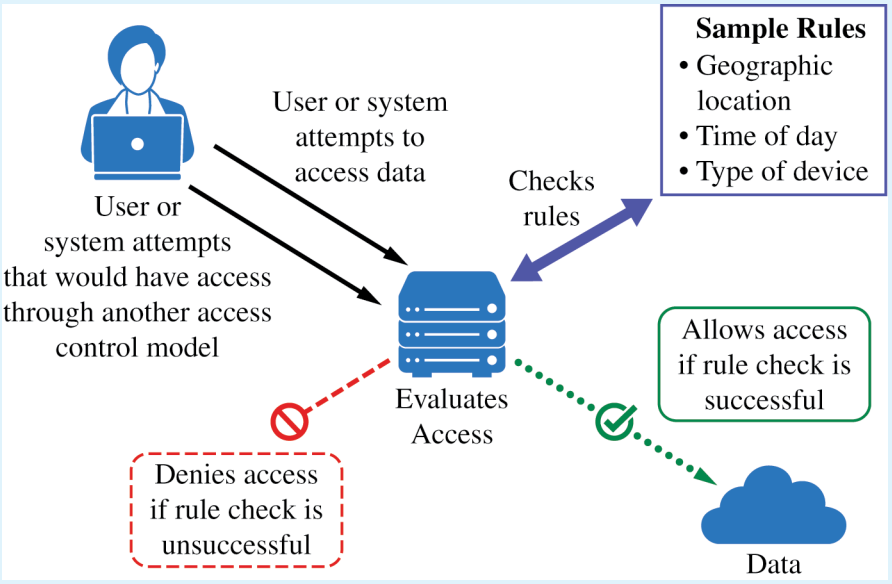

FIGURE 5.2B: Access Control Model – Rule-Based Access Control (RuBAC)

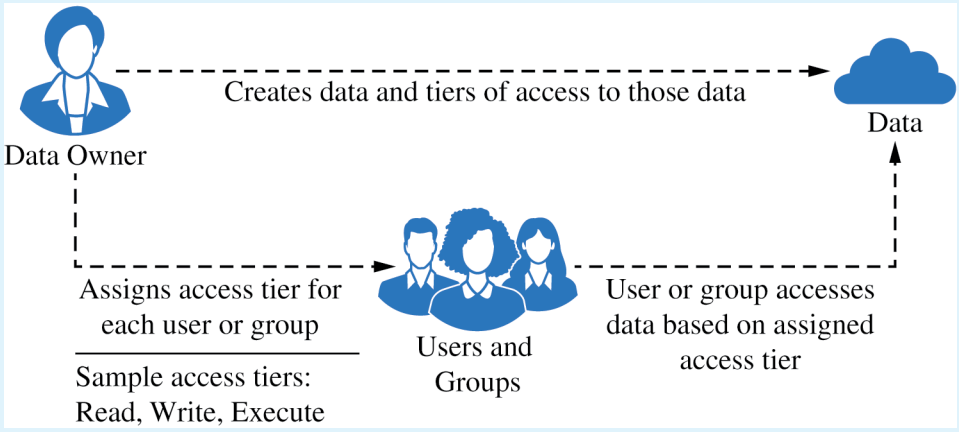

FIGURE 5.2C: Access Control Model – Discretionary Access Control (DAC)

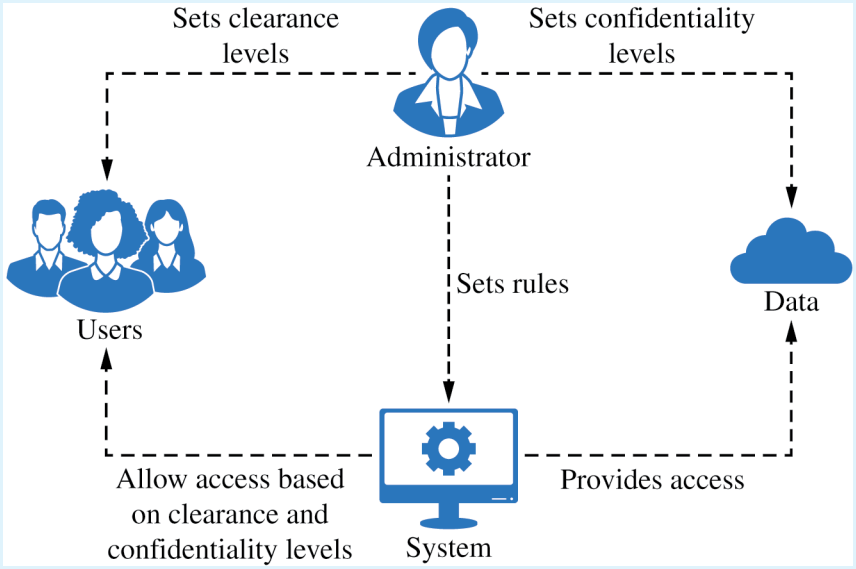

FIGURE 5.2D: Access Control Model – Mandatory Access Control (MAC)

SUGGESTED SKILLS

2

Mitigate Risk

TOPIC 5.3
Protecting Stored Data with Cryptography

Required Course Content

LEARNING OBJECTIVE

5.3.A

Explain how encryption can be used to protect files.

ESSENTIAL KNOWLEDGE

5.3.A.1

The purpose of cryptography is to hide information. A cryptographic algorithm defines a process for encrypting and decrypting information. Encryption is the process of hiding the information, and decryption is the process of reversing the encryption to retrieve the original information.

5.3.A.2

An encryption algorithm defines a process for combining the information to be encrypted with a predefined key. The information to be encrypted is called the plaintext. The output of the encryption algorithm is called the ciphertext.

5.3.A.3

The number of possible keys that can be used in an encryption algorithm is called the keyspace. The larger the keyspace, the longer it will take an adversary to discover the correct key by random chance.

5.3.A.4

Cryptographic algorithms are classified by whether they use one key or two keys.

- Symmetric encryption algorithms use the same key to encrypt and decrypt information.
- Asymmetric encryption algorithms use two different keys—one to encrypt information and the other to decrypt information.

5.3.A
Explain how encryption can be used to protect files.

5.3.B
Apply symmetric encryption algorithms to encrypt and decrypt data.

5.3.A.5
Cryptographic algorithms are also classified by whether they process information one bit at a time or in fixed-size chunks of bits.

- Block encryption handles information in fixed-size chunks called blocks, producing an output block for each input block.
- Stream encryption handles input information continuously, producing output one element at a time.

5.3.B.1
Computer-based encryption algorithms operate on binary data. The most common symmetric encryption algorithm is the Advanced Encryption Standard (AES). AES encryption is used to secure Wi-Fi transmissions, internet browsing, file encryption on disks, and hardware-level encryption on processors.

5.3.B.2
AES is a symmetric key block cipher that encrypts data in 128-bit blocks (16 bytes). AES can operate with keys of varying lengths. Longer keys produce more secure encryption but require more time to encrypt and decrypt.

5.3.B.3
Symmetric encryption and decryption can be performed using the command line, specialized software, or web-based tools.

- On a command line interface, users can encrypt or decrypt with OpenSSL.
- Specialized software like AES Crypt is an open source tool that can encrypt and decrypt files.
- There are many web-based tools for encrypting and decrypting files.

5.3.B.4
Using OpenSSL in a CLI, a user can encrypt and decrypt a file using the following commands (note that the encryption key is derived from the password provided):

- To encrypt a file named test with AES using a 128-bit key, use the command: `openssl enc -aes-128-cbc -e -in test -k password -out test.enc`
- To decrypt the encrypted file using the same key, use the command: `openssl enc -aes-128-cbc -d -in test.enc -k password -out text`

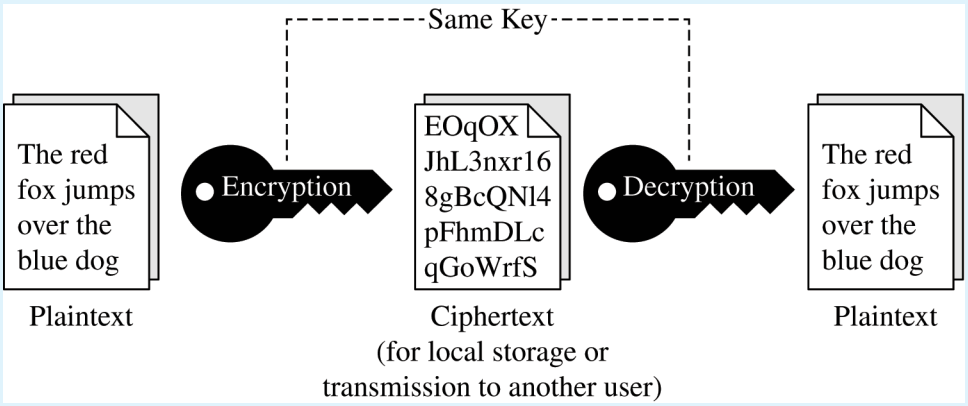

FIGURE 5.3: Symmetric Encryption Algorithms

Symmetric encryption involves a single key encrypting and decrypting data. This helps ensure confidentiality between sender and receiver.

TOPIC 5.4
Asymmetric Cryptography

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE

5.4.A

Determine the appropriate asymmetric key to use when sending or receiving encrypted data.

ESSENTIAL KNOWLEDGE

5.4.A.1

Asymmetric encryption allows users to communicate securely without prearranging a shared secret key.

5.4.A.2

When using asymmetric encryption, each entity that will be receiving data must first generate a key pair. Key pairs are binary strings of equal length that are generated at the same time through a mathematical process. One key is designated as the public key and the other as the private key. The keys are mathematical inverses of each other—each key reverses its partner. Either key can be used to encrypt information, but only the other key in the key pair will then be able to decrypt it.

5.4.A.3

Once the receiver generates the key pair, the private key must be stored securely. If the private key is exposed, shared, stolen, corrupted, or compromised the key pair must be deleted and a new key pair must be generated, because the security of the encryption algorithm rests on the security of the private key. The public key is published for anyone to view and use.

5.4.A.4

To send information securely to someone, the sender will use the receiver's public key to encrypt the data and send it. Only the receiver who has the private key will be able to decrypt and read the information.

5.4.B
Explain why the length of a key impacts the security of encrypted data.

5.4.B.1
Longer keys result in larger keyspaces. For binary keys, an n-bit length key has a keyspace of 2^n.

5.4.B.2
Using an application to randomly guess an n-bit length encryption key means that on average an adversary will be able to guess the correct key in $2^n/2$ or 2^{n-1} guesses.

5.4.B.3
Although longer keys are more secure, they also require more time to encrypt and decrypt messages.

5.4.B.4
Computational processing power and efficiency continue to improve, allowing software to guess keys faster. Key-length recommendations for both symmetric and asymmetric encryption algorithms are periodically increased to account for increased processing power.

5.4.B.5
Key-length comparison is only valid when comparing keys for the same cryptographic algorithm.

ILLUSTRATIVE EXAMPLES
- An AES 256-bit key is more secure than an AES 128-bit key.
- An RSA 4096-bit key is more secure than an RSA 2048-bit key.
- RSA and AES keys cannot be directly compared to one another in determining the level of security.

5.4.C
Apply asymmetric encryption algorithms to encrypt and decrypt data.

5.4.C.1
Common asymmetric encryption algorithms include RSA and elliptic curve cryptography (ECC). Asymmetric algorithms are used in many applications, including digital signatures and digital certificates.

5.4.C
Apply asymmetric encryption algorithms to encrypt and decrypt data.

5.4.C.2
As with symmetric encryption, asymmetric encryption and decryption can be performed using the command line, specialized software, or web-based tools.

- On a command line interface, users can encrypt or decrypt with OpenSSL.
- Specialized software like RSA Encryption Tool is an open source tool that can encrypt and decrypt files.
- There are many web-based tools for encrypting and decrypting files.

5.4.C.3
In a CLI, a user can generate an asymmetric key pair and encrypt or decrypt files as necessary.

- To generate a 2048-bit RSA key pair and save the key to a file named **`rsa.pem`** use the command:
  `openssl genrsa -out rsa.pem 2048`
- To extract the public key from **`rsa.pem`** into a file named **`public.pem,`** use the command:
  `openssl rsa -pubout -in rsa.pem -outform PEM -out public.pem`
- To encrypt the file **`test`** using RSA encryption and the key file **`public.pem,`** use the command:
  `openssl pkeyutl -encrypt -pubin -inkey public.pem -in test -out test.enc`
- To decrypt the **`test.enc`** file using the **`rsa.pem`** file, run the command:
  `openssl pkeyutl -decrypt -inkey rsa.pem -in test.enc -out test`

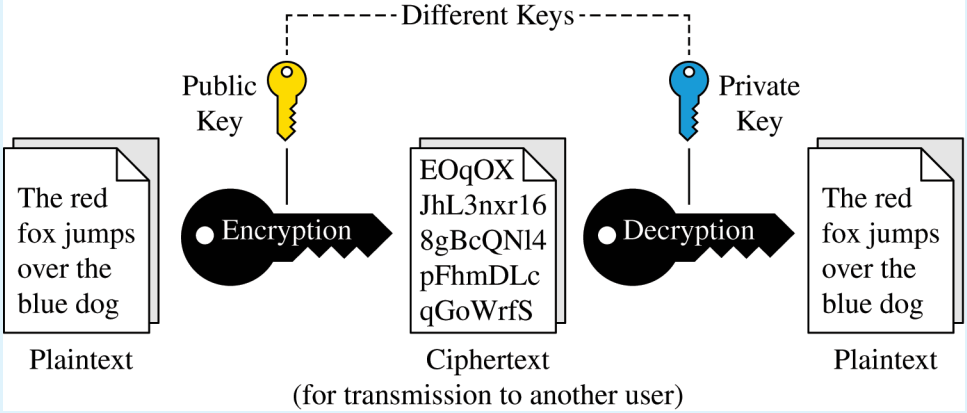

FIGURE 5.4: Asymmetric Encryption Algorithms

Asymmetric encryption involves two keys: a public and a private key. In this encryption method, data encrypted with the public key can only be decrypted by the corresponding private key. This helps ensure secure communication and data integrity.

TOPIC 5.5
Protecting Applications

SUGGESTED SKILLS

2

Mitigate Risk

Required Course Content

LEARNING OBJECTIVE	ESSENTIAL KNOWLEDGE
5.5.A Identify the application security principles of secure by design and security by default.	**5.5.A.1** Secure by design is an initiative that encourages companies to include security in all phases of product development including design. When organizations implement secure by design, security is a design principle not just a technical feature. **5.5.A.2** Secure by design includes three design principles: i. Companies should take ownership of customer security outcomes. Companies should build products that meet the security needs of their customers. ii. Companies should embrace radical transparency and accountability. Sharing relevant security-related product news and updates quickly increases security for everyone. iii. Companies should build organizational structure and leadership to implement secure by design. Companies need leaders who are focused on security and have a security-first posture. **5.5.A.3** Secure by design includes the concept of secure by default, which is the idea that security features for software and devices should be enabled by default. Devices and software should be secure to use out of the box, with security features already enabled.

5.5.B
Explain how user input sanitization protects applications.

5.5.B.1
When users enter input into an application, the application typically encases that input in special characters to process it. The characters that encase the user input are called control characters and include the single quote, the double quote, and the semicolon.

5.5.B.2
When creating a program that takes user input, programmers should use a function to verify that user input meets their expected criteria and does not include any control characters that could be used to manipulate the system. This verification function can sanitize user input by removing potentially malicious characters, or it can give the user an error and force the user to provide different input. This can protect against many application attacks, including:

- SQL injection attacks
- XSS attacks
- Directory traversal attacks

TOPIC 5.6
Detecting Attacks on Data and Applications

SUGGESTED SKILLS

3

Detect Attacks

Required Course Content

LEARNING OBJECTIVE

5.6.A

Explain how to detect attacks on data.

ESSENTIAL KNOWLEDGE

5.6.A.1

Devices track and log when data are accessed and by whom. The process of recording and monitoring user activities is called accounting. Analysis of these logs can reveal malicious activity when an adversary attempts to access, copy, move, or delete data. Suspicious activity can include:

- Accessing files that aren't typically accessed
- Accessing files or applications outside of a user's normal patterns (including time of day, location, and device type)
- Attempts to delete or copy sensitive files

5.6.A.2

A honeypot is a file that appears as if it contains valuable data (e.g., credit card information, PII, passwords), but the data in the file are fake. A system can alert defenders if someone attempts to access the honeypot. Since the honeypot is a fake file, there is no legitimate reason to be accessing it, and any attempted access would be an indicator of malicious activity.

5.6.A.3

Cryptographic hash functions can generate a digest for data and can reveal if data have been altered. If a file has changed unexpectedly, this can be a sign of malicious activity.

5.6.B Determine controls for detecting attacks against applications or data.	**5.6.B.1** Cost is a criterion in determining detective controls. Detective controls like honeypots and using hash values to check data integrity are inexpensive. Some organizations invest in third-party data loss prevention (DLP) services, which monitor data access, usage, and transmission by users throughout the organization to detect suspicious activity; DLP services provide strong detection capabilities at a higher cost.
	5.6.B.2 Sensitivity or criticality of data or applications is a criterion in determining detective controls. More sensitive or critical data or applications are more likely targets of an adversary and should be monitored more closely.
	5.6.B.3 Classification of data is a criterion in determining detective controls. Data that have been classified as private, educational, healthcare, or financial often have legal or regulatory detection and monitoring requirements.
5.6.C Evaluate the impact of a method for detecting attacks against an application or data.	**5.6.C.1** To operate at an effective speed, log analysis needs to be augmented with some automation. Honeypots offer near instantaneous detection capabilities.
	5.6.C.2 Some DLP tools, honeypots, and realtime automated log analysis provide alerts as an attack is happening. These tools allow for a prompt response that can stop an attack before it does more harm. Retrospective log analysis and the use of cryptographic hashes to verify data integrity identify attacks after they have occurred.
	5.6.C.3 False negatives can occur in applications and data attack detection. Cryptographic hash functions only detect if data have been altered. An adversary could view and steal data without altering it, and a cryptographic hash function would not detect this. Honeypots cannot detect adversaries that do not attempt to access them.

5.6.D
Identify whether a file has been altered by verifying its hash.

5.6.D.1
Cryptographic hash functions can help identify changes in a file because they are repeatable: the same input always produces the same output for a given hash function.

5.6.D.2
Hashes can be calculated using the command line on a computer, a website, or specialized software.

- In Windows Powershell, if a user wanted to generate the SHA256 hash for a file named **`testfile`**, they would use the command:
  `Get-FileHash testfile -Algorithm SHA256`
- In BASH the same could be accomplished with the command:
  `sha256sum testfile`
- In zsh, the common command line terminal on Apple computers, this could be accomplished with the command:
  `shasum -a 256 testfile`

5.6.D.3
A file can be hashed and its hash output recorded. Then it can be hashed again later, and the second hash output can be compared to the previous hash output for the same file. If a file's hash changes, then the file was altered between when the first and second hashes were generated.

5.6.E
Apply detection techniques to identify and report indicators of application attacks by analyzing log files.

5.6.E.1
SQL injection attacks can be detected by reviewing application and server logs of user input for SQL control words and symbols such as:

- A single or double quote character:
  `` ` , ` ``
- Boolean conditions like **`OR 1=1`**
- A double dash (which indicates a comment in SQL): `--`
- SQL control words (always in capital letters) like **`WHERE, IN, FROM`**

5.6.E.2
XSS attacks can be detected by reviewing user input for suspicious tags, particularly the **`<script>...</script>`** tag.

5.6.E
Apply detection techniques to identify and report indicators of application attacks by analyzing log files.

5.6.E.3
For web applications, buffer overflows can be detected by checking the amount of data the user is sending to the web application in their request. The fields commonly checked are the URL length, cookie length, query string length, and total request length. Long strings in any of these fields can be an indicator of an attempted buffer overflow attack.

5.6.E.4
Directory traversal attacks can be detected by reviewing application and server logs. `HTTP GET` requests that include paths with sequences of `../` are indicators of an adversary attempting a directory traversal.

AP CYBERSECURITY



Exam Information

Exam Overview

The AP Cybersecurity Exam assesses student understanding of the skills and learning objectives outlined in the course framework. The exam is **2 hours and 10 minutes** long and includes **60 multiple-choice questions** and **1 free-response question**.

Section	Question Type	Number of Questions	Exam Weighting	Timing
I	Multiple-Choice Questions	60	70%	80 Minutes
II	Free-Response Questions	1	30%	50 Minutes

How Student Learning Is Assessed on the AP Exam

Section I: Multiple-Choice

The multiple-choice section of the AP Cybersecurity Exam includes 60 multiple-choice questions. All five units of the course are assessed in the multiple-choice section of the AP Cybersecurity Exam. The assessment is organized around course skills with the following weighting.

Units of Instruction	Approximate Exam Weighting for Multiple-Choice Section
Skill Category 1: Analyze Risk	25–40%
Skill Category 2: Mitigate Risk	25–40%
Skill Category 3: Detect Attacks	25–40%

Section II: Free-Response

The second section of the AP Cybersecurity Exam includes one free-response question.

Device Security Analysis will provide students with several simulated sources about a single digital device. Sources may include security policies, firewall configurations, file-system permissions, and log files. The question will assess students' ability to analyze the provided sources to identify security issues, detect evidence of attacks, describe how configuration or permission changes would affect the device and users, and evaluate how security controls, such as firewalls or automated systems, influence network traffic and device behavior. Students will be expected to cite evidence from the provided sources and explain their reasoning when describing attacks, permission settings, or the impact of policy or configuration modifications. The suggested time for this question is 50 minutes. Skill Categories 2 and 3 are assessed.

Task Verbs Used in Free-Response Questions

The following **task verbs** are commonly used in free-response questions:

Identify: Provide information about cybersecurity concepts or evidence from the given sources.

Explain: Provide reasons that support a solution or that account for how an outcome occurs, using specific evidence to validate your conclusion.

Describe: Provide information about a cybersecurity process or outcome.

Determine: Using the given sources, provide a specific result by applying appropriate criteria or reasoning.

Write: Express in print form a proper command that has the indicated effect.

Sample Exam Questions

The sample exam questions that follow illustrate the relationship between the course framework and the AP Cybersecurity Exam and serve as examples of the types of questions that appear on the exam. After the sample questions is a table that shows which skill(s) and learning objective(s) each question assesses. The table also provides the answers to the multiple-choice questions.

Section I: Multiple-Choice Questions

The following are examples of the kinds of multiple-choice questions found on the exam.

1. A cybersecurity analyst recently completed a review of a hotel's security. Consider the following information from their report.
   - The hotel's Wi-Fi extends to the parking area, allowing outsiders potential access to the network.
   - Open network ports in the conference center connect to the hotel's internal network and could enable spoofing of a legitimate device.
   - Guest feedback tablets in the lobby use a shared Wi-Fi network, exposing nonsensitive customer satisfaction data.
   - Model numbers of printers and the firmware versions the printers are running are visible on the internal network, revealing some information about devices on the network.

   Which of the following risks would the cybersecurity analyst most likely document as a high risk?

   (A) The hotel's Wi-Fi extending to the parking area

   (B) Open network ports in the conference center

   (C) Guest feedback tablets using a shared Wi-Fi network

   (D) The model numbers of printers and the firmware versions the printers are running being visible

2. A school district wants to ensure that only the school principal (**kmurray**) can edit faculty evaluation reports and to limit permissions for everyone else. The district's system administrator wants to set the following permission for the file **Oak_Park_HS**, which contains the faculty evaluations.

```
-rw-r----- kmurray staff 2048 Sep 18 10:45 Oak_Park_HS
```

Which of the following commands can be used to set the permissions shown?

(A) `chmod 444 Oak_Park_HS`
(B) `chmod 640 Oak_Park_HS`
(C) `chmod 740 Oak_Park_HS`
(D) `chmod 777 Oak_Park_HS`

3. Consider the following email.

From: Management
To: Security Manager

Subject: New Access Rules for Transaction System

Thank you for implementing access restrictions on our internal applications.

We are now interested in applying additional security rules that automatically limit user access based on specific conditions. For example, access to the transaction system should only be allowed during business hours and from devices connected to the corporate network.

Thanks!

Which of the following access control models best meets the request in the email?

(A) DAC
(B) MAC
(C) RBAC
(D) RuBAC

4. A network technician is unable to access a server using port 443 from a machine with an IP address of 192.168.45.37.

   Consider the following access control list (ACL) for the server's firewall.

Rule Number	Allow/Deny	Direction	Protocol	Port	Source
1	Allow	Inbound	TCP	22	ALL
2	Allow	Inbound	TCP	80	ALL
3	Deny	Inbound	TCP	443	192.168.0.0 - 192.168.255.255
4	Allow	Inbound	ICMP	ALL	ALL
5	Allow	Inbound	TCP	3306	ALL
6	Deny	Inbound	TCP	3389	ALL
7	Allow	Inbound	TCP	443	ALL
8	Allow	Inbound	TCP	587	ALL
9	Deny	Inbound	TCP	8140	192.168.45.0 - 192.168.45.255
10	Deny	Inbound	ALL	ALL	ALL

   Which of the following changes to the firewall would allow the network technician to access the server?

   (A) Swap firewall rule 1 with firewall rule 10

   (B) Swap firewall rule 3 with firewall rule 4

   (C) Swap firewall rule 3 with firewall rule 7

   (D) Swap firewall rule 4 with firewall rule 7

5. A system administrator runs two hashing functions on four files. Consider the following outputs for the two hashing functions.

Function 1 outputs

```
file1.txt - 8d8e115e5ebc50c8e03930beac6802a94ef4f36ab
file2.txt - 79a7d08081d12ecf123d63845e38c14c09956ee79
file3.txt - 02db6aefd093c317f8cf78a2fbe52a31b58a6bc5e
file4.txt - bcd3cf9d8527f711031d0d908d84cbb0df97ce90b
```

Function 2 outputs

```
file1.txt - 804537a7adfa4e1bce4d72d0b212a80af2dae3a5e
file2.txt - ba429665c8b95d05a963ee89fded2c7f18892d13e
file3.txt - 804537a7adfa4e1bce4d72d0b212a80af2dae3a5e
file4.txt - 7fa2901ebbb731eb283487afc033e45dae210a89e
```

Which of the following statements is supported by the file hashes?

(A) The files **`file1.txt`** and **`file3.txt`** are exact copies of each other.

(B) Function 1 is more secure than Function 2.

(C) Function 1 and Function 2 are the same hashing function.

(D) The files **`file1.txt`** and **`file3.txt`** have a collision in one hashing function.

6. The security manager at a hospital is planning to upgrade the hospital's physical security system to ensure that only authorized personnel can access areas containing sensitive medical equipment and patient records. Because these areas require a high level of security, the manager wants an authentication method that is unique to each individual and extremely difficult for an adversary to duplicate or spoof. Which of the following authentication methods is best suited for these areas?

   (A) Authentication token

   (B) Password

   (C) Retina scan

   (D) Access card

7. Which of the following best describes how offline password attacks work?

   (A) Adversaries attempt user:password combinations in an active authentication portal.

   (B) Adversaries intercept communication as it travels across a network and read the password in transit.

   (C) Adversaries exploit weak access controls to directly retrieve plaintext passwords stored in a database.

   (D) Adversaries use automated tools to hash many potential passwords and compare them to a captured hash.

Questions 8 through 10 refer to the following.

Consider the following email that was identified and reported as a phishing attempt.

From: Human Resources
To: All Employees

Subject: Final Reminder — Deadline Today!

Our records indicate that your employee profile is incomplete. In order to remain in compliance with company-wide HR standards, all staff must confirm their personal information by the end of the day. Failure to respond by this deadline may result in suspension of payroll access until your profile is verified.

Please note: Over 92% of employees have already completed this verification, and you are among the last to finalize your record.

To confirm your employee file, reply to this email with the following details:

1. Personal phone number
2. Pet's name (for verification)
3. Date of birth

We appreciate your cooperation in keeping our records accurate and ensuring continued access to employee services.

Thank you,

Human Resources

8. Which of the following shows how the email uses urgency to pressure the recipient into responding?
   (A) The recipient is warned that they must confirm their personal information by the end of the day.
   (B) The recipient is warned that failure to comply could result in payroll suspension.
   (C) The recipient is encouraged to help human resources keep their records accurate.
   (D) The recipient is told that the message comes from a trusted internal department.

9. How does the email's claim that "Over 92% of employees have already completed the verification" attempt to pressure the recipient into responding to the email?

   (A) By framing the request as routine HR communication that seems safe, showing the use of familiarity

   (B) By implying that the opportunity to comply is limited and may soon be lost, showing the use of scarcity

   (C) By presenting the request as coming from those in power and intimidating the recipient, showing the use of authority

   (D) By applying social pressure and making the recipient believe most coworkers have already acted, showing the use of consensus

10. Which of the following is the most likely impact if the recipient responds to this email with the requested information?

    (A) An adversary could use the recipient's personal details to impersonate them.

    (B) An adversary could use the recipient's device as a foothold and move laterally on the network compromising other devices.

    (C) An adversary could infect the recipient's device with malicious code hidden in the reply email.

    (D) An adversary could disrupt the entire payroll system by disabling access for all employees.

11. A natural gas company's help desk receives reports from employees that the company's website is intermittently crashing when they try to log in. The cybersecurity analyst reviews the server's access logs and finds the following entries.

```
[22/Oct/2025:10:11:02] "GET /index.html HTTP/1.1" 200 4521
[22/Oct/2025:10:11:07] "GET /about.html HTTP/1.1" 200 3890
[22/Oct/2025:10:11:10] "GET ../../../../etc/passwd HTTP/1.1" 403 721
[22/Oct/2025:10:11:12] "GET ../../../../etc/shadow HTTP/1.1" 403 654
```

    Which of the following application attacks is indicated in the log file?

    (A) Buffer overflow attack

    (B) Cross site scripting attack

    (C) Directory traversal attack

    (D) SQL injection attack

12. The system administrator at a high school receives an alert that there may have been multiple unauthorized login attempts to the school's online grading system. To investigate, the administrator decides to review the authentication logs. Which of the following best describes how authentication logs can be used to determine whether unauthorized login attempts have occurred?

    (A) The logs record which password was used in each login attempt, which allows the administrator to verify account ownership.

    (B) The logs record all login activity, which allows the administrator to reconstruct when and how login attempts occurred.

    (C) The logs record the location of each user attempting to log in, which allows the administrator to identify login attempts from other geographic regions.

    (D) The logs record the type of device attempting to log in, which allows the administrator to block unauthorized devices.

13. The network administrator for a manufacturing facility has implemented a signature-based network detection system. Which of the following is a potential impact of using this network detection method instead of anomaly-based detection?

    (A) More false negative alerts

    (B) Higher operating costs

    (C) Slower detection time

    (D) More alert fatigue

14. Consider the following lines from a log file.

```
2025-09-25 08:01:14 ARP Reply: 192.168.1.13 is-at 00:01:5e:00:fc:16
2025-09-25 09:14:15 ARP Reply: 192.168.1.13 is-at 00:3b:cc:5e:ee:01
```

    Which of the following attack types is indicated in the log file?

    (A) ARP poisoning attack

    (B) DNS poisoning attack

    (C) Evil-twin attack

    (D) MAC flooding attack

15. Which of the following best describes the length of a cryptographic hash function output?

    (A) The length of the output is longer than the input due to the hashing process.

    (B) The length of the output is fixed regardless of the length of the input.

    (C) The length of the output varies based on the length of the input.

    (D) The length of the output is shorter than the length of the input.

16. A state's National Guard base is documenting cybersecurity risks from physical vulnerabilities. Which of the following would be classified as a moderate risk?

    (A) An unlocked trailer containing non-networked office equipment that cannot be used to access sensitive systems

    (B) A locked warehouse with noncritical computers that could be a foothold to access other network resources

    (C) A publicly accessible touchscreen directory for visitors that contains no sensitive data and is unlikely to be exploited

    (D) A main server room that contains sensitive systems and information and does not have sufficiently restricted or controlled access

Questions 17 through 20 refer to the following.

Consider the following article.

> *Small Town Bank Disrupts Attempted Cyber Attack on Customer Database*
>
> Fairgrove Community Bank, a local financial institution serving residents of central Kentucky, reported that it successfully stopped a cyber intrusion attempt earlier this week aimed at its customer database.
>
> The attack was detected on Tuesday afternoon when automated security systems flagged unusual database queries originating from the bank's online loan application form. Investigators determined that the form was being used to input malicious code.
>
> "One of the strings the adversary submitted included `' OR '1'='1';--`," said James Holloway, a network administrator at Fairgrove Community Bank. "That's a common trick pulled from online tutorials."
>
> Holloway said the attacker did not succeed in accessing any customer data, but the attempt revealed a flaw in the bank's web application.
>
> Fairgrove Community Bank's security team has since patched the vulnerability. No data was compromised, and banking operations continued without interruption.
>
> "This wasn't some advanced adversary," Holloway added. "They were copying code from the internet and testing to see if anything would work. But even simple attacks like this can work if we don't implement best practices."
>
> Fairgrove Community Bank says it is conducting a full audit of its customer-facing applications to ensure proper protections are in place.

17. Which of the following best describes the adversary in this scenario?

    (A) Cyberterrorist

    (B) Script kiddie

    (C) State actor

    (D) Insider

18. Which of the following types of attacks occurred when the adversary submitted a string that included `' OR '1'='1';--`?

    (A) SQL injection attack

    (B) Buffer overflow attack

    (C) Cross site scripting attack

    (D) Directory traversal attack

19. Which of the following security controls would most likely prevent an attack like this in the future?

    (A) Encryption

    (B) Stateful firewall

    (C) Input sanitization

    (D) Access control list

20. Which of the following best explains how the adversary attempted to manipulate the bank's customer database through the online loan application form?

    (A) When user input is fed into a server's file system, HTTP requests can access sensitive data.

    (B) When user input contains executable scripts, those scripts can run in the user's browser and access sensitive data.

    (C) When user input exceeds the size of the designated memory, it can allow the adversary to access, modify, and delete files.

    (D) When user input from a web form is fed directly into a database query, an adversary can inject control characters that can allow an adversary to view or modify the contents of a database.

21. An organization only allows their users to log into a system if they are physically in one of the following time zones (a time zone is a region where everyone uses the same clock time).

    - Eastern time zone
    - Central time zone
    - Mountain time zone
    - Pacific time zone

    Which of the following authentication factors is being used to verify the identity of the users?

    (A) Biometric factor

    (B) Knowledge factor

    (C) Location factor

    (D) Possession factor

22. A hospital's security manager has implemented an automated network security tool with the following functions.
    - The tool analyzes network traffic for signs of malicious activity so the security team can quickly spot potential threats.
    - The tool generates an alert when suspicious or malicious traffic is detected because the hospital wants to be notified right away if an attack is attempted.
    - The tool does not take direct action to block or stop the traffic itself because the hospital wants administrators to decide how to respond to threats.

    Which of the following security systems did the security manager implement?

    (A) Data loss prevention system

    (B) Network intrusion prevention system

    (C) Network intrusion detection system

    (D) Security information and event management system

Section II: Free-Response Question

The following is an example of the free-response question found on the exam.

Device Security Analysis

The following sources all come from the same device and are captured in a risk assessment for this device.

Source 1

The device's IP address is 192.168.1.10.

Device Firewall Settings

Rule Number	Action	Source	Destination	Direction	Port Number	Protocol
1	Deny	172.45.66.184	192.168.1.10	Inbound	22	SSH
2	Allow	ALL	192.168.1.10	Inbound	21	FTP
3	Allow	ALL	192.168.1.10	Inbound	80	HTTP
4	Allow	ALL	192.168.1.10	Inbound	445	SMB
5	Allow	ALL	192.168.1.10	Inbound	443	HTTPS
6	Allow	ALL	192.168.1.10	Inbound	22	SSH
7	Allow	172.45.66.184	192.168.1.10	Inbound	3306	MySQL
8	Allow	ALL	192.168.1.10	Inbound	3389	RDP
9	Allow	192.168.1.50	192.168.1.10	Inbound	5900	VNC
10	Deny	ALL	ALL	Inbound	ALL	ALL

Source 2

```
sudo tail -n 30 /var/log/app/network_app.log

1 - Nov 10 09:00:11 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/
less/var/log/syslog

2 - Nov 10 09:00:15 ubuntu sudo: pam_unix(sudo:
session): session opened for user root by
jprice(uid=1000)

3 - Nov 10 09:00:35 ubuntu apt-get[1345]: Get:1
http://archive.ubuntu.com jammy InRelease [265 kB]

4 - Nov 10 09:00:46 ubuntu apt-get[1345]: Get:2
http://security.ubuntu.com jammy-security InRelease
[110 kB]

5 - Nov 10 09:00:55 ubuntu apt-get[1345]: Fetched
375 kB in 19s (19.7 kB/s)

6 - Nov 10 09:01:00 ubuntu apt-get[1345]: Reading
package lists... Done

7 - Nov 10 09:01:01 ubuntu sudo: pam_unix(sudo:
session):
session closed for user root

8 - Nov 10 09:02:14 ubuntu jprice: executed command:
'ufw status verbose'

9 - Nov 10 09:02:14 ubuntu jprice: executed command:
'systemctl status apache2'

10- Nov 10 09:02:16 ubuntu jprice: executed command:
'tail –n /var/log/auth.log'

11 - Nov 10 09:03:10 ubuntu jprice: executed
command: 'systemctl status apache2'

12 - Nov 10 09:03:35 ubuntu systemd[1]: Starting
Daily apt download activities...

13 - Nov 10 09:03:36 ubuntu systemd[1]: Finished
Daily apt download activities.

14 - Nov 10 09:04:00 ubuntu jprice: executed
command: 'ss -tuln'

15 - Nov 10 09:04:01 ubuntu jprice: executed
command: 'cat/etc/ufw/user.rules'

16 - Nov 10 09:05:11 ubuntu jprice: executed
command: 'journalctl -xe'

17 - Nov 10 09:05:32 ubuntu jprice: executed
command: 'df -h'

18 - Nov 10 09:05:50 ubuntu jprice: executed
command: 'du -sh/var/log'
```

```
19 - Nov 10 09:06:02 ubuntu jprice: executed
command: 'top -n 1'

20 - Nov 10 09:06:33 ubuntu jprice: executed
command: 'curl -I http://localhost'

21 - Nov 10 09:06:33 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

22 - Nov 10 09:06:34 ubuntu sudo:
pam_unix(sudo:session): session closed for user root

23 - Nov 10 09:07:01 ubuntu CRON[1773]:
pam_unix(cron:session): session opened for user root
by (uid=0)

24 - Nov 10 09:07:01 ubuntu CRON[1773]:
pam_unix(cron:session): session closed for user root

25 - Nov 10 09:07:45 ubuntu jprice: executed
command: 'ip addr'

26 - Nov 10 09:07:47 ubuntu jprice: executed
command: 'netstat - tulnp'

27 - Nov 10 09:08:10 ubuntu jprice: executed
command: 'ufw status verbose'

28 - Nov 10 09:08:11 ubuntu systemd[1]: Reloading
firewall rules (ufw.service)...

29 - Nov 10 09:08:11 ubuntu systemd[1]: Reloaded
firewall rules (ufw.service).

30 - Nov 10 09:08:20 ubuntu jprice: executed
command: 'exit'
```

Source 3

```
sudo tail -n 30 /var/log/auth.log

1 - Nov 10 14:11:43 ubuntu sshd[1123]: Server
listening on 0.0.0.0 port 22.

2 - Nov 10 14:11:43 ubuntu sshd[1123]: Server
listening on :: port 22.

3 - Nov 10 14:21:01 ubuntu vsftpd[2184]: Failed login
for invalid user admin from 203.0.113.25 port 21 ftp

4 - Nov 10 14:21:02 ubuntu vsftpd[2186]: Failed login
for invalid user root from 203.0.113.25 port 21 ftp

5 - Nov 10 14:21:03 ubuntu vsftpd[2188]: Failed login
for invalid user test from 203.0.113.25 port 21 ftp

6 - Nov 10 14:21:04 ubuntu vsftpd[2190]: Failed login
for invalid user guest from 203.0.113.25 port 21 ftp

7 - Nov 10 14:21:05 ubuntu vsftpd[2192]: Failed login
for invalid user ubuntu from 203.0.113.25 port 21 ftp
```

```
8 - Nov 10 14:21:06 ubuntu vsftpd[2194]: Failed login
for invalid user deploy from 203.0.113.25 port 21 ftp

9 - Nov 10 14:21:07 ubuntu vsftpd[2196]: Failed
login for invalid user support from 203.0.113.25
port 21 ftp

10 - Nov 10 14:21:08 ubuntu vsftpd[2198]: Failed
login for invalid user admin1 from 203.0.113.25 port
21 ftp

11 - Nov 10 14:21:09 ubuntu vsftpd[2200]: Failed
login for invalid user oracle from 203.0.113.25 port
21 ftp

12 - Nov 10 14:21:10 ubuntu vsftpd[2202]: Failed
login for invalid user ftp from 203.0.113.25 port 21
ftp

13 - Nov 10 14:22:14 ubuntu sshd[2234]: Connection
closed by authenticating user jprice 192.168.1.50
port 22 [preauth]

14 - Nov 10 14:22:15 ubuntu sshd[2234]: Accepted
password for jprice from 192.168.1.50 port 22 ssh2

15 - Nov 10 14:22:15 ubuntu sshd[2234]:
pam_unix(sshd:session): session opened for user
jprice by (uid=0)

16 - Nov 10 14:25:47 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/apt
update

17 - Nov 10 14:25:47 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

18 - Nov 10 14:25:48 ubuntu sudo:
pam_unix(sudo:session):session closed for user root

19 - Nov 10 14:28:02 ubuntu sshd[2331]: Connection
closed by 203.0.113.25 [preauth]

20 - Nov 10 14:29:01 ubuntu CRON[2345]:
pam_unix(cron:session): session opened for user root
by (uid=0)

21 - Nov 10 14:29:01 ubuntu CRON[2345]:
pam_unix(cron:session): session closed for user root

22 - Nov 10 14:30:17 ubuntu kernel: [UFW BLOCK]
IN=eth0 OUT= SRC=203.0.113.25 DST=192.168.1.10
PROTO=TCP PORT=25 SYN

23 - Nov 10 14:30:18 ubuntu sshd[2369]: Failed
password for invalid user user from 203.0.113.25
port 22 ssh2

24 - Nov 10 14:30:18 ubuntu sshd[2370]: Received
disconnect from 203.0.113.25 port 49151:11: Bye Bye
[preauth]
```

```
25 - Nov 10 14:30:18 ubuntu kernel: [UFW BLOCK]
IN=eth0 OUT= SRC=203.0.113.25 DST=192.168.1.10
PROTO=TCP PORT=77 SYN

26 - Nov 10 14:31:55 ubuntu systemd-logind[99]: New
session 7 of user jprice.

27 - Nov 10 14:31:55 ubuntu systemd: Started Session
7 of user jprice.

28 - Nov 10 14:31:55 ubuntu sudo: jprice : TTY=pts/0 ;
PWD=/home/jprice ; USER=root ; COMMAND=/usr/bin/
journalctl -xe

29 - Nov 10 14:31:55 ubuntu sudo:
pam_unix(sudo:session): session opened for user root
by jprice(uid=1000)

30 - Nov 10 14:31:56 ubuntu sudo:
pam_unix(sudo:session): session closed for user root
```

Source 4

```
sudo tail -n 30 /var/log/nginx/access_log

1 - 192.168.1.50 - jprice [10/Nov/2025:09:02:14
-0500] "GET/index.html HTTP/1.1" 200 4212 "-"
"Mozilla/5.0 (Ubuntu)"

2 - 192.168.1.50 - jprice [10/Nov/2025:09:02:15
-0500] "GET /assets/css/style.css HTTP/1.1" 200 1024
"-" "Mozilla/5.0 (Ubuntu)"

3 - 192.168.1.50 - jprice [10/Nov/2025:09:02:15
-0500] "GET /assets/js/main.js HTTP/1.1" 200 2876
"-" "Mozilla/5.0 (Ubuntu)"

4 - 192.168.1.50 - jprice [10/Nov/2025:09:02:16
-0500] "GET /images/logo.png HTTP/1.1" 200 2048 "-"
"Mozilla/5.0 (Ubuntu)"

5 - 192.168.1.50 - jprice [10/Nov/2025:09:02:17
-0500] "GET /about.html HTTP/1.1" 200 3198 "-"
"Mozilla/5.0 (Ubuntu)"

6 - 192.168.1.50 - jprice [10/Nov/2025:09:02:18
-0500] "GET /contact.html HTTP/1.1" 200 2951 "-"
"Mozilla/5.0 (Ubuntu)"

7 - 192.168.1.50 - jprice [10/Nov/2025:09:02:20
-0500] "POST /contact_form HTTP/1.1" 200 87
"https://example.local/contact.html" "Mozilla/5.0
(Ubuntu)"

8 - 192.168.1.50 - jprice [10/Nov/2025:09:02:21
-0500] "GET /dashboard HTTP/1.1" 200 4981 "-"
"Mozilla/5.0 (Ubuntu)"
```

```
9 - 192.168.1.55 - - [10/Nov/2025:09:03:10 -0500]
"GET /api/user/profile?id=12 HTTP/1.1" 200 614 "-"
"curl/7.81.0"

10 - 192.168.1.55 - - [10/Nov/2025:09:03:11
-0500] "GET /api/data/list HTTP/1.1" 200 1187 "-"
"curl/7.81.0"

11 - 192.168.1.55 - - [10/Nov/2025:09:03:12 -0500]
"POST /api/user/update HTTP/1.1" 200 152 "-"
"curl/7.81.0"

12 - 10.0.0.5 - admin [10/Nov/2025:09:04:01
-0500] "GET /admin/login HTTP/1.1" 200 4329 "-"
"Mozilla/5.0 (Windows NT 10.0)"

13 - 10.0.0.5 - admin [10/Nov/2025:09:04:02 -0500]
"POST /admin/login HTTP/1.1" 302 112 "https://
example.local/admin/login" "Mozilla/5.0 (Windows NT
10.0)"

14 - 10.0.0.5 - admin [10/Nov/2025:09:04:03 -0500]
"GET /admin/dashboard HTTP/1.1" 200 6275 "-"
"Mozilla/5.0 (Windows NT 10.0)"

15 - 203.0.113.45 - - [10/Nov/2025:09:04:11 -0500]
"GET ../../../../etc/passwd HTTP/1.1" 400 234 "-"
"curl/7.68.0"

16 - 203.0.113.45 - - [10/Nov/2025:09:04:12 -0500]
"GET ../../../etc/shadow HTTP/1.1" 403 312 "-"
"curl/7.68.0"

17 - 203.0.113.45 - - [10/Nov/2025:09:04:13 -0500]
"GET ../../../var/www/html/config.php.bak HTTP/1.1"
404 198 "-" "curl/7.68.0"

18 - 192.168.1.55 - - [10/Nov/2025:09:04:15 -0500]
"GET /api/status HTTP/1.1" 200 94 "-" "curl/7.81.0"

19 - 192.168.1.50 - jprice [10/Nov/2025:09:04:16
-0500] "GET /logout HTTP/1.1" 302 51 "-"
"Mozilla/5.0 (Ubuntu)"

20 - 192.168.1.50 - jprice [10/Nov/2025:09:04:17
-0500] "GET /login.html HTTP/1.1" 200 3811 "-"
"Mozilla/5.0 (Ubuntu)"

21 - 192.168.1.50 - jprice [10/Nov/2025:09:05:00
-0500] "GET /favicon.ico HTTP/1.1" 200 428 "-"
"Mozilla/5.0 (Ubuntu)"

22 - 192.168.1.50 - jprice [10/Nov/2025:09:05:22
-0500] "GET /docs/index.html HTTP/1.1" 200 2491 "-"
"Mozilla/5.0 (Ubuntu)"

23 - 192.168.1.55 - - [10/Nov/2025:09:05:23 -0500]
"GET /api/docs HTTP/1.1" 200 682 "-" "curl/7.81.0"

24 - 192.168.1.50 - jprice [10/Nov/2025:09:05:25
-0500] "GET /help HTTP/1.1" 200 4122 "-"
"Mozilla/5.0 (Ubuntu)"
```

```
25 - 192.168.1.55 - - [10/Nov/2025:09:05:26 -0500]
"GET /api/user/profile?id=14 HTTP/1.1" 200 637 "-"
"curl/7.81.0"

26 - 10.0.0.5 - admin [10/Nov/2025:09:05:27 -0500]
"GET /admin/settings HTTP/1.1" 200 5214 "-"
"Mozilla/5.0 (Windows NT 10.0)"

27 - 10.0.0.5 - admin [10/Nov/2025:09:05:28
-0500] "POST /admin/update HTTP/1.1" 200 164 "-"
"Mozilla/5.0 (Windows NT 10.0)"

28 - 192.168.1.50 - jprice [10/Nov/2025:09:05:29
-0500] "GET /assets/js/analytics.js HTTP/1.1" 200
1193 "-" "Mozilla/5.0 (Ubuntu)"

29 - 192.168.1.50 - jprice [10/Nov/2025:09:05:30
-0500] "GET / HTTP/1.1" 200 4231 "-" "Mozilla/5.0
(Ubuntu)"

30 - 192.168.1.50 - jprice [10/Nov/2025:09:05:31
-0500] "GET /images/banner.jpg HTTP/1.1" 200 3087
"-" "Mozilla/5.0 (Ubuntu)"
```

Source 5

```
ls -l /home/jprice/Documents

-rw-r--r--  1 jprice jprice   2143 Nov  08  09:15  report.txt

-rw-------  1 jprice jprice   1024 Nov  02  09:01  secrets.key

-rwxr-xr-x  1 jprice jprice   8576 Nov  10  11:02  backup.sh

-r--r-----  1 jprice admin    3421 Nov  06  11:53  config.cfg

-rw-rw-r--  1 jprice devteam  5012 Nov  10  09:04  notes.md

-rwx------  1 jprice jprice   7744 Nov  10  06:17  deploy_script

-rw-r-----  1 jprice admin    2088 Nov  09  09:36  database.ini

-rwxrwx---  1 jprice devteam  9281 Nov  04  01:27  run_tests.sh

-rw-r--rw-  1 jprice shared   3999 Nov  01  12:08  public_data.csv
```

Source 6

Acceptable Use Policy

Required Activities:

- Users must keep the operating system and installed software up to date.

Permitted Activities:

- Users may connect peripheral devices such as keyboards, mice, monitors, and printers as needed for daily work.

Prohibited Activities:

- Users may not connect external drives, USB storage devices, or other removable media unless explicitly authorized.
- Users may not modify system configurations, security settings, or access controls without authorization.
- Users may not access social media websites on this device.

Device Security Analysis

Use the given information to respond to parts A, B, C, D, and E. Label any subparts (e.g., i and ii) that may be present.

Part A

Consider the policy for the device in Source 6.

i. **Explain** how one part of the policy helps protect the device.

ii. **Explain** how one rule in the current policy could be modified to make the device more secure. Include a specific example in your response.

Part B

In the authorization log, there is evidence of a password attack in rows 3–12.

i. **Describe** the evidence in the log file that indicates a password attack. Include specific entries from the log file in your response.

ii. **Identify** the IP address of the adversary.

Part C

Consider all the sources from the device.

i. **Explain** how the permission settings for one file in the `/home/jprice/Documents` directory determine the level of access for that file for the owner, group, and all other users on the system. Include the name of the file in your response.

ii. Other than removing all permissions from all users, **describe** one way the permission settings for one file on the system could be configured to restrict access for some users on the device. Include the name of the file in your response.

iii. Using the explanation from part C (ii), **write** one or more `chmod` commands that set the permissions described.

Part D

Consider all the sources from the device.

i. **Explain** how one connection attempt on the device was blocked by the device's firewall. Include evidence from a log file in your response.

ii. Other than allowing all traffic for all services, **describe** a modification to one firewall rule that would allow the connection attempt identified in part D (i).

iii. Other than allowing the connection attempt identified in part D (i), **describe** one impact of your modification from part D (ii) on incoming or outgoing network traffic on the device.

Part E

Apart from the password attack identified in part B, there is evidence of another attack on the device. Consider all the sources from the device.

i. **Determine** the type of attack evidenced in a log file.

ii. **Describe** specific information in the log file that indicates the attack named in part E (i).

iii. **Describe** one way an automated system could halt this type of attack in real time.

iv. This attack could be mitigated by an automated system, such as a firewall, IDS, IPS, or AI. **Identify** a different countermeasure that could mitigate, prevent, or deter the attack.

Answer Key and Question Alignment to Course Framework

Multiple-Choice Question	Answer	Skill	Learning Objective
1	B	1.C	3.1.C
2	B	2.D	5.2.D
3	D	2.B	5.2.C
4	C	2.C	3.4.B
5	D	1.A	4.2.A
6	C	2.B	4.2.C
7	D	1.B	4.2.B
8	A	1.A	1.1.A
9	D	1.B	2.1.A
10	A	1.C	1.1.C
11	C	3.D	5.6.E
12	B	3.A	4.4.A
13	A	3.C	3.5.D
14	A	3.D	3.5.E
15	B	2.A	4.2.A
16	B	1.D	2.2.C
17	B	1.A	2.1.B
18	A	3.D	5.6.E
19	C	2.B	5.5.B
20	D	1.B	5.1.B
21	C	2.A	4.2.C
22	C	3.A	3.5.A

Free-Response Question	Skills	Learning Objectives
Device Security Analysis	2.A, 2.B, 2.C, 2.D, 3.B, 3.D	3.1.A, 3.4.B, 3.4.D, 3.5.A, 3.5.E, 4.1.C, 4.2.D, 4.3.A, 4.3.C, 4.4.A, 4.4.D, 5.1.B, 5.2.D, 5.5.B, 5.6.E

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Scoring Guidelines

Device Security Analysis — 14 points

Use the given information to respond to parts A, B, C, D, and E. Label any subparts (e.g., i and ii) that may be present.

Part A

Consider the policy for the device in Source 6.

i. **Explain** how one part of the policy helps protect the device.
ii. **Explain** how one rule in the current policy could be modified to make the device more secure. Include a specific example in your response.

Part B

In the authorization log, there is evidence of a password attack in rows 3–12.

i. **Describe** the evidence in the log file that indicates a password attack. Include specific entries from the log file in your response.
ii. **Identify** the IP address of the adversary.

Part C

Consider all the sources from the device.

i. **Explain** how the permission settings for one file in the `/home/jprice/Documents` directory determine the level of access for that file for the owner, group, and all other users on the system. Include the name of the file in your response.
ii. Other than removing all permissions from all users, **describe** one way the permission settings for one file on the system could be configured to restrict access for some users on the device. Include the name of the file in your response.
iii. Using the explanation from part C (ii), **write** one or more chmod commands that set the permissions described.

Part D

Consider all the sources from the device.

i. **Explain** how one connection attempt on the device was blocked by the device's firewall. Include evidence from a log file in your response.
ii. Other than allowing all traffic for all services, **describe** a modification to one firewall rule that would allow the connection attempt identified in part D (i).
iii. Other than allowing the connection attempt identified in part D(i), **describe** one impact of your modification from part D (ii) on incoming or outgoing network traffic on the device.

Part E

Apart from the password attack identified in part B, there is evidence of another attack on the device. Consider all the sources from the device.

i. **Determine** the type of attack evidenced in a log file.
ii. **Describe** specific information in the log file that indicates the attack named in part E (i).
iii. **Describe** one way an automated system could halt this type of attack in real time.
iv. This attack could be mitigated by an automated system, such as a firewall, IDS, IPS, or AI. **Identify** a different countermeasure that could mitigate, prevent, or deter the attack.

Model Responses

Part A

i. Not allowing users to connect removable media devices helps protect the device against malware that could be installed on it. Because the organization does not have control over external devices, they cannot guarantee that no malware will automatically be installed when they are plugged into the device.

ii. The AUP could require the system to check for updates within a certain time frame, such as weekly. If they force the system to check for updates weekly, this will ensure that all patches are installed in a timely fashion.

Part B

i. There are multiple failed login attempts within seconds of each other all from the same device. Row 3 is the first failed login at 14:21:01, and 9 seconds later there are 10 failed login attempts ending on row 12 at 14:21:10.

ii. 203.0.113.25

Part C

i. In the run_tests.sh file, the owner of the file and the group devteam have all permissions (read, write, and execute) for the file because the first and second groupings have rwx, while all other users on the system have no permissions for the file because the last grouping has ---.

ii. To harden the report.txt file, they could remove the read permission from both the group and all other users for this system.

iii. "chmod g-r report.txt" and then "chmod o-r report.txt"

Part D

i. Since firewall rule 10 denies all traffic to port 25 due to the absence of an allow rule, when the connection attempt from IP 203.0.113.25 occurs on line 22 in the auth log, the attempt to access port 25 is blocked.

ii. Rule 2 of the firewall could change the port number from 21 to 25.

iii. Changing the port in rule 2 to 25 from 21 would stop all inbound FTP/port 21 traffic to the device.

Part E

i. Directory traversal attack

ii. In lines 15–17 of the web application log (source 4), there are attempts of "../..", which is the classic sign of a directory traversal attack. They are attempting to go back in the file structure of the system where the web application is hosted—where they could try to access parts of the system that they should not have access to.

iii. An automated system could notice the malicious signs of a directory traversal attack and shut down the IP address from accessing the machine. So, in this case, it would stop the IP address of 203.0.113.45 from accessing the device when it recognizes the "../.." in the URL.

iv. The system could sanitize the user inputs to not allow any "../.." in the URL submitted by the user.

Scoring Guidelines for Question: Device Security Analysis

Reporting Category	Scoring Criteria	
Part A (i) **(0–1 points)** **Point 1**	**0 points** Does not explain how any part of the policy helps protect the device.	**1 point** Accurately **explains** how one part of the policy helps protect the device.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Are vague or unrelated to the policy. ▪ Describe something not in the policy. ▪ Do not clearly connect the policy to improved security. ▪ Identify something in the policy without explaining how it protects the device.	**Responses that earn this point:** ▪ Explain how a part of the acceptable use policy protects the device.
	Examples that do not earn this point: ▪ "Long passwords are good." ▪ "Users should avoid downloading games." ▪ "The policy keeps the device safe."	**Examples that earn this point:** ▪ "Users need to keep their operating system and software up to date because this ensures all known vulnerabilities are patched, preventing adversaries from exploiting them on the device." ▪ "Keeping the operating system and software up to date ensures known vulnerabilities are patched, reducing the risk of adversaries exploiting those vulnerabilities on the device."

Reporting Category	Scoring Criteria	
Part A (ii) **(0–1 points)** **Point 2**	**0 points** Does not explain a modification to the current policy or describes a modification that would not improve security.	**1 point** Accurately **explains** how one rule in the current policy could be modified to make the device more secure, including a specific example in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Suggest adding a new rule instead of modifying an existing rule. ▪ Suggest a modification that would not enhance security. ▪ Do not provide evidence from a log file. ▪ Identify or describe without explaining.	**Responses that earn this point:** ▪ Propose a modification to a policy rule and accurately explain how this helps make the device more secure.
	Examples that do not earn this point: ▪ "Allow social media during lunch breaks." ▪ "Let users plug in USB devices if they think it's safe."	**Examples that earn this point:** ▪ "Modifying the removable media rule to include blocking wireless external storage, such as Bluetooth file transfers, would help prevent wireless Bluetooth attacks because it eliminates an additional attack vector." ▪ "Requiring automatic OS updates instead of manual updates ensures updates are applied without user intervention, helping keep the system up to date and reducing exposure to known vulnerabilities."

Reporting Category	Scoring Criteria	
Part B (i) **(0–1 points)** **Point 3**	**0 points** Does not describe evidence of a password attack in the authorization log or identifies the attack but does not include evidence from a log file.	**1 point** Accurately **describes** valid evidence in the log file that indicates a password attack, including specific entries from a log file in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Mention entries unrelated to failed authentication attempts. ▪ Describe normal logins.	**Responses that earn this point:** ▪ Describe multiple failed password attempts from the same IP address in quick succession.
	Examples that do not earn this point: ▪ "Row 14 shows a successful login." ▪ "There was a CRON job run at 14:29."	**Examples that earn this point:** ▪ "Rows 3–12 show repeated failed FTP login attempts for many usernames within seconds."

Reporting Category	Scoring Criteria	
Part B (ii) **(0–1 points)** **Point 4**	**0 points** Does not identify the correct IP address or port in the password attack.	**1 point** Accurately **identifies** the indicated IP address or port in the password attack.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Provide any IP address other than 203.0.113.25. ▪ Identify multiple IP addresses. ▪ Provide a port.	**Responses that earn this point:** ▪ Identify IP address 203.0.113.25 as the adversary in the attack.
	Examples that do not earn this point: ▪ "113.25" ▪ "203.0.113.25 and 6.117.89.203"	**Examples that earn this point:** ▪ "203.0.113.25" ▪ "IP address 203.0.113.25"

Reporting Category	Scoring Criteria	
Part C (i) **(0–1 points)** **Point 5**	**0 points** Does not accurately explain file permissions or identifies incorrect user or group permissions.	**1 point** Accurately **explains** how the permission settings for one file in the indicated directory determine the level of access for that file for the owner, group, and all other users on the system, including the name of the file in the response.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Misread the permission bits. ▪ Describe permissions for a file not in the stimulus. ▪ Do not list the name of the file. ▪ Identify or describe without explaining.	**Responses that earn this point:** ▪ Explain the correct permissions for owner, group, and others for a chosen file and identify the file.
	Examples that do not earn this point: ▪ "Everyone can read notes.md." ▪ "deploy_script is open to all users." ▪ "The owner can read and write, the group can read, and all other users have no permissions."	**Examples that earn this point:** ▪ "For backup.sh, the owner has read, write, and execute permissions because the permissions are rwx, while the group and others have read and execute permissions indicated by r-x." ▪ "For secrets.key, only the owner has read and write permissions, as shown by rw-, while the group and others have no permissions since no permission bits are set." ▪ "File: report.txt Owner: read and write since the first group is rw- Group: read only since the second group is r-- Others: read only since the last group is r--"

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part C (ii)
(0–1 points)
Point 6</td><td>0 points
Does not describe a valid configuration change to the permissions of one file to modify access for users on this device.</td><td>1 point
Accurately describes one way the permission settings for one file on the system could be configured to appropriately modify access (by granting or removing permissions) for some users on the device, including the name of the file in the response.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Suggest removing all permissions for a file on this system.
Suggest removing all access for the owner.
Do not identify the file name.</td><td>Responses that earn this point:
Suggest removing one or more permissions from a file that it currently has.
Suggest removing read, write, or execute access appropriately.</td></tr>
<tr><td>Examples that do not earn this point:
“Remove execute permission from report.txt for owner.”
“Remove all permissions so no one can access it.”
“Give write permissions to all users on secrets.key.”</td><td>Examples that earn this point:
“Remove read access for the group and others on report.txt to keep it private to the owner.”
“Remove execute permission for the owner on deploy_script.”</td></tr>
<tr><td colspan="2">Additional notes:
The file explained in part C (i) does not have to be the same file discussed in part C (ii) to earn the point.</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part C (iii)
(0–1 points)
Point 7</td><td>0 points
Does not write a valid chmod command or the command does not match the permissions described in part C (ii).</td><td>1 point
Accurately writes one or more chmod commands that would set the permissions described in part C (ii).</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Have incorrect command syntax.
Have permissions that do not match the configuration to restrict access described in part C (ii).</td><td>Responses that earn this point:
Use correct syntax, such as <code>chmod 600 filename</code>, or symbolic modes matching the response in part C (ii).</td></tr>
<tr><td>Examples that do not earn this point:
“chmod -rw------- deploy.sh”
“chmod 777 secrets.key”</td><td>Examples that earn this point:
“chmod 200 run_tests.sh”
“sudo chmod go-r report.txt”</td></tr>
<tr><td colspan="2">Additional notes:
Correct responses may begin with <code>sudo</code>, but <code>sudo</code> is not required to earn the point.
The response may still earn the point for part C (iii) if it did not earn the point for part C (ii) as long as the chmod command accurately sets the permissions described in part C (ii).</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part D (i)
(0–1 points)
Point 8</td><td>0 points
Does not explain how a connection attempt was blocked or identifies an event unrelated to the firewall.</td><td>1 point
Accurately explains how one connection attempt on the device was blocked by the device's firewall, including evidence from a log file in the response.</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Reference a login failure not caused by the firewall.
Indicate a successful login attempt.
Indicate multiple attempts being blocked where at least one attempt is incorrect.
Do not provide evidence from a log file.
Identify or describe without explaining.</td><td>Responses that earn this point:
Correctly identify a line from a log file and a firewall rule that would prevent the attempt in the log file, and explain why it would be prevented.
Indicate how more than one connection attempt is being blocked by the firewall.</td></tr>
<tr><td>Examples that do not earn this point:
"User admin failed login because of a wrong password."
"SSH from 192.168.1.50 was blocked."</td><td>Examples that earn this point:
"Source 3 line 22 shows a blocked TCP SYN packet to port 25 from 203.0.113.25 because no firewall rule allows traffic on port 25."
"In line 25 of the auth log, a connection attempt to port 77 is blocked by the firewall, as access to port 77 is not permitted."</td></tr>
</table>

<table>
<tr><th>Reporting Category</th><th colspan="2">Scoring Criteria</th></tr>
<tr><td rowspan="5">Part D (ii)
(0–1 points)
Point 9</td><td>0 points
Does not describe a valid change to a firewall rule or suggests a modification that does not allow the connection attempt identified in part D (i).</td><td>1 point
Accurately describes a modification to one firewall rule that would allow the connection attempt identified in part D (i).</td></tr>
<tr><td colspan="2">Decision Rules and Scoring Notes</td></tr>
<tr><td>Responses that do not earn this point:
Suggest adding another deny rule to the firewall.
Suggest altering an unrelated firewall rule.
Suggest allowing a modification that would allow all traffic for all services.</td><td>Responses that earn this point:
Suggest a change that would allow the connection attempt from part D (i).</td></tr>
<tr><td>Examples that do not earn this point:
“Change rule 3 from allow to deny.”
“Disable the firewall.”</td><td>Examples that earn this point:
“Modify rule 8 to allow port 25 before the final deny-all rule.”</td></tr>
<tr><td colspan="2">Additional notes:
The response may still earn the point for part D (ii) if it did not earn the point for part D (i).</td></tr>
</table>

Reporting Category	Scoring Criteria	
Part D (iii) **(0–1 points)** **Point 10**	**0 points** Does not describe the impact of the modification suggested in part D (ii).	**1 point** Correctly **describes** one impact of the modification suggested in part D (ii) on incoming or outgoing network traffic on the device.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Do not include an accurate impact of the firewall change. ▪ Include an incorrect impact of the firewall change. ▪ Only references the connections in part D (i) or part D (ii) being impacted. ▪ Reference a different change than was recommended in part D (ii).	**Responses that earn this point:** ▪ Describe an impact of implementing the modification to the firewall as described in part D (ii).
	Examples that do not earn this point: ▪ "It would block all adversaries." ▪ "It would stop brute force attempts." ▪ "It would allow the connection that was blocked originally by the firewall."	**Examples that earn this point:** ▪ "Allowing port 25 would permit email traffic into the device but could expose the system to SMTP-based attacks."

Reporting Category	Scoring Criteria	
Part E (i) **(0–1 points)** **Point 11**	**0 points** Does not determine the type of attack.	**1 point** Accurately **determines** the type of attack evidenced in a log file.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Identify a type of attack not supported by the evidence. ▪ Indicate multiple attack types where at least one attack is incorrect. ▪ Indicate a password attack.	**Responses that earn this point:** ▪ Identify directory traversal as the type of attack.
	Examples that do not earn this point: ▪ "Ping flood attack" ▪ "DDoS attack" ▪ "ARP poisoning and directory traversal"	**Examples that earn this point:** ▪ "There is evidence of a directory traversal attack." ▪ "Directory traversal"

Reporting Category	Scoring Criteria	
Part E (ii) **(0–1 points)** **Point 12**	**0 points** Does not describe how specific entries indicate the attack using evidence from the log or gives a description unrelated to the log.	**1 point** Accurately **describes** specific information in the log file that indicates the attack named in part E (i).
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Do not include evidence from the log. ▪ Incorrectly interpret a directory traversal attack.	**Responses that earn this point:** ▪ Describe how the attack is indicated using evidence from source 4 lines 15–17 that show attempts, like "../../../../etc/passwd".
	Examples that do not earn this point: ▪ "The attacker sent a POST request, which shows they were trying to hack the server." ▪ "There is a lot of traffic, which indicates an attack." ▪ "The system blocked port 25, which indicates a traversal attack."	**Examples that earn this point:** ▪ "In source 4 line 15, the request includes '../../../../etc/passwd', which is a path traversal sequence attempting to reach system files outside the web root." ▪ "Lines 15–17 show attempts to access sensitive files like '/etc/passwd' and '/etc/shadow' using repeated '../', which is a signature of directory traversal attacks."

Reporting Category	Scoring Criteria	
Part E (iii) **(0–1 points)** **Point 13**	**0 points** Does not describe how an automated system could halt this type of attack.	**1 point** Accurately **describes** one way an automated system could halt this type of attack in real time.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Reference making changes to the system prior to the attack. ▪ Indicate an action that would not stop the attack.	**Responses that earn this point:** ▪ Correctly state that an automated system would notice the malicious traffic and give a way to stop this traffic. ▪ Correctly state more than one way an automated system would stop this attack immediately.
	Examples that do not earn this point: ▪ "The device could install updates to stop the attack." ▪ "The system should deny social media so attackers can't get in."	**Examples that earn this point:** ▪ "An IPS could detect repeated '../' patterns and block 203.0.113.45 immediately." ▪ "An intrusion prevention system could monitor for attempts to access protected files, like /etc/passwd, and immediately drop the connection and blacklist the IP."

Reporting Category	Scoring Criteria	
Part E (iv) **(0–1 points)** **Point 14**	**0 points** Does not identify a valid countermeasure or provides one already listed in the prompt.	**1 point** Accurately **identifies** a countermeasure other than firewall, IDS, IPS, or AI that could mitigate, prevent, or deter the attack.
	Decision Rules and Scoring Notes	
	Responses that do not earn this point: ▪ Identify a firewall, IDS, IPS, or AI-based countermeasure. ▪ Do not identify a countermeasure that would stop this type of attack.	**Responses that earn this point:** ▪ Identify sanitizing inputs. ▪ Indicate not allowing "../.." patterns as a way to stop this type of attack.
	Examples that do not earn this point: ▪ "Install an IDS." ▪ "Disable Telnet from the device as it is outdated."	**Examples that earn this point:** ▪ "The application could sanitize user input to remove all '../' sequences before processing."



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EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 1 - Intro to AI and Ethics

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.

15.4.12.B- Digital Citizenship: Evaluate the impact of social, legal, ethical, and safe behaviors on digital citizenship.

15.3.12.T- Electronic Communication/Digital Citizenship: Demonstrate application of digital citizenship in work and personal situations.

15.3.12.E- Communication/Research: Evaluate chosen print and electronic resources for advanced research.

CSTA Standards:

HS-ALG-PS-05- Algorithms & Design: Evaluate AI-generated

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Artificial intelligence systems generate outputs from patterns in data; their responses can appear convincing without being accurate, complete, or unbiased.
- ❏ Responsible AI use requires human judgment, verification, privacy awareness, and attention to the possible effects of AI-generated content on individuals and communities.
- ❏ Bias can enter AI systems through training data, design choices, and use contexts, so AI outputs should be examined critically rather than accepted at face value.
- ❏ Generative AI can create realistic synthetic media and misinformation, making source evaluation and media literacy increasingly important.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ What is artificial intelligence, and what makes an AI system different from a human thinker or a traditional computer program?
- ❏ How does the way an AI system is trained influence what it produces?
- ❏ When should we trust an AI-generated response, and how can we determine whether it is reliable?
- ❏ How can bias, hallucinations, deepfakes, and misinformation cause harm?
- ❏ What responsibilities do users, developers, schools, businesses, and society have when using AI?

output to assess bias, accuracy, and potential harms.	❑ Ethical decisions about AI involve balancing benefits and innovation with safety, fairness, transparency, accountability, and potential harm.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Core meaning and common characteristics of artificial intelligence. ❑ Basic idea that generative AI produces outputs by using patterns learned from training data. ❑ Meaning of training data and the relationship between data quality and AI output. ❑ Definitions and examples of bias, hallucination, misinformation, and deepfake/synthetic media. ❑ Safe and responsible AI-use practices, including protecting personal or sensitive information and verifying important claims. ❑ Major ethical concerns connected to AI, including fairness, accuracy, privacy, transparency, accountability, and misuse.	*Students will be skilled at...* ❑ Explaining AI concepts using appropriate introductory vocabulary and concrete examples. ❑ Analyzing AI-generated content for possible bias, hallucinations, misinformation, or other reliability concerns. ❑ Evaluating training-data examples and identify ways incomplete or unbalanced data could affect results. ❑ Verifying AI-generated claims using appropriate evidence or trusted sources rather than relying on the output alone. ❑ Applying safe and responsible decision-making when interacting with AI tools. ❑ Identifying features or warning signs of deepfakes and misleading AI-generated media. ❑ (In an AI ethics scenario) supporting a position with reasons, evidence, and consideration of consequences.

EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 2 - Intro to AI Models

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.

15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.

15.6.12.M- Emerging Technologies in Careers: Evaluate the impact of emerging technologies on various career paths and provide examples of industry certifications within the field.

CSTA Standards:

HS-ALG-ML-06- Machine Learning: Justify the selection of a type of AI algorithm to accomplish a task.

This fits the distinction among

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❑ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ AI is a broad field containing different kinds of systems and models designed for different purposes; generative and predictive AI solve different types of problems.
- ❑ Large language models generate language by learning statistical patterns from large amounts of data, and the quality of interaction depends partly on how users communicate their goals and constraints.
- ❑ Machine learning systems improve or make predictions by learning from data or feedback rather than by relying only on explicitly programmed rules.
- ❑ Supervised, unsupervised, and reinforcement learning use different forms of data or feedback and are appropriate for different tasks.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How are human intelligence and artificial intelligence similar and different?
- ❑ When is generative AI more appropriate than predictive AI, and vice versa?
- ❑ How do large language models produce responses, and what are their limitations?
- ❑ How does prompt design influence the usefulness of an AI response?
- ❑ How do supervised, unsupervised, and reinforcement learning differ?
- ❑ How are AI models trained, tested, and used in real-world industries?
- ❑ Who is responsible for the behavior and impact of an AI model?

generative/predictive AI and different approaches to machine learning. **HS-ALG-ML-07-** Machine Learning: Evaluate training data by examining its source, quality, representativeness, potential biases, and privacy implications. **HS-ALG-ML-08-** Machine Learning: Develop a machine learning model for a chosen task using appropriate data and tools. **S1-AIN-DD-01-** Artificial Intelligence Specialty: Analyze AI systems to differentiate the types of problems they address. **S1-AIN-DD-02-** Artificial Intelligence Specialty: Modify AI system training data to improve fairness and accuracy in outputs. **S1-AIN-HR-09-** Artificial Intelligence Specialty: Analyze the potential biases and limitations of AI systems.	❑ AI models are human-created systems: people make choices about goals, data, training, testing, deployment, and use, and those choices influence model behavior. ❑ Training data and model design can introduce or amplify bias; evaluating a model requires attention to both performance and the people or contexts affected by its use.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Distinctions among artificial intelligence, machine learning, generative AI, predictive AI, and large language models. ❑ Basic purpose and behavior of large language models. ❑ Elements of an effective prompt, including clear intent, relevant context, details, constraints, and desired output. ❑ Basic machine-learning lifecycle: defining a task, gathering/preparing data, training, testing/evaluating, and using or refining a model. ❑ Characteristics of supervised learning, unsupervised learning, and reinforcement learning. ❑ Examples of AI-model applications across industries. ❑ Roles people play in building AI systems and the influence of human decisions throughout development. ❑ How biased, incomplete, or unrepresentative training data can affect model outcomes.	*Students will be skilled at...* ❑ Classify examples as generative or predictive AI and justify the classification. ❑ Compare AI approaches and select an appropriate type of model or learning method for a stated problem. ❑ Construct and revise prompts to produce more relevant and useful AI outputs. ❑ Explain, at an introductory level, how a machine-learning model moves from data to learned patterns and outputs. ❑ Distinguish supervised, unsupervised, and reinforcement learning from scenarios or examples. ❑ Train or interact with a simple model and interpret how changes in examples, labels, or feedback influence its behavior. ❑ Investigate an industry use of AI and explain its purpose, benefits, limitations, and possible risks. ❑ Examine a training set or model outcome for potential bias and recommend improveme

Course Name Intro to AI with Vibe Coding

Unit Title Unit 3 - Intro to Vibe Coding and Design

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.A- Influence of Emerging Technologies: Apply the creative and productive use of emerging technologies for educational and personal success.
15.4.12.G- Software/Applications: Create an advanced digital project using sophisticated design and appropriate software/applications.
15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.
15.4.12.K- Digital Media: Evaluate advanced multimedia work products and make recommendations based on the evaluation.

CSTA Standards:
HS-PRO-RD-18- Programming: Evaluate AI-generated code for

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❑ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS
Students will understand that...

- ❑ Vibe coding uses natural-language communication with AI to help create software, but effective results still depend on clear human intent, evaluation, and revision.
- ❑ Prompting for code is a design and communication skill: specific goals, context, constraints, and descriptive language help translate an idea into a usable digital product.
- ❑ AI-generated code is a starting point rather than a finished product; developers improve it through testing, diagnosis, debugging, manual editing, and repeated iteration.
- ❑ Understanding enough of the underlying webpage structure to inspect and edit content gives creators greater control over AI-generated work.
- ❑ Good web design is centered on users: usability, accessibility, visual choices,

ESSENTIAL QUESTIONS
Students will keep considering...

- ❑ How can we communicate an idea clearly enough for an AI coding tool to build what we intend?
- ❑ What makes a prompt effective for creating or revising a website?
- ❑ When an AI-generated website does not work as intended, how do we determine what to change?
- ❑ Why should a vibe coder understand and manually edit at least some HTML rather than rely entirely on AI?
- ❑ What makes a website usable and accessible for different users?
- ❑ How do color, typography, layout, and design descriptors influence a user's experience?
- ❑ How can prototypes, user testing, and iteration lead to a better final product?

accuracy, reliability, and alignment with program requirements. **HS-PRO-TR-19-** Testing & Refining: Evaluate a computing technology's alignment with design specifications and responsible design values, including its correctness, effectiveness, and user experience. **HS-PRO-TR-20-** Testing & Refining: Refine a computing technology based on user feedback, testing results, and responsible design values to improve its effectiveness and impact. **HS-ALG-IM-09-** Human-Centered Design: Design a computing technology using human-centered design principles.	and feedback should shape how a site is built and revised. ❑ Prototypes and user testing reduce uncertainty by allowing designers to test ideas, compare alternatives, and improve a product before or during full implementation.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Vibe coding as an iterative process of describing, generating, testing, evaluating, and revising with AI. ❑ Qualities of effective prompts for coding and design: clarity, specificity, context, constraints, examples, and desired behavior or appearance. ❑ Purpose of iteration and debugging in improving AI-generated code. ❑ Basic role of HTML text/content in a webpage and the idea that generated code can be manually edited. ❑ Core user-experience concepts, including usability, clarity, consistency, navigation, and user testing. ❑ Core accessibility considerations for websites and the goal of making digital content usable by more people. ❑ How color, fonts, layout, and descriptive design vocabulary communicate style and affect readability. ❑ Purpose of prototypes and the value of comparing design alternatives before finalizing a solution.	*Students will be skilled at...* ❑ Translate a creative idea or user need into a detailed natural-language prompt for an AI coding environment. ❑ Iteratively revise prompts based on observed output rather than restarting without analysis. ❑ Test an AI-generated webpage, identify mismatches or errors, and describe the problem precisely enough to support a fix. ❑ Use AI to diagnose and correct errors while evaluating whether the proposed fix actually solves the problem. ❑ Manually edit webpage text/content in HTML to customize an AI-generated site. ❑ Recreate or approximate a target website/design by analyzing visible features and expressing them as design requirements. ❑ Evaluate a website from a user-experience perspective and recommend specific improvements. ❑ Identify accessibility barriers and use AI and/or an accessibility checker to improve a webpage. ❑ Use design vocabulary to specify colors, typography, visual style, and layout. ❑ Create and compare prototypes, conduct basic user testing, interpret feedback, and revise a design.

EAST PENN SCHOOL DISTRICT

Course Name Intro to AI with Vibe Coding

Unit Title Unit 4 - Capstone Website Project

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

PA BCIT Standards:

15.4.12.G- Software/Applications: Create an advanced digital project using sophisticated design and appropriate software/applications.

15.4.12.H- Programming: Use programming languages to develop logical thinking and problem-solving skills.

15.4.12.K- Digital Media: Evaluate advanced multimedia work products and make recommendations based on the evaluation.

15.3.12.W- Communication: Collaborate via electronic communication with peers, educators, and/or professionals to meet organizational goals.

CSTA Standards:

HS-PRO-RD-18- Programming: Evaluate AI-generated code for accuracy, reliability, and alignment with program

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Leverage AI and emerging technologies as tools for solving authentic problems, creating meaningful products, and making informed decisions—while critically evaluating their accuracy, limitations, ethics, and impact on people.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Successful digital products begin with understanding the client or user's needs before choosing features or generating code.
- ❏ Specifications and wireframes translate a client's goals into a shared plan that guides development and reduces ambiguity.
- ❏ AI can accelerate website creation, but the developer remains responsible for interpreting requirements, making design decisions, testing the product, and ensuring the result meets the client's needs.
- ❏ Professional development is iterative and collaborative: interviews, product meetings, feedback, testing, and revision are part of producing a useful final product.
- ❏ A finished website should be evaluated not only by whether it works, but also

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do we turn a client's goals and ideas into clear website requirements?
- ❏ What questions should a developer ask before beginning to design or build?
- ❏ How can a wireframe help a client and developer reach a shared understanding of the product?
- ❏ How should a vibe coder decide what to delegate to AI and what requires human judgment or manual revision?
- ❏ How do we know when a website is ready to present to a client?
- ❏ How should client feedback, testing, accessibility, and design principles influence revisions?
- ❏ What can a retrospective teach us about our development process?

requirements. **HS-PRO-TR-19-** Testing & Refining: Evaluate a computing technology's alignment with design specifications and responsible design values, including its correctness, effectiveness, and user experience. **HS-PRO-TR-20-** Testing & Refining: Refine a computing technology based on user feedback, testing results, and responsible design values to improve its effectiveness and impact. **HS-ALG-IM-09-** Human-Centered Design: Design a computing technology using human-centered design principles.	by how well it satisfies specifications, communicates effectively, supports users, and reflects responsible design choices. ❑ Reflection on process and product helps developers identify what worked, what changed, and how they would improve future projects.	
	Acquisition(need to align with above and standards)	
	Students will know... ❑ Purpose of client interviews and product meetings in identifying goals, audience, content, features, style, and constraints. ❑ Meaning and purpose of project specifications and acceptance criteria. ❑ Purpose of a wireframe as a pre-build representation of page structure, content, and interface elements. ❑ An iterative client-development workflow: interview, define requirements, plan/wireframe, generate/build, test, gather feedback, revise, present, and reflect. ❑ Relevant Unit 3 design principles, including UX, accessibility, visual design, prototyping, testing, and iteration. ❑ Role of AI prompting and debugging in creating a website that conforms to stated specifications. ❑ Purpose of a project retrospective in evaluating both the final product and the process used to create it.	*Students will be skilled at...* ❑ Conduct or participate in a client interview and ask purposeful follow-up questions. ❑ Synthesize interview information into clear website specifications and priorities. ❑ Create a wireframe that reflects the client's goals before generating the website. ❑ Write and refine AI coding prompts that incorporate client requirements, content, style, constraints, and desired functionality. ❑ Build and customize an AI-assisted website to match agreed-upon specifications. ❑ Test the website for functionality, usability, accessibility, and consistency with client requirements. ❑ Collect, interpret, and prioritize client or peer feedback, then make justified revisions. ❑ Explain design and development decisions to a client or audience using appropriate terminology. ❑ Present a completed website and demonstrate how it addresses the client's stated needs. ❑ Conduct a retrospective that identifies successes, challenges, changes made during development, and next steps for improvement.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 1: Foundations of Visual Storytelling & Media Production

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="5">3.5.9-12.Q - Implement and critique principles, elements, and factors of design.
3.5.9.12.U - Define and evaluate a design's purpose.
3.5.9-12.P - Apply a broad range of design skills to a design thinking process.
3.5.9-12.OO - Use project management tools, strategies, and processes in planning, organizing, and controlling work.
3.5.9-12.QQ - Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.</td><td colspan="2">Students will independently adapt media-production skills to create purposeful visual and written communication across audiences, contexts, and real-world needs, making intentional technical, design, and editorial choices.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that...
• EU1: Visual identity emerges from intentional choices in imagery, typography, color, composition, editing, and written communication for an audience and purpose.
• EU2: Media skills transfer across purposes and contexts when creators adapt their choices to new needs.
• EU3: Creators must represent people, events, and information accurately while making editorial choices and considering multiple perspectives.
• EU4: Experimentation, critique, and revision strengthen communication; technology alone does not create meaning.
• EU5: Professional production depends on planning, organization, collaboration, communication, and deadlines.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
• How do media creators make people care about a story?
• How do purpose and audience influence the choices a creator makes?
• What makes an image or piece of media feel intentional rather than accidental?
• How does a creator develop a recognizable visual identity?
• How can skills developed for one media problem be adapted to solve another?
• How do we make creative choices while still representing people, events, and information accurately?
• What responsibilities do media creators have when documenting real people and events?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know...
• Composition, hierarchy, typography, color, and</td><td>Students will be skilled at...
• Composing, selecting, and editing original</td></tr>
</table>

	visual consistency • Exposure, camera operation, and candid/event photography • Audience, purpose, and relationships between images and copy • Interviewing, identification, captions, and headline conventions • Verified facts, unknowns, source credibility, and quote attribution • Copyright, image sourcing, and ethical editing • File naming, metadata, backups, and deadlines • Critique vocabulary and the media-production process	photographs • Combining design and written copy in Canva • Explaining intentional Visual Identity choices • Verifying facts and distinguishing unknowns • Interviewing and collecting accurate names, facts, and quotes • Writing headlines, captions, and supporting copy • Crediting sources and using imagery appropriately • Organizing and submitting files on deadline • Using critique to revise and document individual work • Adapting skills across personal and yearbook contexts

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 2 — Storytelling, Audience & Promotion

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="2">Applicable source curriculum standards
3.5.9-12.P — Apply a broad range of design skills to a design thinking process.
3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.
3.5.9-12.H — Evaluate ways that technology and engineering can impact individuals, society, and the environment.
3.5.9-12.N — Analyze and use relevant and appropriate design thinking processes to solve technological and engineering problems.
3.5.9-12.Q — Implement and critique principles, elements, and factors of design.</td><td colspan="2">Students will be able to independently use their learning to...
T1. Communicate meaningful stories through writing, photography, video, audio, and design.
T2. Make creative decisions based on audience, message, platform, and desired response.
T3. Gather, verify, and attribute information through research, observation, and interviewing to create ethical media.
T4. Plan, produce, critique, revise, and prepare media for publication using a professional workflow.
T5. Apply storytelling and promotion skills in new personal, academic, professional, and yearbook contexts.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td></td><td>UNDERSTANDINGS
Students will understand that...
EU1. Effective media begins with story, purpose, and audience; techniques serve those decisions.
EU2. Creators shape meaning through what they include, emphasize, sequence, or omit.
EU3. Accurate information, human details, purposeful interviews, and ethical representation strengthen storytelling.
EU4. Platforms require different techniques while the central message remains coherent.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
EQ1. How do media creators shape a story to connect with a specific audience?
EQ2. How does purpose influence what we write, photograph, film, design, and publish?
EQ3. What makes someone stop, look, listen, or care?
EQ4. How can we tell someone else's story accurately while making creative decisions?
EQ5. How does storytelling change when the goal is to inform, entertain, document, or persuade?
EQ6. How do creators know whether their media worked?</td></tr>
</table>

	EU5. Marketing combines story, visual identity, audience awareness, and persuasive writing to encourage a response. EU6. Planning, experimentation, critique, revision, and reflection improve creative work.	
	Acquisition(need to align with above and standards)	
	Students will know... K1. Story elements: setup, desire or goal, conflict or challenge, change, and result or resolution; not every nonfiction story requires a dramatic conflict. K2. Relationships among story, purpose, audience, platform, hook, message, and call to action. K3. Open and follow-up interview questions, active listening, recording and note-taking, attribution, verification, and ethical representation. K4. Characteristics of headlines, expanded captions, profiles, scripts, voice-over, social copy, and promotional writing. K5. Video composition, orientation, stability, movement, shot types and sequences; A-roll, B-roll, dialogue, natural sound, music, and lighting. K6. Storyboards, shot lists, sequencing, pacing, continuity, audio levels, graphics, and platform-specific exports. K7. Audience segmentation, branding, campaign consistency, distribution planning, and evidence of audience response. K8. Accuracy, privacy, permission, copyright, music rights, accessibility, and misleading manipulation in publishing.	**Students will be skilled at...** S1. Researching a personally meaningful subject and identifying a central story, audience, purpose, and hook. S2. Preparing and documenting interviews; selecting accurate quotes and details; checking names, facts, and attribution. S3. Writing and revising headlines, captions, profiles, scripts, voice-over, promotional copy, and calls to action. S4. Planning a storyboard and shot list; capturing purposeful sequences, usable dialogue, natural sound, and supporting footage. S5. Editing image, sound, text, and graphics for clarity, continuity, pacing, meaning, and horizontal or vertical delivery. S6. Creating at least three coordinated campaign pieces and explaining each medium and distribution choice. S7. Testing drafts with an audience, giving critique, revising, meeting deadlines, and documenting individual contributions. S8. Transferring an independently developed skill to usable yearbook content or promotion and explaining evidence of growth.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 3 — Editorial Design & Publication

<table>
<tr><th colspan="3">STAGE 1 | DESIRED RESULTS</th></tr>
<tr><th>Standards</th><th colspan="2">Transfer</th></tr>
<tr><td rowspan="4">Applicable source standards
3.5.9-12.Q — Implement and critique principles, elements, and factors of design.
3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work.
3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.</td><td colspan="2">Students will be able to independently use their learning to...
T1. Combine typography, imagery, and writing to communicate a story for a specific audience.
T2. Apply design systems to organize clear, coherent publications across new contexts.
T3. Gather and verify information, examine representation, and make responsible editorial and image-editing decisions.
T4. Manage production through research, experimentation, planning, critique, revision, and quality control.
T5. Transfer a personally developed design skill to an authentic yearbook need and explain its effect.</td></tr>
<tr><th colspan="2">Meaning</th></tr>
<tr><td>UNDERSTANDINGS
Students will understand that...
EU1. Design shapes what readers notice, understand, and remember.
EU2. Typography communicates through both words and the visual form of letterforms.
EU3. Image manipulation changes context and emphasis; editable techniques support revision and responsible representation.
EU4. Images and writing strengthen a story when they contribute complementary information.
EU5. Consistent design systems unify publications while allowing individual stories to differ.
EU6. Coverage choices determine whose experiences are represented; verification and revision improve publication quality.</td><td>ESSENTIAL QUESTIONS
Students will keep considering...
EQ1. How can a page guide a reader without explaining how to read it?
EQ2. How can the appearance of a word communicate its meaning?
EQ3. How does removing a background or combining images change the story a viewer perceives?
EQ4. What should images and words each contribute to a story?
EQ5. How can a publication feel unified while making room for different stories?
EQ6. Whose story is being told, and whose perspective is missing?
EQ7. What makes a publication ready for its audience?</td></tr>
<tr><th colspan="2">Acquisition(need to align with above and standards)</th></tr>
</table>

	Students will know... K1. Hierarchy, reading order, dominance, contrast, white space, columns, grids, margins, gutters, and caption placement. K2. Type anatomy, spacing, scale, arrangement, readability, and the distinction between editable text and graphic letterforms. K3. Selections, editable layer masks, transparency, refined edges, hair and negative spaces, layer order, and type/image composition. K4. Headlines, leads, body copy, expanded captions, credits, attribution, and secondary coverage forms. K5. Page plans, style consistency, theme connections, production responsibilities, and editorial versus technical proofs. K6. Accuracy, representation, image rights, responsible manipulation, and output requirements confirmed with the adviser/publisher.	**Students will be skilled at...** S1. Researching examples, setting a personal learning goal, sketching alternatives, and testing techniques. S2. Turning typography into purposeful graphics while retaining an editable text version. S3. Isolating a photographic subject in Photoshop with a refined layer mask and integrating it with type. S4. Selecting images and writing/revising accurate headlines, copy, captions, and credits. S5. Gathering missing perspectives and designing a secondary coverage package from verified information. S6. Applying a consistent grid/type system across a small publication and assigned yearbook content. S7. Critiquing, revising, proofing, preparing appropriate files, and documenting individual contribution and transfer.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 4 — Commercial Photography & Advertising

STAGE 1 | DESIRED RESULTS		
Standards	**Transfer**	
Applicable source standards 3.5.9-12.Q — Implement and critique principles, elements, and factors of design. 3.5.9-12.X — Implement the best possible solution to a design using an explicit process. 3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work. 3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.	**Students will be able to independently use their learning to…** T1. Create intentional photographs and persuasive writing for a defined audience and purpose. T2. Develop and test a media solution through research, experimentation, critique, and revision. T3. Respond to a client brief with coordinated media that meet agreed requirements. T4. Represent products and organizations accurately and make responsible choices about claims, imagery, and attribution. T5. Manage individual production and transfer a personally developed skill to an authentic yearbook need.	
	Meaning	
	UNDERSTANDINGS Students will understand that… EU1. Lighting, staging, and composition shape how viewers perceive a subject. EU2. Persuasive media connect a credible message with an audience's needs and context. EU3. Images, typography, and copy work together to guide attention and action. EU4. Audience feedback helps creators improve communication when it is interpreted against the intended purpose. EU5. Client work requires negotiation among creative choices, requirements, resources, and deadlines. EU6. Effective advertising depends on accurate representation as well as visual appeal.	**ESSENTIAL QUESTIONS** Students will keep considering… EQ1. How does the way we photograph something change its perceived value? EQ2. What makes a message persuasive to a particular audience? EQ3. What should an image communicate, and what should the words add? EQ4. How can we tell whether an advertisement communicates its intended message? EQ5. How do creators reconcile their ideas with a client's needs? EQ6. Where is the boundary between making a product appealing and misrepresenting it?
	Acquisition(need to align with above and standards)	

	Students will know... K1. Light direction, softness, reflection, diffusion, exposure, color consistency, backgrounds, props, and product composition. K2. Audience research, observable needs, message, medium, placement, and limits of demographic assumptions. K3. Headline, benefit-focused copy, supporting evidence, call to action, and visual hierarchy. K4. Editable retouching, masks, type/image integration, image rights, credits, and responsible representation. K5. Creative briefs, client questions, concept pitches, schedules, feedback, revisions, and delivery requirements. K6. Audience testing, qualitative feedback, success criteria, and editorial/technical proofing.	**Students will be skilled at...** S1. Researching a product and audience, verifying claims, and writing a focused creative brief. S2. Planning and testing lighting, staging, and composition to create coordinated original photographs. S3. Editing photographs with retained originals and explaining the effect of retouching decisions. S4. Writing and revising headlines, supporting copy, calls to action, pitches, and client questions. S5. Integrating photography, graphics, and typography into advertisements suited to a medium. S6. Testing message comprehension and using evidence to revise a design. S7. Managing a client project, adapting media across formats, proofing deliverables, and documenting individual yearbook transfer.

EAST PENN SCHOOL DISTRICT

Course Name Advanced Media Production

Unit Title Unit 5 — Independent Media Capstone & Portfolio

STAGE 1 | DESIRED RESULTS

Standards

Applicable source standards

3.5.9-12.Q — Implement and critique principles, elements, and factors of design.

3.5.9-12.X — Implement the best possible solution to a design using an explicit process.

3.5.9-12.OO — Use project management tools, strategies, and processes in planning, organizing, and controlling work.

3.5.9-12.QQ — Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.

Source: current Units 1/4 (Q), Unit 4 (X), and Unit 3 (OO, QQ).

Evidence: design decisions, production plans, critique/revision, proofs, and evaluation against agreed criteria.

Transfer

Students will be able to independently use their learning to...

T1. Integrate media techniques and substantial writing to communicate for a defined audience and purpose.

T2. Research unfamiliar approaches, experiment, and manage a sustained project from proposal through delivery.

T3. Use critique, audience feedback, verification, and quality control to improve media work.

T4. Apply independently developed skills to a shared publication or distribution need while fulfilling individual responsibilities.

T5. Select evidence of growth, explain creative decisions, and identify how learning transfers to future work.

Meaning

UNDERSTANDINGS

Students will understand that...

EU1. Purpose and audience guide the selection and integration of media techniques.

EU2. Independent learning requires inquiry, experimentation, realistic planning, and adaptation.

EU3. Revision improves communication when creators evaluate work against meaningful criteria.

EU4. Images and writing communicate responsibly when information, sources, and representation are examined.

EU5. Shared production depends on accountable individual contributions and coordinated decisions.

ESSENTIAL QUESTIONS

Students will keep considering...

EQ1. What do I want an audience to understand, feel, or do, and which media choices will help?

EQ2. How can I learn what a project requires when I do not yet know how to do it?

EQ3. How do I know when my work is ready for its audience?

EQ4. How can I balance creative ambition with time, resources, and publication responsibilities?

EQ5. What does responsible contribution to a shared publication look like?

EQ6. What evidence best demonstrates my growth and ability to transfer learning?

	EU6. A portfolio demonstrates growth through selected evidence and explanation of decisions.	
	Acquisition(need to align with above and standards)	
	Students will know... K1. Audience, purpose, scope, success criteria, and relationships among photography, design, video, writing, and promotion. K2. Research strategies, source evaluation, experimentation, milestones, feedback cycles, and revision records. K3. Writing forms appropriate to media: interview questions, scripts, narration, headlines, copy, captions, credits, and instructions. K4. Accuracy, attribution, image/audio rights, representation, and editorial/technical proofing. K5. Supplement coverage and production needs, distribution communication, role assignments, and adviser-confirmed procedures. K6. Portfolio selection, process evidence, presentation, reflection, and transfer.	**Students will be skilled at...** S1. Defining a personally meaningful project and pitching a feasible proposal with measurable success criteria. S2. Researching examples, testing techniques, troubleshooting, and revising a production plan. S3. Integrating multiple course skills into a sustained media product with substantial writing. S4. Gathering and verifying information, critiquing drafts, and completing editorial/technical proofs. S5. Producing assigned supplement content or usable distribution materials and documenting individual contribution. S6. Selecting portfolio evidence, explaining before/after decisions, presenting work, and evaluating transfer.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Understanding Food Sources

STAGE 1 | DESIRED RESULTS
Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.
11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.
11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and pricing to menu planning.
11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods
11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.
11.2.9-12.D: Compare and contrast the selection of goods by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❑ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS
Students will understand...

- ❑ Where food comes from directly impacts its flavor, cost, and quality in the kitchen.
- ❑ Food labels require careful reading to separate certified standards from marketing terms.
- ❑ The benefits of buying produce during its peak season.
- ❑ Recipes and techniques can be adjusted based on what ingredients are fresh and available.
- ❑ Proper storage and smart kitchen habits reduce food waste and save money

ESSENTIAL QUESTIONS
Students will keep considering...

- ❑ How to distinguish real food certifications from marketing claims on packaging?
- ❑ How can consumers distinguish real food certifications from marketing claims on packaging?
- ❑ Why does cooking with seasonal ingredients make financial and culinary sense?
- ❑ How does food preparation change when substituting off-season or store-bought produce?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ Proper storage techniques to keep ingredients fresh after purchasing
- ❑ How food sourcing impacts cost, freshness, and quality
- ❑ The differences between official, regulated food labels and unregulated marketing terms.

Students will be skilled at...

- ❑ Reading food packaging and produce labels to determine sourcing origins.
- ❑ Choosing fresh ingredients based on quality, seasonality, and price.

Course Name Farm to Table

Unit Title: Produce and Seasonality

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods

11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.

11.2.9-12.D: Compare and contrast the selection of goods by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❏ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Fresh, seasonal ingredients taste better, last longer, and cut down on reliance on processed foods
- ❏ Cooking with seasonal produce requires flexible recipe planning to get the best quality for the lowest price

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do food labels and sourcing change what you choose to buy and cook?
- ❏ In what ways do seasonal availability and regional agriculture dictate how to plan, prepare, and enjoy fresh food?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ How growing seasons affect local produce flavor, availability, and price.
- ❏ Basic storage techniques that extend the shelf life and quality of fresh ingredients.
- ❏ How cooking from scratch gives you control over flavor and ingredients
- ❏ Practical ways to reduce food waste, such as using scraps and repurposing ingredients across multiple meals.

Students will be skilled at...

- ❏ Inspecting fresh, local produce for peak seasonality and quality.
- ❏ Adapting basic recipes by substituting seasonal produce as harvests change.
- ❏ Applying core cooking methods to build flavor using fresh, whole ingredients.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Proteins and Preparation

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.
11.1.9-12.B: Evaluate the role of government agencies in safeguarding our food supply.
11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.
11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.
11.2.9-12.A: Develop a global view to weigh consumer and design decisions with the parameters of sustainability, socioeconomic, and cultural contexts.
11.2.9-12.D: Compare and contrast the selection of goods and services by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❏ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Different cuts and types of protein require specific cooking techniques, storage, and handling.
- ❏ Where protein comes from directly affects its price, taste, and quality.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do you choose the right cooking method for different cuts and types of protein?
- ❏ How do sourcing practices impact protein quality, flavor, and cost?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ The main characteristics and categories of plant and animal proteins.
- ❏ How animal diet and sourcing practices affect quality, fat content, and flavor.
- ❏ How to identify cooking methods for a variety of proteins.
- ❏ How to stretch protein budgets using scrap utilization and waste reduction.

Students will be skilled at...

- ❏ Executing specified cooking techniques based on the protein cut or type.

EAST PENN SCHOOL DISTRICT

Course Name Farm to Table

Unit Title: Seasonal Meal Planning

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.2.9-12.D: Compare and contrast the selection of goods and services by applying safe and effective consumer strategies.

Transfer

Students will be able to independently use their learning to...

- ❑ Plan, source, and prepare balanced, seasonal meals using sustainable local ingredients.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Planning a complete menu requires balancing flavor, texture, nutrition, seasonal sourcing, and cost.
- ❑ Applying proper cooking techniques helps turn basic seasonal ingredients into full meals.
- ❑ Balanced menus can be designed around available seasonal ingredients without sticking strictly to a recipe

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How do sourcing, seasonality, and cooking techniques come together to build a balanced menu?
- ❑ How does reducing food waste save money while helping the environment?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ How to plan a balanced seasonal menu and estimate total food costs
- ❑ Advanced culinary techniques for prepping, cooking, and finishing complete dishes.
- ❑ How to assess current food inventory and adjust recipes based on available ingredients.

Students will be skilled at...

- ❑ Designing and costing out balanced, seasonal menus using local and available ingredients.
- ❑ Executing intermediate and advanced cooking techniques to prepare complete meals.
- ❑ Tasting, adjusting seasoning, and managing prep timing for complete dishes

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Fundamentals of Baking

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.A: Predict factors that affect food safety and security from production through consumption.

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ measure, scale, and execute standard baking recipes accurately and safely

Meaning

UNDERSTANDINGS

Students will understand....

- ❏ Baking is a precise science where minor changes in measurements or technique directly impact the final product
- ❏ Every core ingredient plays a specific role in creating the structure, flavor, and texture of a baked good

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How is baking different from cooking and why does precision matter?
- ❏ How do individual ingredients affect the texture, structure, and outcome of a baked good?
- ❏ How does gluten development change the texture of a baked product?

Acquisition (Skills and Knowledge)

Students will be skilled at...

- ❏ Using kitchen tools and equipment safely and correctly
- ❏ Scaling recipes up or down to adjust recipe yield
- ❏ Reading, interpreting, and executing standard baking recipes
- ❏ Measuring liquid and dry ingredients accurately using volume and weight tools

Students will know...

- ❏ The functional roles of core baking ingredients
- ❏ The principles of gluten development and factors that affect it

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Quick Breads and Cookies

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❑ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❑ select and execute the proper mixing method and leavener to achieve a target texture, rise, or cookie spread

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ Mixing methods directly control gluten development, determining whether a product turns out tender, flaky, or tough
- ❑ Chemical leaveners require liquid, acid, or heat to make baked goods rise
- ❑ Fat and sugar dictate a cookie's shape, crunch, and moisture

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How does the mixing method change the final texture of a baked good?
- ❑ What makes quick breads rise without using yeast?
- ❑ How do small changes in ingredients alter the shape and texture of cookies?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ How chemical leaveners react in a recipe
- ❑ How fat, sugar, and flour affect structure, spread, and tenderness
- ❑ The procedural steps and ratios for the biscuit, muffin, and creaming methods

Students will be skilled at...

- ❑ Applying foundational mixing techniques based on recipe requirements
- ❑ Portioning and shaping batters and doughs evenly so items bake at the same rate
- ❑ Evaluating finished quick breads and cookies for proper rise, texture, color, and flavor

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Yeast Breads

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ manage time, temperature, and fermentation to control dough development and produce quality yeast breads

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Yeast is a living organism that needs specific conditions to grow and give bread its rise
- ❏ Kneading and resting dough creates the structure and texture of the bread
- ❏ Adding certain ingredients changes how yeast dough behaves and tastes

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do time and temperature control the outcome of yeast bread?
- ❏ How does fermentation create air, rise, and structure in dough?
- ❏ How do extra ingredients like sugar, fat, and salt change a basic dough recipe?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ Environmental factors that activate, slow down, or destroy yeast
- ❏ Structural and ingredient differences between lean and enriched doughs
- ❏ The stages of yeast bread production
- ❏ How salt and sugar affect fermentation and gluten strength

Students will be skilled at...

- ❏ Handling yeast doughs through all key stages of preparation
- ❏ Determining dough readiness by testing dough growth and texture before baking
- ❏ Evaluating finished yeast breads for proper rise, crust, and crumb structure

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Pies and Pastries

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❏ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❏ manage dough temperature, fat distribution, and moisture to prepare flaky crusts and delicate pastries

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Cold fat and minimal handling are essential for flaky pastry layers
- ❏ Managing moisture and liquid is key to keeping pastries crisp and fully baked
- ❏ Steam and air act as leaveners to give pastries rise and texture

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ What makes a pastry flaky versus tender?
- ❏ Why is temperature control important when working with pastry dough?
- ❏ How do filling, crust, and temperature work together to create a successful pastry?

Acquisition (Skills and Knowledge)

Students will know...

- ❏ Characteristics of foundational pastry doughs
- ❏ How temperature, fat distribution, and steam create physical leavening and flaky layers

Students will be skilled at...

- ❏ Rolling, shaping, and blind-baking doughs
- ❏ Preparing, shaping, and piping pastry doughs
- ❏ Evaluating finished crusts and pastries for flakiness, color, and doneness

EAST PENN SCHOOL DISTRICT

Course Name: Baking and Pastry Arts

Unit Title: Cakes and Decorating

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

11.1.9-12.E: Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.

11.1.9-12.F: Apply the fundamentals of time, temperature, and cooking techniques to preparing, cooking, cooling, reheating, and holding a variety of foods.

11.1.9-12.G: Analyze the relevance of scientific principles to food processing, preparation, and packaging.

Transfer

Students will be able to independently use their learning to...

- ❑ use core pastry techniques and baking science to confidently bake, evaluate, and fix recipes on their own
- ❑ construct, level, and decorate stable, visually balanced cakes

Meaning

UNDERSTANDINGS

Students will understand that...

- ❑ The mixing method determines cake structure and moisture level
- ❑ Temperature control is necessary for stable icing, smooth fillings, and stacked assembly
- ❑ Visual presentation, clean finish work, and piping technique enhance overall dessert appeal and value

ESSENTIAL QUESTIONS

Students will keep considering...

- ❑ How does the mixing method affect cake texture and structure?
- ❑ How do temperature and assembly techniques create stability in decorated cakes?
- ❑ How do piping techniques and clean finish work enhance the overall appeal of a dessert?

Acquisition (Skills and Knowledge)

Students will know...

- ❑ Structural and ingredient differences between creamed and sponge cake types
- ❑ Key procedural steps for cake assembly, including leveling, crumb-coating, and icing
- ❑ How different piping techniques create specific borders and designs

Students will be skilled at...

- ❑ Mixing and baking uniform cake layers
- ❑ Leveling, filling, and crumb-coating a cake for decorating
- ❑ Piping basic borders and designs using buttercream

EAST PENN SCHOOL DISTRICT

Course Name Weightlifting

Unit Title Unit 1

STAGE 1 | DESIRED RESULTS

Context and relevance for student learning

Standards

10.9.9-12.B - Apply advanced non-locomotor skills in fitness routines, sports performance, and movement-based practices, including, but not limited to, strength conditioning and yoga.

10.10.9-12.A - Analyze personal movement and fitness data to optimize performance and prevent injury.

10.10.9-12.B - Analyze personal effort during physical activity using tools such as the talk test, heart rate monitoring, or rate of perceived exertion (RPE) to understand how these

Transfer

Students will be able to independently use their learning to...(make purpose-takeaway in 5 years)

- ❏ Create and implement a training plan that actually works for me.

Meaning

UNDERSTANDINGS

Students will understand that...

- ❏ Effective strength training is a feedback loop: plan, execute, measure, adjust — not a fixed program followed blindly.
- ❏ Data only becomes useful when it's interpreted — tracking numbers without analyzing patterns doesn't prevent injury or improve performance.
- ❏ Perceived effort (RPE) is a more reliable day-to-day guide than a fixed number on the bar, because readiness and recovery change constantly.
- ❏ Progress requires a deliberate, gradual increase in demand (progressive overload) balanced against recovery — training is a dose, not just an activity.
- ❏ A fitness plan is only as good as its fit to the individual's goal, current ability, and life constraints — and it should evolve as the person does.

ESSENTIAL QUESTIONS

Students will keep considering...

- ❏ How do I lift safely? In other words, what separates a "correct" lift from one that just moves the weight?
- ❏ What is my training actually telling me, and how would I know if I ignored it?
- ❏ Why might two people lifting the same weight be doing very different amounts of work?
- ❏ Why does form matter more as the weight gets heavier?
- ❏ Why doesn't doing the same workout every day make you stronger?
- ❏ What makes a fitness plan mine rather than just a plan?

factors influence health and quality of life now and in the future. 10.10.9-12.D - Analyze exercise principles and movement sequences to create plans that improve performance in self-selected lifetime activities. 10.10.9-12.F - Design and implement a personalized health and fitness plan that applies knowledge of health-related fitness and is differentiated for individual goals to monitor, analyze, and support progress toward a healthy lifestyle. 10.1.9-12.C - Evaluate personal physical activity patterns and apply fitness principles to support lifelong health and prevent disease.	**Acquisition(need to align with above and standards)** *Students will be able to...* ❑ Name and demonstrate the major movement patterns: squat, hinge, lunge, rotation, push, pull and gait. ❑ Execute proper setup, grip, and bar path for core lifts (back squat, deadlift, bench press, overhead press, row). ❑ Identify and self-correct common form breakdowns. ❑ Progress a lift from bodyweight/light-load technique work to loaded, full-range repetitions. ❑ Record and interpret training log data (weight, sets, reps, RPE, %1RM) session to session. ❑ Use video, teacher feedback and peer feedback to compare techniques against a form checklist. ❑ Identify patterns that signal overtraining or elevated injury risk ❑ Use data trends to justify an adjustment to load, volume, or exercise selection. ❑ Estimate and work within a percentage of one-rep max (%1RM). ❑ Use heart rate or RPE data to decide whether to progress, hold, or reduce load in a session. ❑ Explain the relationship between training intensity, recovery, and long-term health. ❑ Define progressive overload, specificity, overload, and periodization. ❑ Sequence a training week/cycle that balances muscle groups and recovery. ❑ Apply the FITT principle (frequency, intensity, time, type) to a strength program. ❑ Modify a training plan in response to progress, plateaus, or missed sessions. ❑ Set a specific, measurable personal training goal (e.g., strength, hypertrophy, endurance, general fitness). ❑ Design a multi-week program with appropriate exercise selection, load, volume, and rest. ❑ Track progress against the plan using logs ❑ Evaluate outcomes and revise the plan based on results. ❑ Evaluate personal training frequency/consistency against recommended guidelines. ❑ Explain how strength training complements cardiovascular activity in an overall fitness pattern. ❑ Execute dynamic warmup and cardiovascular activities, and explain how those activities complement strength training in an overall fitness pattern.

EMMAUS
HIGH SCHOOL

PROGRAM OF STUDIES 2027-2028

EAST PENN
SCHOOL DISTRICT

EAST PENN SCHOOL DISTRICT

EMMAUS HIGH SCHOOL

500 Macungie Avenue
Emmaus, PA 18049
Main Office: (610) 965-1650
Visit our website: https://www.eastpennsd.org/ehs/

Emmaus High School is proud to provide a variety of academic opportunities for students. It is our mission to foster a community in which students become effective problem solvers, collaborators, critical thinkers, and communicators. Everyday, we strive to empower students to grow into confident, adaptable, compassionate individuals to become lifelong learners and contributors to a global society. Our School Profile highlights all the great things we provide at EHS. To view our current school profile, please visit: https://www.eastpennsd.org/ehs/wp-content/uploads/sites/2/2026/09/EHS-PROFILE-26-27.pdf.

PORTRAIT OF A GRADUATE [SKILLS]

COLLABORATORS

CALCULATED RISK TAKERS

INNOVATIVE CREATORS

PROBLEM SOLVERS

CRITICAL THINKERS

EFFECTIVE COMMUNICATOR

CONSCIENTIOUS RESEARCHERS

FLEXIBLE & CREATIVE THINKERS

SELF-DIRECTED LEARNERS

ENGAGED CITIZEN

PORTRAIT OF A GRADUATE [ATTRIBUTES]

INCLUSIVE	SELF-AWARE	CONFIDENT
ADAPTABLE	REFLECTIVE	CARING & COMPASSIONATE
PERSISTENT	INTROSPECTIVE	CURIOUS
GLOBALLY AWARE	RESILIENT	PHYSICALLY & MENTALLY HEALTHY

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Mrs. Beth Guarriello, EHS Principal
Ms. Lorie Gamble, Principal for Academic Affairs
Dr. Rodd Luckenbill, Student Service Principal
Ms. Nicole D'Emilio, Student Service Principal
Ms. Wendi Myers, Student Service Principal
Mr. Marc Zimmerman, Student Service Principal
Ms. Rebecca George, Athletics Director
Mrs. Carrie Okken, Student Activities Director

For information regarding 1) civil rights, 2) grievance procedures, 3) services, activities and facilities that are accessible to and usable by handicapped persons, or 4) employee or participant complaints of harassment or discrimination, contact Director of Human Resources (Compliance Officer), 800 Pine Street, Emmaus, PA 18049. The Federal Drug-Free Workplace Act requires that your workplace be free of the illegal use of drugs and requires that we issue the following statement to you. No one is allowed to use, make, sell, distribute, or have in their possession any illegal drugs. Any violation of the act will lead to severe disciplinary action which will normally include dismissal.

EAST PENN SCHOOL DISTRICT

A MESSAGE FROM THE PRINCIPAL

Dear Emmaus High School Students and Families,

Choosing courses is an exciting and important step in shaping each student's high school experience and preparing for the opportunities that follow graduation. The Emmaus High School Program of Studies is designed to help students and families make thoughtful, informed decisions as they plan for the 2027-2028 school year.

Emmaus High School offers an outstanding range of learning experiences to meet the interests, strengths, and goals of every student. From Advanced Placement and dual-enrollment courses to career and technical education at LCTI, the arts, sciences, humanities, and many engaging electives, students have numerous opportunities to challenge themselves, explore new interests, and discover their talents.

As you review this guide, I encourage students to think not only about graduation requirements but also about the experiences that will help them grow. The best course selections provide an appropriate level of academic challenge while allowing students to pursue their interests and maintain a healthy balance. Families are encouraged to have meaningful conversations about each student's strengths, aspirations, and plans for the future.

While academic challenge and success are important, getting involved outside of the classroom is equally valuable. Athletics, clubs, music, theater, student leadership, and community service provide opportunities for students to build friendships, develop confidence, discover new interests, and feel connected to our school community. We encourage every student to find at least one activity that makes Emmaus High School feel like their school.

Our Program of Studies also reflects our continued commitment to the **EPSD Portrait of a Graduate**. Through their coursework and school experiences, students develop essential skills such as critical thinking, communication, collaboration, creativity, and responsible decision-making. These skills will help prepare them to succeed in college, careers, and their communities.

We also recognize that students are most successful when they feel supported. Emmaus High School offers a wide variety of academic, mental health, and social-emotional supports to help students navigate the challenges of high school. We are fortunate to have exceptional teachers, counselors, support staff, and administrators who genuinely care about our students and want them to be healthy, happy, and successful—not only during high school, but well beyond graduation.

Our team is here to help students understand their options and create an academic plan that is both purposeful and personal. We encourage every student to ask questions, seek guidance, embrace new opportunities, and take an active role in planning their educational journey.

At Emmaus High School, we are incredibly proud of the many pathways and experiences available to our students. We look forward to partnering with you as each student discovers their potential, pursues meaningful goals, and creates a high school experience filled with growth, connection, achievement, and success.

Sincerely,

Beth Guarriello, Principal
Emmaus High School

SCHOOL COUNSELING SERVICES

School counseling services are intended to help students as they navigate high school and prepare to transition to their postsecondary plans. Students are to discuss concerns about academic course work, career planning or social/emotional issues that may arise with their school counselor.

More specifically, the role of the school counselor is to:

- guide students in finding solutions to individual problems
- help students transition and adjust to their surroundings
- aid students in identifying building and community supports
- provide resources for exploring post high school plans and career options
- raise awareness of career and technical opportunities
- assist with academic course planning to meet graduation requirements
- support students through the admission process for post-secondary institutions, technical schools, military enlistment and/or entering the workforce.

Through a comprehensive school counseling program, school counselors support student success by aiming to help students achieve optimal personal growth, acquire positive social skills, set informed career goals and realize their full academic potential so that they may become productive, contributing members of the global community.

CONTACT YOUR SCHOOL COUNSELOR

Kristen Grim, *Department Chair*	610-965-1663
Laura Baranek	610-965-1666
Sara Burk	610-965-1664
Colleen Demchak	610-965-1689
Heather Greene	610-965-1665
Jessica LaBar	610-965-1691
Alexis Traupman	610-965-1527
Heather Spotts	610-965-1667
Paul Wood	610-965-1687

Department Chairs can be reached through the Emmaus High School Main Office at 610-965-1650.

DEPARTMENT CHAIRS

Katie Pfenninger	Art
John Dietrick	Business and Computer Applications
Justine Frantzen	English
Ann Breidenbach	English Learner (EL)
Alon Hogan	Family and Consumer Sciences
Kim Adams	Mathematics/Computer Science
Molly Magro	Library
Spencer Koppenol	Music
Julia Zimmer	Music
Kelly Musselman	Science
Brent Ohl	Science
Matthew Reightler	Special Education
Melissa Moxley	Social Studies
Steve Braglio	Technology Education
Jake Beitler	Well/Fit/Driver Education/Health
Shannon Fraser	World Language

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The East Penn School District is an equal opportunity education institution and will not discriminate in its educational programs, activities or employment practices on the basis of race, color, national origin, sex, age, religion, ancestry, disability, union membership or other legally protected classification. Announcement of this policy is in accordance with state and federal laws, including Title VI, Title IX, Section 504 and ADA.

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ATTENDANCE

Under Pennsylvania law, all students between the ages of six (6) and eighteen (18) must attend school every day. Once a student is enrolled in school, this includes students in kindergarten, they are subject to compulsory school laws until the student reaches age 18. The student can only be withdrawn if they transfer out of the District. The student will remain on the District's roll and the student/family is subject to truancy court if they do not attend school. A parent/guardian who enrolls their child in kindergarten may formally withdraw their child from school prior to reaching compulsory school age (age six), at which point the child would no longer be subject to compulsory school laws until they turn six (6) years old.

A student shall be considered in attendance if present at any place where school is in session by authority of the Board; if receiving approved tutorial instruction or health or therapeutic services; if engaged in an approved and properly supervised independent study, remote learning such as VESPA (EPSD's virtual/online program), work-study, field study, or career education program; if receiving approved homebound instruction; or if the student's placement is instruction in the home.

Pennsylvania Department of Education regulations state that students have a legal right to attend school until the age of 21.

Students who turn 21 during the school term are entitled to finish out the school year.

Parents/guardians are expected to:

- Ensure that their child(ren) between the ages of six (6) and eighteen (18) are enrolled in school and attend school regularly, on time, and for the entire school day.
- Emphasize the importance of on-time attendance in school, class, and supervised activities-and celebrate good attendance and success.
- Send their child(ren) to school every day prepared to participate and learn. Establish reasonable, age-appropriate curfews and bedtimes.
- Make appointments for their child(ren) outside of the school day or days when schools are closed whenever possible.
- Ensure that their child receives the periodic student health examinations and immunizations that are required by law.
- Schedule family vacations to coincide with school recesses.
- Call the school to report when their child is or will be absent within 3 days upon the student's return to school per attendance guidelines.
- Provide a written excuse for every absence when their child returns to school, per attendance guidelines.
- Provide a written excuse for every late arrival and early departure, per attendance guidelines.
- Provide the school with correct, current addresses, emergency contacts, home, cell, and work telephone numbers, e-mail addresses at the beginning of each school year and update information whenever there are changes.
- Participate in school attendance improvement conferences for their child to improve daily attendance when necessary.

WHAT IS AN EXCUSED ABSENCE?

Sometimes students have to miss school. Absences which meet the conditions or situations indicated below under Excused/Lawful Absence shall be considered an excused absence.

- Written or electronic excuse notes must be given to the school within three (3) days upon the student's return to school. If the note is not submitted to the school within the required time frame, the day(s) may not be excused. For absences that do not total three (3) consecutive days, a parent/guardian may submit a written excuse note stating the reason for the absence.
- All absences resulting in a total of three or more consecutive days due to illness will require a written excuse note by a licensed healthcare provider.
- When a student has been absent, excused with a parent/guardian note, totaling ten (10) days (cumulative), all subsequent absences may require a written excuse note from a licensed healthcare provider.

Written excuse notes must include a valid telephone number or other means of contact for verification purposes.

EXCUSED/LAWFUL ABSENCE

The following conditions or situations constitute reasonable cause for absence from school:

- Obtaining professional health care or therapy service rendered by a licensed practitioner.
  - Upon written request by a parent/guardian , a student may be excused during school hours for the purpose of obtaining professional health care or therapy service only if the following requirements are met:
    - The health or therapeutic services are to be rendered by licensed practitioners; It is not practical or possible for the student to receive the services outside of school hours; and
    - The time of necessary absence from school involves a minimum of interference with the student's regular program of studies.
- Illness, including if a student is dismissed by designated District staff during school hours for health-related reasons.
- Quarantine
- Recovery from accident
- Required court appearance
- Death in family
- Educational trip/tour if the following conditions are met:
  - The parent or guardian submits the documentation required for excusal prior to the absence, within the appropriate time frame.
    - The student's participation has been approved by their administrator.
    - The adult directing and supervising the tour or trip is acceptable to the parent or guardian.
    - College tours, trade school tours, career and technical training program tours, community college tours, or tours of other non-District schools, with prior approval.
    - The District may limit the number and duration of non-school-sponsored educational tours or trips for which excused absences may be granted to a student during the school year.
- Observance of a religious holiday, upon prior written request from the person in parent/guardian
- Out-of-school suspension
- Family Emergency (An unexpected, serious event that is outside of the control of the student's family)
  - Requires parent/guardian note explaining the emergency received within 3 school days of the student's return. School staff will evaluate if the situation constitutes a family emergency.
- Participation in a project sponsored by a statewide or countywide 4-H, Future Farmers of America (FFA), or combined 4-H and FFA group, upon prior written request.
- Participation in a musical performance in conjunction with District approval
- Other urgent reasons that may reasonably cause a student's absence as well as circumstances related to homelessness and foster care.

UNEXCUSED/UNLAWFUL ABSENCES

Absences which do not meet the above conditions or situations shall be considered an unexcused/unlawful absence.

An "unexcused" or "illegal" absence occurs when a student is absent without a valid excuse in writing. That means that either no written note was submitted to the school upon the student's return or that the reason provided in the note was deemed invalid. Examples of invalid excuses include (but not limited to): babysitting, waking up late, illness of a family member, and vacation.

Absences shall be treated as unexcused until the school receives a written excuse explaining the absence, to be submitted within three (3) days of the absence.

ATTENDANCE (CONT'D.)

RESPONSES TO NON-ATTENDANCE (TRUANCY)

When a student has been absent for three (3) days during the current school year without a lawful excuse, District staff shall provide notice to the parent/guardian within ten (10) school days of the student's third unexcused absence.

If the student continues to accumulate additional unexcused absences after issuance of the notice, the parent/guardian and student will be invited to attend a School Attendance Improvement Conference (SAIC) where a School Attendance Improvement Plan (SAIP) will be created in order to support the family in identifying and alleviating attendance barriers. A SAIP must be developed for any student by their sixth (6th) unexcused absence. The parent/guardian and student must be invited to this conference in advance. Neither the student nor the parent/guardian shall be required to participate, although it is highly recommended. The SAIC shall occur even if the parent/guardian declines to participate or fails to attend the scheduled conference.

If the student's attendance does not improve after the school has created a SAIP, and has ten (10) or more illegal absences, the student may be referred to Truancy Court. At that time a truancy provider will contact the parent/guardian in order to assist further with alleviating barriers to attendance. The student and parent/guardian will be required to attend truancy court and the parent/guardian must comply with the truancy court order. The court order may include a referral for services. If the student's attendance does not improve at the truancy court level, truancy court may refer the case to family court. Suspension from school or transfer to an alternative education setting is not a permissible response to truancy.

This information can also be found on our website at EPSD's attendance expectations.

VIRTUAL STUDY HALL

A Virtual Study Hall is a privilege available to eligible juniors and seniors each school year. It can include an early release from school and/or late arrival to school. This is not automatically granted for all students. Prior to each school year, student data from the previous school year is reviewed using 3 criteria including attendance, discipline, and grades to determine if a student qualifies for this privilege for the upcoming school year. All rising seniors and juniors who have a naturally occurring study hall are eligible but must qualify for early release (seniors and juniors) or late arrival (seniors only) by meeting 3 criteria.

Students must be in good standing in the 3 areas to acquire and maintain this privilege during any scheduled study halls that may fall during blocks 1 and 4 throughout the year. These criteria includes no offenses of the following:

- **Discipline:** A Level 3 or higher discipline referral
- **Academics:** Failure of 2 or more courses during the previous marking period
- **Attendance:** 20 or more unexcused lates to school throughout the year or an accumulation of 20 unexcused absences.

Students may not drop or rearrange a class to schedule to acquire this privilege. If a student qualifies, they will be automatically scheduled for this privilege, but also must be able to provide their own transportation. Please note: Students are not guaranteed the privilege for every marking period during the school year. Student records are reviewed at the end of each marking period to determine the continuation of this privilege. This privilege will be determined for future marking periods after each marking period's grades are stored. Should a student wish to be reconsidered for the privilege, they can email their assistant principal to schedule a review of their eligibility.

COURSE SELECTION: A MESSAGE TO PARENTS

Each eighth, ninth, tenth and eleventh grade student will have access to the Program of Studies (POS) via the EHS website. Paper copies will be made available upon request. The POS is the result of meetings with teachers, school counselors, department chairpersons, administrators, parents/guardians, the Superintendent and the Board of School Directors. The Program of Studies describes each course offered in the high school. Please take some time to become familiar with our course offerings. Course selection is regarded as an important function and should be given very serious consideration by students and parents. In February, students will discuss next year's course selections with their subject teachers. All teachers will use the knowledge they have gained having your student in class to assist them in choosing an appropriate course for next year which best suits their abilities and aspirations. Students will then have the opportunity to discuss their teachers' recommendations with their families prior to course registration.

Occasionally, a teacher's recommendation will not match your or your student's selection. You are encouraged to contact the teacher(s) if you have questions regarding your student's course recommendations for that subject area or your student's school counselor for general questions regarding course registration. Please note that students must request a minimum of 5.25 credits each year and fulfill the high school's graduation requirements by the end of their senior year.

Students are encouraged to select courses with the following objectives in mind:

1. Complete all graduation requirements.
2. Select courses which will prepare the student for entrance into post-secondary education, the military, technical schools or the workforce. College bound students should familiarize themselves with admission requirements for individual colleges and choose courses accordingly.
3. Select courses that are taught at the highest academic level possible for student success.

Please Note: Selecting courses should involve careful consideration by the student and their family and should be made on the basis of student interests, abilities, and vocational goals. It is advisable to work closely with the school counselors in the selection of a program of studies. It is strongly recommended that a student planning to take the second year of a continuing type course follow recommended prerequisites.

Course requests will be entered in February. Students, teachers, and families will have the opportunity to verify course requests as part of the scheduling process. Once verifications are completed, all the course requests are tallied. The number of sections of a particular course and teachers' assignments are determined by the students' course requests. All course selection changes must be made before the end of **June 30th**. A course may not be offered because an insufficient number of students selected the course, a certified teacher is not available, or budgetary funds are not available. Although every effort is made to accommodate students' requests, some cannot be honored. Because of the implications a few changes can have on the entire schedule, it is very important that each student's selections be made very carefully.

GRADUATION REQUIREMENTS

The East Penn School District requires that all students complete a minimum of twenty-one (21) credits as defined in the Program of Studies between grades 9 and 12 to graduate. Beginning with the class of 2030, all graduates of the East Penn School District will have to earn a total of 21.5 credits. This change is in accordance with Act 35 from the Pennsylvania Department of Education which mandates a course in personal finance beginning in 2030.

Credits must be completed in the following areas:

# OF CREDITS	SUBJECT AREA
4	English
4	Social Studies
3	Science
3	Mathematics
2	Arts/Humanities
1	Wellness/Fitness
0.5	Health
.25	Driver Education
0.5	Family and Consumer Science
0.5	STEM*
0.5	Personal Finance *Beginning with the class of 2030**
2.25	Elective Credits

*Elective courses that fulfill this requirement will be denoted in the course description. In addition, any science or mathematics course taken beyond the above listed requirements may also be used for this purpose.

All students are required to complete four credits of Social Studies. As students select courses to fulfill the four credit requirement, they must complete all of the following:

1. American Studies (American Studies 1 and 2 OR U.S History, Advanced Placement)
2. World Studies (World Studies; European History, Advanced Placement; or World History, Advanced Placement)
3. Government (Government & Economics Literacy; Government; U.S. Government, Advanced Placement; U.S. History, Advanced Placement; or Humanities)

Students must pass three full credits of science, at least one of which must be Biology.

Arts/Humanities: Any course offered in the following departments may be used to satisfy the Arts/Humanities requirements:

Art	**Music**	**English**	**Family and Consumer Science**
Social Studies	**World Language**	**Technology Education**	

Students must successfully complete four (4) Wellness/Fitness courses (one each year). One of these must be Aquatics.

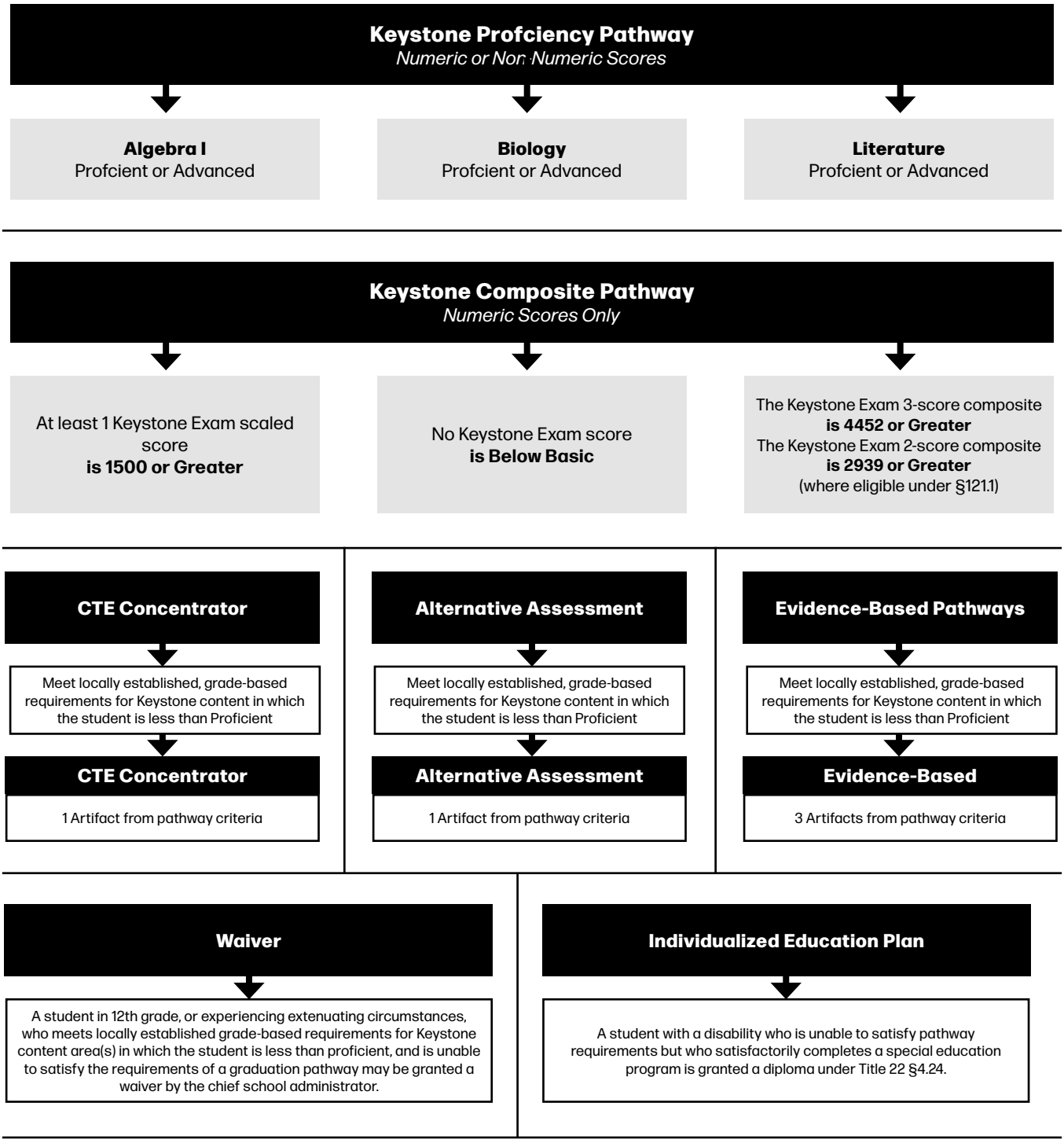
Beginning with the class of 2030, all graduates of the East Penn School District will have to earn a total of 21.5 credits that includes a course in personal finance.

Students transferring into the East Penn School District who are in jeopardy of not satisfying local graduation requirements due to differences in requirements between the East Penn School District and the previous school(s) attended and/or students enrolled in approved differentiated academic programs are entitled to an adjustment in the graduation requirements according to procedures established by the Superintendent/Principal.

ACT 158

In accordance with Act 158 of 2018, students must meet statewide graduation requirements in one of five ways.

PENNSYLVANIA PATHWAYS TO GRADUATION



NOTE: Although this infographic displays a sequential progression, students may fulfill criteria under the CTE Concentrator, Alternative Assessment, or Evidence-Based Pathways prior to demonstrating proficiency in Keystone academic content through Keystone Exam scores or locally established grade-based requirements.

ACT 158 (CONT'D.)

PENNSYLVANIA PATHWAYS TO GRADUATION

CTE Concentrator

1 Artifact

Industry-based competency certification

Likelihood of industry-based competency assessment success

Readiness for continued engagement in CTE Concentrator program of study

Alternative Assessment

1 Artifact

Attainment of one alternative assessment score or better: ACT (21), ASVAB AFQT (31), PSAT/NMSQT (970), or SAT (1010)

Attainment of Gold Level or better on ACT WorkKeys

Attainment of 3 or better on AP Exam(s) related to each Keystone content area in which less than Proficient

Attainment of 4 or better on IB Exam(s) related to each Keystone content area in which less than Proficient

Successful completion of concurrent enrollment course(s) related to each Keystone content area in which less than Proficient

Successful completion of a pre-apprenticeship program

Acceptance into accredited, non-profit Institution of Higher Education (IHE) 4yr program for college-level coursework

Evidence-Based

3 Artifacts consistent w/ student goals

ONE or more from Section One No more than TWO from Section Two

Section 1

Attainment of 630 or better on any SAT Subject Test

Attainment of Silver Level or better on ACT WorkKeys

Attainment of 3 or better on any AP Exam

Attainment of 3 or better on any IB Exam

Successful completion of any concurrent enrollment or postsecondary course

Industry-recognized credentialization

Acceptance into accredited, non-profit Institution of Higher Education (IHE) for college-level coursework in an other-than-4yr program

Section 2

Attainment of Profcient or Advanced on any Keystone Exam

Successful completion of a service-learning project

Letter guaranteeing full-time employment or military enlistment

Completion of an internship, externship, or cooperative education program

Compliance with NCAA Division II academic requirements

PREREQUISITES AND OVERRIDE REQUESTS

Students and families are expected to review and consider prerequisites before registering for any course. Students who have not satisfied the prerequisite and/or who are not recommended by their current teacher to take the desired course should first discuss the recommendation with their teacher. If the prerequisite has not been met, students should see their school counselor for more information or to request the Prerequisite Override Request Form by **the end of March**. The request will be reviewed and approved or denied by a committee based on the information presented.

SEMESTERS, FULL TERMS

Emmaus High School operates on an A/B block schedule. In an A/B block schedule, students attend a maximum of four classes per day, which are longer in duration than on a traditional schedule. Students attend half of their classes each day, on an A/B rotation. One credit courses run for a full year. Half credit courses run for one semester (two marking periods). Quarter credit classes run for one marking period. Courses that receive more than 1.0 credit may meet both A & B cycle days.

CLASS TRANSFERS AND WITHDRAWALS

Students requesting a class transfer and/or withdrawal from a course must meet specific criteria and follow the process for requesting a course change. Once the posted deadline for schedule changes has passed, transfers and/or withdrawals from scheduled classes will only be considered in very unusual situations. The process for requesting a change is as follows:

1. Family and/or student contacts school counselor to request a change.
2. If the presented reason qualifies as a special circumstance, school counselor provides the form to the family, student, and teacher to complete. All three parties must complete the form.
3. The committee comprised of school counselors and administrator(s) reviews the request. The outcome is determined by the committee after analyzing the student's record and the information provided in the aforementioned form.

A withdrawal that does not result in a transfer to another course in the same academic content area will receive a W as the final grade on a student's transcript after a marking period grade has been issued.

The deadline for a student to request a course change is **October 15th** for year long and first semester courses. For courses scheduled during the second semester only, the deadline for such a request is **February 28th**.

COURSE WITHDRAWAL CRITERIA

Once schedules are developed (in May the year prior), a student can make any changes until the end of June with parent/guardian permission (prior to the school year starting). Once a class has started in August, transfers and/or withdrawals from scheduled classes are only considered in "Special Circumstances." A change request is highly unlikely to be implemented after **June 30th** due to the explicit and complex nature of our master schedule of which is solely built using student course requests from our entire student body. We cannot stress enough the importance of the course selection process during our Course Registration time frame for this reason. With that said, we still review cases if they meet the Special Circumstance criteria.

If a student wants to add/drop a class after **June 30th**, the student must speak with their school counselor to determine if the request meets the criteria. In order for the change request to be considered, the reason for wanting the change must fall in one of six predetermined categories.

Special Circumstance criteria:

1. A student wishes to challenge themself by adding an additional course to their schedule.
2. The student wishes to challenge themself by moving up to a more rigorous course level.
3. The student requested to take a course that is beyond their ability and wishes to drop the course. Student historical & current data would need to support this request.
4. The student requested to take a course that was beyond their ability and wishes to move to a less rigorous course level of the same content area. Student historical & current data would need to support this request.
5. The student wishes to drop a course or change a course level for medical reasons. **Medical documentation is required for this request**
6. The student has greater than 7.0 credits in their schedule for the year.

CLASS TRANSFERS AND WITHDRAWALS (CONT'D.)

If the school counselor assesses the request and determines the student meets one or more of these criteria, a student may proceed through the process of add/drop where a committee reviews the required submissions and the student's historical data. Once the data is reviewed, the committee makes a determination if the request meets the criteria for a change/approval.

Please note- A student must sit through and experience a class prior to seeking to drop a course with their school counselor if a request is made after **June 30th**. A junior or senior who is approved to drop a course during this process during a Block 1 or 4 is not eligible to obtain a Virtual Study hall. Students may qualify for future marking periods should they have a study hall to replace a course dropped, and they meet the criteria for a Virtual Study Hall.

GRADE POINT AVERAGE (GPA)

The Grade Point Average (GPA) is a system for calculating a student's scholastic average on a 0 to 4+ scale.

Wellness/Fitness courses, courses taken at a college/university, courses taken as pass/fail, and courses that are taken as an independent study are not used in calculating the GPA.

The GPA calculation is based on final grades earned in each course. Final grades are awarded based on quarter and semester exam grades. GPA is calculated and reported once annually, and additionally, at the end of a student's seventh semester. These calculations are performed in the following manner:

- A mark is assigned a numerical value called the Quality Point (QP). The Quality Point values for course marks are:

GRADE	AP	HONORS/DUAL CREDIT	OTHERS
90 - 100	**5 QP**	**4.5 QP**	**4 QP**
80 - 89	**4 QP**	**3.5 QP**	**3 QP**
70 - 79	**3 QP**	**2.5 QP**	**2 QP**
60 - 69	**2 QP**	**1.5 QP**	**1 QP**
0 - 59	**0 QP**	**0.0 QP**	**0 QP**

I, W, P and F are not used in calculating GPA

- Each course has an assigned credit value. A course's credit value is based on the number of meeting times per cycle and the length of the course
- The course value for each quarter is multiplied times the Quality Point Value of the grade earned
- The GPA is determined by dividing the total Quality Points for all courses by the total attempted course credits attempted for all courses. Note: This calculation is reported once annually and additionally, at the end of a student's seventh semester
- **Please note:** All Dual Credit courses listed in the Program of Studies will carry an honors weight when calculating GPA. Dual Credit and Credit by Exam courses are listed on the back cover of the Program of Studies.

The official cumulative GPA is reported at the end of the academic year. This sum will be divided by the total attempted credits to calculate the cumulative GPA.

A cumulative GPA, which includes all completed coursework through the end of a student's seventh semester, will be calculated and provided to post-secondary institutions that require a mid-year report from applicants upon student request.

CLASS RANK

The School Board authorizes a system of class rank, by grade point average reported as percentiles, for students in grades 9-12. All students shall be ranked together. Class rank shall be computed by the final grade in all subjects for which credit is awarded. It will not be printed on student report cards, transcripts or other documents. A student's class rank can only be provided directly to a college, university, or other appropriate institution or agency, when required. Class rank is not made available to students or their families.

HONORS AND ADVANCED PLACEMENT SEQUENCE

Honors and Advanced Placement courses are intended for students who are interested in an enriched experience in a specific subject. Enrollment is open to all students who have satisfied the prerequisites and have the ability and desire to handle the increased academic demands. Students who complete an AP course are encouraged to take the AP examination.

Any costs for courses outside of the regular high school program will be the responsibility of the student and their family.

PASS/FAIL OPTION

A course may be taken on a Pass/Fail basis if the below conditions are satisfied. **All arrangements for Pass/Fail courses must be completed prior to the midway date in the first grading period of the course.**

1. Students must take a minimum of 5.00 credits in the academic year
2. Students may not take graduation requirements pass/fail. This includes specific subject requirements and total course requirements
3. The request must be approved by the parent/guardian, teacher, school counselor, and principal or student service assistant principal
4. The teacher may recommend withdrawal from the course if the student is not meeting the course responsibilities

EXEMPTING COURSES BY EXAM

The purpose of this exemption, whenever available, shall be to allow a student, in unusual circumstances, to exempt a particular course because of an existing knowledge base. All arrangements must be approved by the principal or his/her designee by the determined deadline. Exempting exams will be offered during midterm exams, final exams and during the summer. Please reference **School Board Policy 116.1** for more information. Please contact the school counselor if interested.

EXEMPTING COURSES BY TUTORING

The purpose of this exemption shall be to move students ahead of the district- adopted sequence of courses in a particular academic subject through private tutoring. All arrangements must be approved by the principal or his/her designee by the determined deadline. Please reference **School Board Policy 116.1**. Please contact the school counselor if interested.

GIFTED SUPPORT PROGRAM

Emmaus High School offers programming options for students enrolled in the Gifted Support Program. EHS gifted teachers in the high school develop and implement Gifted Individualized Education Plans (GIEPs). The gifted teachers provide students with enrichment and acceleration when appropriate, and conduct consultations and collaborations for the differentiation of instruction.

NCAA ELIGIBILITY

All student athletes interested in continuing their athletic careers at the collegiate level (Divisions I and II only, Division III is not affected) must familiarize themselves with NCAA Eligibility rules and requirements, as high school course selection can have an impact on future collegiate academic eligibility.

Student athletes are advised to begin planning early in their high school careers in order to meet NCAA requirements, which are found in detail here: **www.eligibilitycenter.org**. It is the student athlete's responsibility to be aware of NCAA requirements. Please contact the coach, the EHS Athletic Office, or the school counselor, if you have any questions. Courses approved by the NCAA are identified with the N.C.A.A. icon

SPECIALIZED PROGRAMS AND OFFERINGS

Please review these additional options and reach out to the EHS school counselor with any questions.

LCCC DUAL CREDIT PROGRAM

Lehigh Carbon Community College and Emmaus High School have partnered together to offer Dual Credit courses. This program enables students to take one or more college courses while still in high school during the regular school day. Courses are taught by qualified high school teachers serving as an LCCC adjunct instructor. Faculty teaching Dual Credit courses are required to meet the hiring standards of LCCC's accrediting agency. Taking advantage of this postsecondary experience will not only jump-start a student's college career, but may give them the opportunity to earn transferable college credits while they are still meeting high school graduation requirements.

The cost for Dual Credit courses taught in sponsoring high schools by high school faculty is a fee determined by the college and is the responsibility of the student and their family. There is no application fee for Dual Credit students. Students should consult with their prospective colleges/universities to determine their policy for Dual Credit coursework.

CREDIT BY EXAM WITH WEST CHESTER UNIVERSITY (GRADES 10-12)

The Credit-by-Exam opportunity applies to Geology of National Parks, Meteorology, and Oceanography. Students in 10th, 11th or 12th grade with a GPA of 2.8 or higher can become non degree students at West Chester University. Courses are taught by EHS teachers during the regular school day.

This program is a Dual Credit program. The final grade for West Chester University will be based upon a final exam aligned to EHS approved course curriculum, but also matches the rigor of an entry level college course/exam. The grade submitted to West Chester University may be different from the final course grade at Emmaus High School. Students can apply as non-degree students and complete an application form as part of the agreement. There is a fee as determined by the college, and is the responsibility of the student and their family.

COLLEGE COURSES

A number of local colleges and universities provide affordable opportunities for Emmaus High School students to take courses on the college's campus while still in high school. Students interested in such an opportunity should contact their school counselor. Prior written approval of the high school principal is required for all college courses **6 weeks in advance of the beginning of the college semester.** Approved college courses will receive letter grades and credit which will be reflected on the transcript where appropriate but will not be counted as part of the GPA.

Any costs for courses outside of the regular high school program will be the responsibility of the student and their family.

INDEPENDENT STUDY

Independent study programs are available in unusual situations when it is determined that a course is a necessary component of a student's program, but it cannot be scheduled. The course must be in the Program of Studies and offered during the academic school year. Courses taken in this manner will receive a grade and assigned course value, but the grade will not be included in GPA calculations. Independent Study arrangements must be approved by the teacher, parent/guardian, school counselor, and principal in writing, and the agreement must be completed prior to midway date in the first grading period of the course. Please reference **school board policies 116.1 and 118** for additional information regarding Independent Study.

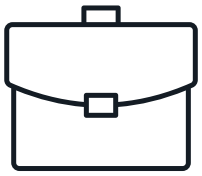
VESPA - VIRTUAL EAST PENN ACADEMY

The Virtual East Penn Academy (VESPA) is a full-time, online learning option that allows K-12 students to engage in asynchronous online coursework from home while maintaining enrollment in the East Penn School District. This cyber program is free of charge for all families residing in the East Penn School District. VESPA students enjoy a flexible, online learning environment while staying connected to EPSD academic supports, clubs, athletics and events. New enrollments are accepted prior to the start of each new marking period. For more detailed information, students should contact their EHS school counselor.

SPECIALIZED PROGRAMS AND OFFERINGS (CONT'D.)

FIELD STUDY PROGRAM

(Grades 11-12) The purpose of the Field Study program is to provide Emmaus High School students the opportunity to explore careers of interest, to develop employability skills, and to gain hands-on experience in a business or agency within the community. Students can earn from .25 to up to 2.0 academic credits by participating in the program. Field Studies can be tailored to the unique needs and interests of the learner. We offer students 2 types of Field Study experiences, external and internal.



- External - Students work with a mentor in a field of their choice in a community based setting (local business, studio, etc.).
- Internal - Students serve as a Student Intern Teacher with one of our EPSD teachers or work with an EPSD employee in another capacity (i.e. human resources, IT, athletic trainer)

Eligibility Criteria:

- Students must be in 11th or 12th grade to participate in Field Study.
- Students must secure a teacher recommendation as part of the application process.
- Students must have an acceptable attendance and discipline record as reported by the EHS Administration.
- Students may not be related to the employer/mentor and must not have previously worked in the position.
- Students must choose a job that they are currently not qualified to perform (i.e. the job requires more training or schooling).
- Students must be able to provide their own transportation to and from the Field Study site. Participation in this program does not guarantee an assigned parking spot at Emmaus High School.

  Please note that juniors WILL NOT be issued school parking permits.

For more information, please visit the **Field Study Website** or contact the Field Study Coordinator.

LEHIGH CAREER AND TECHNICAL INSTITUTE (LCTI)

Lehigh Career and Technical Institute (LCTI) is an extension of the home school. The various programs offered are an integral part of the curriculum of the home high school. Students enrolled in the LCTi half-day program take their required courses at the home school during one-half of the school day and attend LCTi the other half-day for their specialized career program. Students earn credit for the successful completion of each year of vocational training. All LCTi programs require an application.

An alternative to the half-day program, LCTi's Academic Center provides ninth through twelfth grade students the opportunity to attend LCTi for a full day. This program allows students to take both academic and technical classes at LCTi. The Academic Center also affords students the opportunity to take advanced coursework at Lehigh Carbon Community College in dual credit. Ask your school counselor for more information.

Diplomas awarded at graduation are given only by the home high school and not LCTi. The Lehigh Career and Technical institute does, however, present a certificate to each graduating student who has successfully met LCTi standards. Lehigh Career and Technical institute graduates also receive a listing of competencies completed in their trade area.

DIVERSIFIED CAREER OCCUPATIONS (DCO)

(Grade 11 & 12) The DCO program allows students to split their time between academic courses and part-time work in career fields that interest them, and is available to students during their 11th & 12th grade year. Those students who are in good standing academically and on track for graduation may be released from school during block 3 and/or 4 to go to work. Students are required to attend the entire block of Hornet Homeroom daily, as well as meet weekly with a certified, professional school-to-career coordinator from LCTI who helps them develop 21st-century skills such as collaboration, critical thinking and problem solving. Weekly competency-based instruction takes place at the high school with the LCTI coordinator and students are formally evaluated by both the LCTI coordinator and their employer each marking period. Students who participate in DCO receive credit towards graduation. Background checks are required for employer mentors who hire minors in the DCO program. Proof of employment and continued employment throughout the duration of the term assigned is required or a student will risk withdrawal from the course and/or be required to take an alternative course at EHS for credit. Students may not be without employment for more than two weeks without notifying their counselor and LCTI.

This course is available during both semesters with an opportunity to obtain 1.5 credits per semester.The student is responsible for their own transportation when participating in DCO. Participation in this program does not guarantee an assigned parking spot at EHS.

For more detailed information and/or to apply for this program, students should see their EHS school counselor.

THE JASPER LEARNING INITIATIVE

JASPER COURSE SEQUENCE

Interested students must be prepared to take the CP level courses below. To apply and get more information, please visit www.eastpennsd.org/Jasper.

9TH GRADE COURSES

The learning plan for 9th grade students will consist of 4 college preparatory courses. These courses include:

American Studies 1 - J201	9th Grade English - J111	Global Science Inquiry - J411

These courses are taught in a project-based manner. Course descriptions can be found in the Program of Studies. All 3 meet NCAA requirements

Design & Development - J970

Utilizing a design thinking framework, students will learn the essentials of product design and problem-solving. Students will be faced with three design challenges and will use design thinking to make an improvement for our community, create a tangible product based on the needs of others, and solve a community problem of their choice. While progressing through the design process, students will work closely with community needs in mind and will continually hone their organizational, communication and interpersonal skills, their creative and problem-solving abilities, and their understanding of the design process.

10TH GRADE COURSES

The learning plan for 10th grade students will consist of 3 courses. These courses include:

American Studies 2 - J211	10th Grade English - J118	Biology - J417

These courses are taught in a project-based manner. Course descriptions can be found in the Program of Studies. All 3 meet NCAA requirements

11TH GRADE COURSES

The learning plan for 11th-grade students will consist of at least 2 courses with Chemistry being an optional course depending on individual interest. These courses include:

World Studies - J224	11th Grade English - J128	Project Based Chemistry CP (optional) - 421PB

These courses are taught in a project-based manner. Course descriptions can be found in the Program of Studies. World Studies and 11th grade English meet NCAA requirements

12TH GRADE COURSES

The learning plan for 12th grade students will consist of 2 college preparatory courses. These courses include:

Government DC - J237DC	12th Grade English - J139

These courses are taught in a project-based manner. Course descriptions can be found in the Program of Studies. Both courses meet NCAA requirements

Field Study (optional in 11th and 12th Grade)

Please read the Program descriptions in the Program of Studies for more information about field study opportunities. This is not a requirement for Jasper students in 11th or 12th grade, but is recommended.

STANDARDIZED TESTING

PSAT/NMSQT

The PSAT is recommended for all college-bound juniors who plan on taking the SAT and/or wish to compete for the National Merit Scholarship. PSAT testing occurs in October each year.

KEYSTONE EXAMS

As noted previously within graduation requirements, the Keystone Exams are end-of-course assessments designed to assess proficiency in various subjects.

SAT

Emmaus High School will offer the SAT test throughout the school year. Please see https:// collegeboard.org/ for specific dates and to register for a test. A student with a disability, whose condition substantially limits their ability to participate in College Board tests, may be eligible for accommodations. The request for accommodations is initiated by completing a Student Eligibility Form. This eligibility form has specific deadline dates and can be obtained on the College Board website.

ASVAB - ARMED SERVICES VOCATIONAL APTITUDE BATTERY TEST

EHS is proud to offer the free ASVAB test to all our students. The ASVAB (Armed Services Vocational Aptitude Battery) is a valuable tool that measures your strengths, areas for growth, and potential for success in a wide range of careers. In addition to helping you meet the state graduation requirement, the ASVAB provides:

- Career information for both civilian and military occupations
- Insights into your skills and interests
- Guidance that can benefit your future—whether you plan to attend college, enter vocational training, begin working, or pursue military service

Important note: Taking the ASVAB does not mean you are enlisting in the military and information is not shared with the military.

Additionally, the ASVAB can fulfill the **state graduation requirement for Act 158** if the student earns a score of 31 or higher.

ADVANCED PLACEMENT (AP) EXAMS

Emmaus High School will offer AP exams for College Board approved Advanced Placement courses taught at EHS. AP Exams are standardized exams designed to measure how well a student has mastered the content and skills of a specific AP course. For more information on AP testing, please go to **https://apstudents.collegeboard.org/**. Students may earn college credit for an AP course, depending on their AP exam score. For more information on this aspect of AP testing, please visit specific college websites, as each institution has their own AP credit policy.

CAREER READINESS

To help ensure that all students in Pennsylvania are on track for meaningful postsecondary engagement and success, the Pennsylvania Department of Education has included a measure of students' career exploration, preparation, and readiness as part of Pennsylvania's state and federal accountability system through the Future Ready PA Index and under the Every Student Succeeds Act (ESSA).

The Career Education and Work Standards are part of the State Board of Education's regulations of required education for all students in Pennsylvania. The Career Education and Work Standards address four areas of knowledge:

- Career Awareness and Exploration
- Employability Skills
- Growth + Advancement
- Personal Interests + Career Planning

In conjunction with the requirements set forth by the PA Department of Education, Emmaus High School students are required to submit a minimum of eight (8) artifacts, showing they have met Career Readiness standards by April of their junior year. Students receive, track, and submit this information through their respective Schoology grade level classroom. Throughout grades 9-11, EHS students have many opportunities to fulfill this requirement, including, but not limited to: classwork activities, college/career visits, Naviance activities and reflections, and Schoology Classroom activities. If students have any questions regarding the fulfillment of Career Readiness standards, they should contact their school counselor.



SPECIAL EDUCATION SERVICES AND PROGRAMS

In accordance with both Pennsylvania and federal laws, students who meet the criteria for special education eligibility possess the right to participate in the general education curriculum within a standard educational environment known as the Least Restrictive Environment (LRE). The framework of support and services is outlined in the student's Individualized Education Program (IEP). The fundamental principle of providing a Free and Appropriate Public Education (FAPE) to students with disabilities commences with considering services within the LRE. The organization and delivery of special education services are designed to be adaptable and responsive, ensuring that the student's unique eligibility requirements are met without unnecessarily isolating them from the standard educational setting. Supplementary aids and services provided to each student are contingent upon their specific needs. The East Penn School District actively promotes inclusive opportunities for all its students.

Students are encouraged to participate to the fullest extent possible in the general education curriculum within the standard classroom, with appropriate accommodations, adaptations, or modifications when necessary. The district offers a comprehensive range of services and programs, and eligible students may receive instruction through supplemental curricula. Service/program alternatives may be considered when intensifying the study program becomes necessary to address the student's overall needs.

Transition planning initiates at age 14, with the IEP team determining the courses that will prepare the student for life beyond high school during this process. The transition planning, involving the student and parent, encompasses various aspects such as college or post-high school planning, exploration of employment opportunities, and independent living skills, including recreational and leisure activities. The planning also involves selecting high school courses that align with the student's future goals. Early planning promotes a coordinated approach between the student's current education and their future aspirations. Students are encouraged to prepare for post-high school education, whether it be college or vocational/technical school. Those considering college are advised to take the PSAT and SAT assessments, with or without accommodations. Some students may opt for a vocational curriculum and attend the Lehigh Carbon Technical Institute (LCTI), which offers a diverse range of programs.

All students receiving special education services are assured the opportunity to earn a high school diploma. The IEP Team determines the criteria for awarding a diploma, with eligible students required to successfully complete all mandatory courses and credits, as well as meet performance standards through assessments or via the IEP transition goals.

CO-TAUGHT COURSES

Co-teaching is an evidence-based approach aimed at aiding students in need of academic support, with a particular focus on helping them meet the heightened literacy requirements necessary for career and college readiness. In co-taught classes, there are two educators collaborating: one holds certification in a content area, such as English or mathematics, while the other is certified in special education.

The primary objective of the EHS co-teaching program is to deliver high-quality instruction to academically at-risk students, those currently not demonstrating proficiency, within a setting that emphasizes both high expectations and robust support. This program is structured to provide standards-based instruction aligned with Pennsylvania graduation requirements, incorporating substantial support measures to ensure compliance. Such support entails a concept-oriented approach, alternative teaching and assessment methods, and increased teacher-student interaction.

In this dynamic environment, students will receive comprehensive support for their core learning needs while simultaneously developing personal skills. Roles and responsibilities within the classroom are clearly defined, and individualized support is precisely targeted to each student. The curriculum adheres to grade-level standards but is adapted as needed, fostering the belief that diligent effort leads to success.

As previously mentioned, co-taught classes feature two educators, each with distinct yet equally vital roles. These educators collaborate not only with each other but also with students to foster academic growth and achievement. Students are held to elevated standards and receive robust support from both instructors.

EMMAUS
HIGH SCHOOL

COURSE DESCRIPTIONS

2027-2028

ART DEPARTMENT

The Art Department specializes in four types of art:

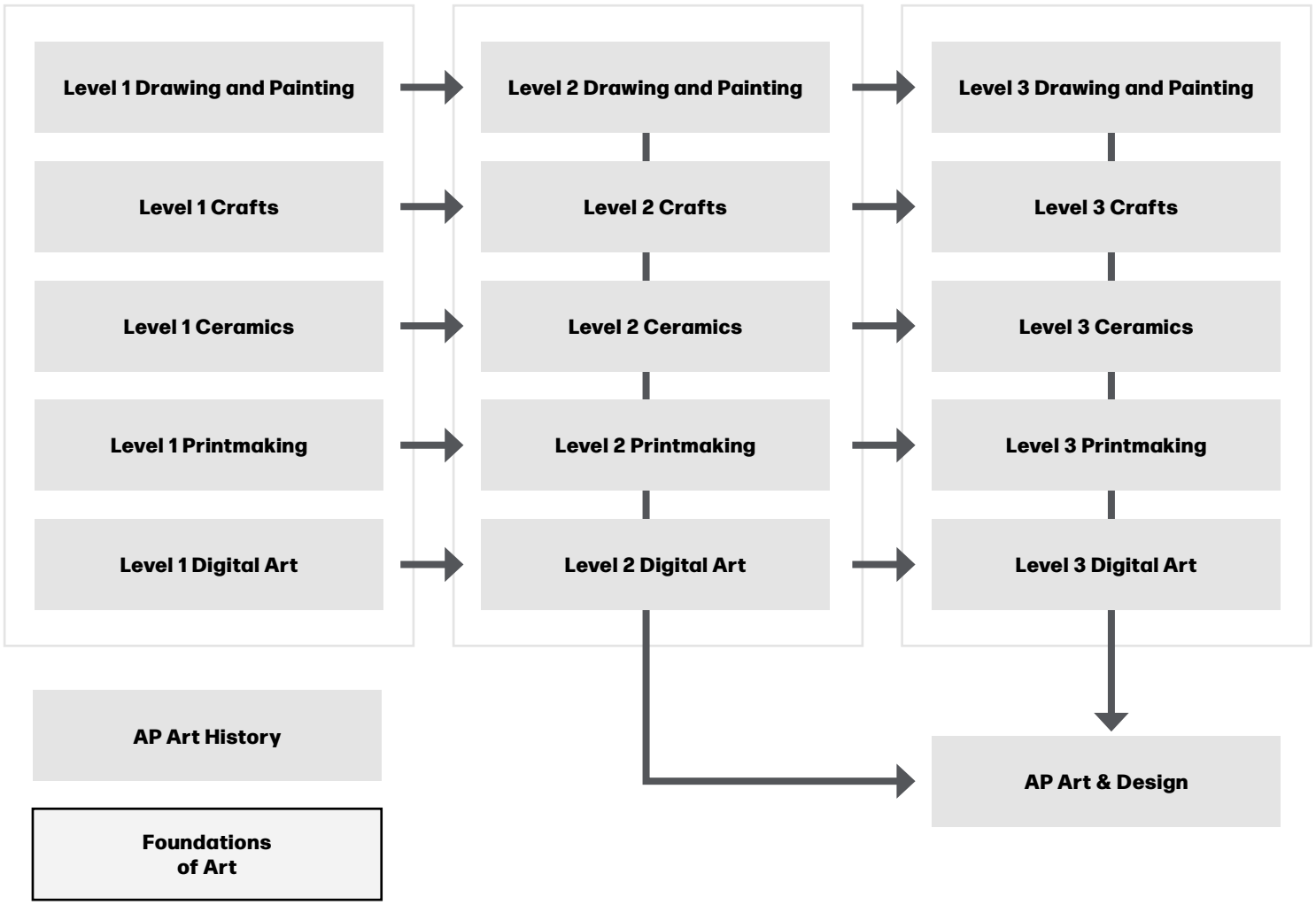
Printmaking, Crafts, Ceramics, and Drawing/Painting. Each has a Level One, Two, and Three course. All Level One classes are half-year (.5 cr) and the Level Two and Three courses are full-year (1.0 cr).

Are you a freshman, or just starting out in the art department? We recommend you pair two classes to get a full year of art!

- **2D Pairing** - Request both Drawing/Painting 1 and Printmaking 1. These two courses will build your technical drawing, painting, and composition skills.
- **3D Pairing** - Request both Crafts 1 and Ceramics 1. These two courses will build your technical building and design skills.

Looking for a challenge in 11th or 12th grade? We offer AP Art & Design and AP Art History in our program. Be sure to look at the prerequisites for AP Art & Design if you're interested!

ART PATHWAYS



ART DEPARTMENT (CONT'D.)

CERAMICS 1

Credit: 0.5

A708 | GRADE 9-12

Students will recognize their creative potential in clay through the investigation of historical and contemporary ceramics. Ceramics 1 focuses on developing successful studio practices while exploring a wide variety of ceramics forms, building processes, and surface decoration techniques.

CERAMICS 2

Credit: 1

718DC | GRADE 10-12

Students will push their creative potential in clay while investigating historical and contemporary ceramics. Ceramics 2 focuses on further applying successful studio practices while exploring major themes in art to guide independent student exploration.

Prerequisite: Recommended 80% or better in Ceramics 1

Students may elect to take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

CERAMICS 3

Credit: 1

A728 | GRADE 11-12

Students will continue to push their creative capacity in clay while investigating historical and contemporary ceramics. Ceramics 3 focuses on mastering successful studio practices and requires students to choose a theme that will guide their projects throughout the year.

Prerequisite: Recommended 80% or better in Ceramics 2

CRAFTS 1

Credit: 0.5

A709 | GRADE 9-12

Students will recognize their creative potential in various craft mediums (wood and fibers). Crafts Level 1 teaches the elements and principles of art and helps students develop successful art studio practices.

CRAFTS 2

Credit: 1

A719 | GRADE 10-12

Students recognize their creative potential in various crafts mediums (wood and fibers). Crafts Level 2 students understand the elements and principles of art and begin to intrinsically use these traits in their work. Students learn how to practice the 8 Studio Habits of Mind from the book Studio Thinking.

Prerequisite: Recommended 80% or better in Crafts 1

CRAFTS 3

Credit: 1

A729 | GRADE 11-12

Students promote their individual creative strengths through crafts (wood and fibers). Crafts Level 3 students will demonstrate a synthesis of their own creative ability, use of elements and principles of design and refine their 8 studio habits of mind skills.

Prerequisite: Recommended 80% or better in Crafts 2

DRAWING AND PAINTING 1

Credit: 0.5

A703 | GRADE 9-12

Students will recognize their creative potential in various drawing and painting mediums. Drawing and Painting Level 1 teaches the elements and principles of art and helps students develop successful art studio practices.

DRAWING AND PAINTING 2

Credit: 1

A721 | GRADE 10-12

Students recognize their creative potential in various drawing and painting mediums. Drawing and Painting Level 2 students understand the elements and principles of art and begin to intrinsically use these traits in their work. Students learn how to practice the 8 Studio Habits of Mind from the book Studio Thinking.

Prerequisite: Recommended 80% or better in Drawing and Painting 1

DRAWING AND PAINTING 3

Credit: 1

A731 | GRADE 11-12

Students promote their individual creative strengths through drawing and painting. Drawing and Painting Level 3 students will demonstrate a synthesis of their own creative ability, use of elements and principles of design and refine their 8 studio habits of mind skills.

Prerequisite: Recommended 80% or better in Drawing and Painting 2

PRINTMAKING 1

Credit: 0.5

A712 | GRADE 9-12

Students will recognize their creative potential in various printmaking mediums (relief, intaglio, monoprint, and screenprint), while exploring historic and contemporary printmakers. Printmaking Level 1 teaches the elements and principles of art and helps students develop successful art studio practices.

PRINTMAKING 2

Credit: 1

A722 | GRADE 10-12

Students recognize their creative potential in various printmaking mediums (relief, intaglio, monoprint, screenprint, risograph, etc.) Printmaking Level 2 students understand the elements and principles of art and begin to intrinsically use these traits in their work. They'll learn about historic and contemporary printmakers. Students learn how to practice the 8 Studio Habits of Mind from the book Studio Thinking.

Prerequisite: Recommended 80% or better in Printmaking 1

ART DEPARTMENT (CONT'D.)

PRINTMAKING 3

Credit: 1

A732 | GRADE 11-12

Students promote their individual creative strengths through printmaking mediums (relief, intaglio, monoprint, screenprint, risograph, etc.). They'll learn about historic and contemporary printmakers. Printmaking 3 students will demonstrate a synthesis of their own creative ability, use of elements and principles of design and refine their 8 studio habits of mind skills.

Prerequisite: Recommended 80% or better in Printmaking 2

DIGITAL FINE ART 1

Credit: 0.5

A713 | GRADE 9-12

Students will recognize their creative potential in various digital programs. Digital Fine Art 1 teaches the elements and principles of art and helps students develop successful art studio practices.

DIGITAL FINE ART 2

Credit: 1

A723 | GRADE 10-12

Students recognize their creative potential in various digital art programs. Digital Fine Art 2 students understand the elements and principles of art and begin to intrinsically use these traits in their work. Students learn how to practice the 8 Studio Habits of Mind from the book Studio Thinking.

Prerequisite: Recommended 80% or better in Digital Fine Art 1

DIGITAL FINE ART 3

Credit: 1

A733 | GRADE 11-12

Students promote their individual creative strengths through digital fine art. Digital Fine Art students will demonstrate a synthesis of their own creative ability, use of elements and principles of design and refine their 8 studio habits of mind skills.

Prerequisite: Recommended 80% or better in Digital Fine Art 2

ART HISTORY, ADVANCED PLACEMENT

Credit: 1

764 | GRADE 11-12

This college-level course will help students gain an understanding and knowledge of architecture, sculpting, painting and other art forms within historical and cultural context (Prehistoric, European, West/Central Asia, Indigenous Americas, Africa, South Pacific, East/South Asia, Global Contemporary).

Prerequisite: Current enrollment in college preparatory Social Studies and college preparatory English courses (recommended 75% or better in both)

ART AND DESIGN, ADVANCED PLACEMENT

Credit: 1

766 | GRADE 11-12

AP Art and Design is an introductory college-level course that has an exam fee due in October. In AP Art and Design at EHS students choose a 3-D, 2-D, or Drawing Portfolio. Students develop the skills that artists and designers use, and create a portfolio of work that is assessed and scored by the CollegeBoard. Students refine and apply artistic skills to ideas they investigate individually throughout the school year. Students upload images of their work over the course of the year, creating a digital portfolio. https://apcentral.collegeboard.org/courses/aboutap-art-and-design

Prerequisite: Recommended 80% or better in any level 3 course AND portfolio review & approval required

FOUNDATIONS OF ART

Credit: 0.5

A705C | GRADE 9-12

This course is designed for students with a limited background in art and offers additional support to build confidence and skills. Students will learn to observe closely, develop their craft, and use art as a form of communication. A variety of media and art experiences will be introduced, with emphasis placed on the creative process rather than the final product. Projects will be guided step by step, while still allowing opportunities for student choice. Please note that this course is not an entry point to other Art Department tracks; instead, it is intended to provide exposure to exploratory art.

BUSINESS AND COMPUTER APPLICATIONS

The department's mission is to prepare students for lifelong learning through the use of 21st century skills in technology, business and economic concepts. The curriculum is designed, delivered, evaluated and updated to prepare students to enter the ever changing global economy and job market. Courses that fulfill the STEM graduation requirement are noted in the course descriptions.

INTRODUCTION TO BUSINESS

Credit: 0.5

601 | GRADE 9-12

This introductory course explores the foundations of business and consumer decision making in the global marketplace. Units of study include conducting business in the global marketplace, understanding economic concepts as they apply to the buying and purchasing of goods and services, business ethics and social responsibility, business organization, and entrepreneurship and small business management. This course will incorporate the use of research projects and the creation of projects using real-world scenarios to assist students in building the relevant business and technology skills they will need to develop to enter the business world.

ENTREPRENEURSHIP

Credit: 0.5

604DC | GRADE 10-12

Do you have an idea for a new product or business, or a curiosity about how products are developed? Jump into the world of Entrepreneurship as students engage in a Shark-Tank-like experience. Students begin by coming up with ideas for a new product and delivering an elevator pitch for it. Next, students vote on the best ideas, form teams to develop their strategies according to the 9 Building Block model, design logos and create working prototypes. Public speaking, communication, and teamwork skills are emphasized, which are vital to the success of any business. As the culminating final project, students may travel to a local business incubator and will deliver professional product pitches to a panel of investors.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

PERSONAL FINANCIAL MANAGEMENT

Credit: 0.5

610DC | GRADE 9-12

In this course students will gain practical life skills and knowledge necessary to maintain the finances of a household. Topics include paychecks, budgeting, income taxes, checking accounts, saving and investing, credit, buying a car or home, and insurance.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

ACCOUNTING 1

Credit: 1

606 | GRADE 9-12

In this course, students are introduced to accounting principles surrounding the basic accounting equation: Assets = Liabilities + Owner's Equity. Students will learn the steps of the accounting cycle and apply them to both a sole proprietorship and a partnership. Key areas of study include: analyzing transactions, creating journal entries, maintaining subsidiary ledgers, completing bank reconciliations and preparing financial statements. Automated accounting software will be used to complete a business simulation project at the end of the course.

BUSINESS LAW

Credit: 1

614DC | GRADE 10-12

This course is perfect for future entrepreneurs, lawyers, college bound business majors, and criminal justice majors. Business Law will engage students in legal case studies, presentations, and hot issues that involve the laws that govern business and commerce. Topics include contract law, tort law, negligence, criminal law, constitutional law and court, intellectual property law, product liability, employment law, and ethics and social responsibility. This class implements real case studies, mock trials, and guest speakers in helping students understand methods and procedures for starting and running a business.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

ACCOUNTING 2

Credit: 1

616DC | GRADE 10-12

In this course, students will continue their study of accounting principles and develop a comprehensive understanding of the transactions learned in Accounting 1. Key areas of study include: accounts payable, accounts receivable, inventory, plant assets, accrued/prepaid expenses, and accrued/unearned revenue. Automated accounting software and Microsoft Excel will be used.

Prerequisite: Successful completion of Accounting 1

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

INVESTING AND CORPORATE FINANCE

Credit: 0.5

621 | GRADE 10-12

This course will give students an understanding of the way individuals, businesses, and organizations raise, manage, invest, and use monetary resources over time. Students will be engaged in using fundamental and technical analysis of company information to better understand the internal and external impact that the U.S. economy and current market trends may have on the corporation. Students will get a hands-on understanding of investing basics and learn about the corporate world of finance by trading stocks online and creating a financial portfolio.

MICROSOFT® OFFICE

Credit: 0.5

623 | GRADE 9-12

This course will provide students with the knowledge required to create documents using Microsoft Word, spreadsheets using Microsoft Excel and multimedia presentations using Microsoft PowerPoint and will include fundamental techniques. (Fulfills STEM requirement for graduation)

BUSINESS AND COMPUTER APPLICATIONS (CONT'D.)

MICROSOFT® WORD

Credit: 0.5

625 | GRADE 9-12

This course encompasses both core and advanced skills in Microsoft Word and will prepare students to take the Microsoft Office Specialist (MOS) test, if desired. MOS certification is the leading IT certification in the world. MOS enables students to become experts in the software by utilizing the full features and functionality of the Microsoft Office system. Many colleges are accepting the certification in lieu of taking a college level course. (Fulfills STEM requirement for graduation)

MICROSOFT® EXCEL

Credit: 0.5

627 | GRADE 9-12

This course encompasses both core and advanced skills in Microsoft Excel and will prepare students to take the Microsoft Office Specialist (MOS) test, if desired. MOS certification is the leading IT certification in the world. MOS enables students to become experts in the software by utilizing the full features and functionality of the Microsoft Office system. Many colleges are accepting the certification in lieu of taking a college level course. (Fulfills STEM requirement for graduation)

MICROSOFT® POWERPOINT

Credit: 0.5

631 | GRADE 9-12

This course encompasses both core and advanced skills in Microsoft PowerPoint and will prepare students to take the Microsoft Office Specialist (MOS) test, if desired. MOS certification is the leading IT certification in the world. MOS enables students to become experts in the software by utilizing the full features and functionality of the Microsoft Office system. Many colleges are accepting the certification in lieu of taking a college level course. (Fulfills STEM requirement for graduation)

WEB DESIGN

Credit: 0.5

636 | GRADE 9-12

This course is designed to give students basic web design and development. Students will learn how to create a basic webpage utilizing both HTML code and CSS, as well as WYSIWYG approach using the online sitebuilder, WIX. (Fulfills STEM requirement for graduation)

ADOBE PHOTOSHOP/ILLUSTRATOR

Credit: 0.5

638 | GRADE 9-12

This course will provide students with the knowledge required to apply design principles to the multimedia areas of graphics and illustration. Professional quality software titles, Adobe Photoshop and Adobe Illustrator, will be utilized to prepare students for creating dynamic, interactive content to be used in both print and web based applications. (Fulfills STEM requirement for graduation)

ADVANCED PHOTOSHOP

Credit: 0.5

639 | GRADE 9-12

This advanced course will expand students' knowledge in the area of graphic design through broadening their understanding of basic and advanced features of Adobe Photoshop. Using Adobe Photoshop will prepare students for creating dynamic, interactive content to be used in both print and online applications. Upon successful completion of the course, students will be prepared to complete the Adobe Certification Associate Exam in Visual Communications, using Adobe Photoshop. Students may also be able to receive college credit by becoming certified. (Fulfills STEM requirement for graduation)

! Prerequisite: Successful completion of Adobe Photoshop/Illustrator

RETAIL MANAGEMENT 1

Credit: 0.5

646 | GRADE 9-12

This course gives students the opportunity to gain experience in the world of retail and management where different management styles, theories and outcomes are explored and studied. Students will learn useful skills associated with a retail business, including planning strategies, advertising, product design, inventory control, and customer service. To better prepare students for the real-world of management and business, presentations are required as part of the course.

RETAIL MANAGEMENT 2

Credit: 0.5

648DC | GRADE 10-12

This course expands on the foundations of retail and management introduced in Retail Management 1, giving students a deeper look into advanced business concepts and practical applications. This course explores advanced concepts in retail and management, including decision-making, critical thinking, team building, organizational culture, change theory, entrepreneurship, and global perspectives. Presentations, projects, and problem-solving activities will be key components of this course, preparing students with the skills necessary for future careers in business and management.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

! Prerequisite: Successful completion of Retail Management 1 OR Successful completion of AP Business with Personal Finance

INTRO TO MOBILE APP DEVELOPMENT

Credit: 0.5

650 | GRADE 9-12

This course will teach students how to create native apps across today's most popular major mobile device platforms and Web apps. Students will use a hands-on approach to develop 21st century skills of problem-solving, critical-thinking, and technical programming. Though apps continue to evolve, having a combination of 21st century skills and fundamental app development, students will be prepared to keep up with the ever changing technological world. (Fulfills STEM requirement for graduation)

BUSINESS AND COMPUTER APPLICATIONS (CONT'D.)

INTRODUCTION TO AI AND VIBE CODING

Credit: 0.5

660 | GRADE 9-12

This half-year course will inform and instruct students on the historical, ethical, and practical usage of the ever-changing artificial intelligence (AI) technology. Students will learn how artificial intelligence works and how to build websites and mobile apps using simple, everyday language, known as "vibe coding." With the "vibe coding" approach, students can focus on big ideas and creative problem-solving while AI tools handle the complex line-by-line coding. (Fulfills STEM requirement for graduation)

MARKETING 1

Credit: 0.5

670 | GRADE 9-12

This course introduces students to the fundamentals of business marketing and its essential role in today's economy. Topics include the purpose of marketing within a business, market research and segmentation, basic economics, developing a marketing plan, e-commerce, product development, pricing strategies, distribution, and promotion. As an entry-level course, students actively participate in collaborative projects, and required presentations, providing students with valuable skills in one of the core areas of business while building a strong foundation for success in Marketing 2.

MARKETING 2

Credit: 0.5

678DC | GRADE 9-12

This advanced course builds on the foundations of Marketing 1, providing students with a deeper exploration of marketing principles and their application in real-world business settings. Students will engage in case studies, collaborative projects, and required presentations that emphasize critical thinking, problem-solving, and strategic decision-making. Topics include advanced market research and analysis, consumer behavior, branding, digital and social media strategies, global marketing, and integrated marketing communications. Designed for motivated students ready to take on challenging coursework, this class demands active participation and a high level of commitment as students refine their ability to design, implement, and evaluate comprehensive marketing plans.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

Prerequisite: Successful completion of Marketing 1 OR Successful completion of AP Business with Personal Finance

BUSINESS WITH PERSONAL FINANCE, ADVANCED PLACEMENT

Credit: 1

679 | GRADE 9-12

AP Business with Personal Finance is an introductory, college-level business and personal finance course. Students explore the business disciplines of entrepreneurship, marketing, finance, accounting, and management through real-world business applications, case studies, and project-based learning. In addition, students learn and apply all the National Standards for Personal Finance Education created by the Council for Economic Education and the Jump$tart Coalition for Personal Financial Literacy. Upon successful completion of this course, students may take Marketing 2 or Retail Management 2.

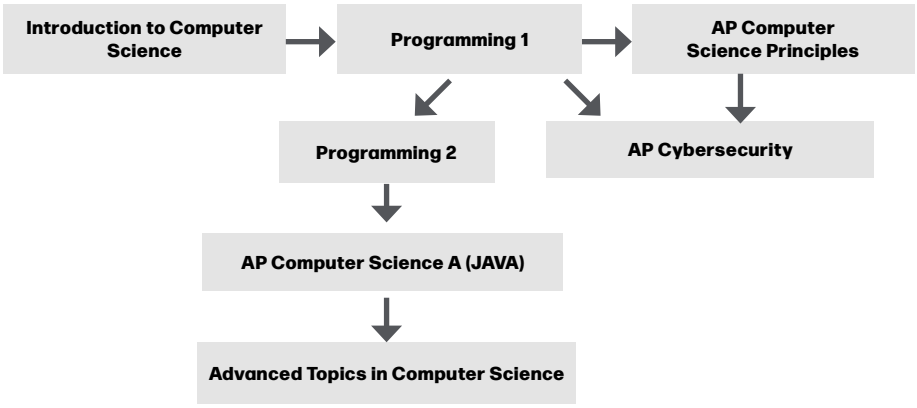
This course will satisfy the Personal Finance .5 graduation requirement

COMPUTER SCIENCE DEPARTMENT

All of the computer science courses are electives and satisfy the STEM graduation requirement. They are highly recommended for students pursuing STEM careers. Prerequisites are stated as recommendations for success by most students. Students who wish to take advanced courses without having satisfied the prerequisites should either exempt a course by exam or gain permission from a member of the computer science department via an interview and proof of student work.

COMPUTER SCIENCE PATHWAY

Note: Students who have completed Algebra I with an 80 percent or better can start at Programming I



INTRODUCTION TO COMPUTER SCIENCE

Credit: 0.5

321 | GRADE 9-12

This course is designed to introduce students to computer science concepts and simple programming techniques in a project-based environment. Projects incorporate the use of both drag-and-drop and text-based programming. The course will also include computer and Internet history, the basics of computer hardware and software, computer ethics, and careers in computer science. Students who have successfully completed Algebra 1 (80% or better) should begin the Computer Science sequence with Programming 1 instead. (Fulfills STEM requirement for graduation)

PROGRAMMING 1

Credit: 0.5

325 | GRADE 9-12

This course is designed to enable all students to develop better problem solving skills that will prepare them for many different fields of study and future computer science courses. Utilizing the Python programming language, students will learn to write programs that include turtle graphics, input and output, decisions, loops, functions, and strings. Topics in the first contest of the ACSL contest will also be covered. Students interested in taking AP Computer Science A (Java) during the following school year should register for both Programming 1 and Programming 2. (Fulfills STEM requirement for graduation)

Prerequisite: Completion of Algebra 1 with an 80% or better

PROGRAMMING 2

Credit: 0.5

326 | GRADE 10-12

This course is a continuation of Programming 1. Students will extend their knowledge of Python by writing programs that include strings, lists, text input and output, searching and sorting, and recursion. Students will also transition to Java programming language in preparation for the AP Computer Science A (Java) course. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Programming 1

ADVANCED PLACEMENT COMPUTER SCIENCE PRINCIPLES

Credit: 1

363 | GRADE 10-12 ONLY

AP Computer Science Principles is an introductory college-level computing course that introduces students to the breadth of the field of computer science. Students learn to design and evaluate solutions and to apply computer science to solve problems through the development of algorithms and programs. They incorporate abstraction into programs and use data to discover new knowledge. Students also explain how computing innovations and computing systems—including the internet—work, explore their potential impacts, and contribute to a computing culture that is collaborative and ethical. This course is not meant for those planning to major in computer science in college. Those students should take AP Computer Science A. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or higher in Algebra 1

ADVANCED PLACEMENT COMPUTER SCIENCE A (JAVA)

Credit: 1

365 | GRADE 10-12

This course will cover the entire curriculum as prescribed by the College Board for a one semester college course in computer science. This includes control structures, arrays, strings, classes, interfaces, files, and efficiency of algorithms. Upon completion of this course, students will be prepared to take the AP Computer Science A level exam. Students will be expected to engage in rigorous problem solving activities and utilize computer resources outside of class. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Programming 1 and Programming 2.

Note: Instructor permission may be granted on an individual basis for students who have only completed Programming 1. A summer JAVA assignment will be required for these students

COMPUTER SCIENCE DEPARTMENT (CONT'D.)

ADVANCED TOPICS IN COMPUTER SCIENCE (AP WEIGHT)

Credit: 0.5

368 | GRADE 11-12

This course will build on a solid foundation of computing methodology to introduce students to advanced representation and processing of data. Topics will include algorithm efficiency, recursion, inheritance, and dynamic memory allocation. Students will learn how to process data that is stored as strings, arrays, stacks, queues, linked lists, sets, maps, files, and tree structures to solve a variety of real life application problems. This course includes second semester college-level computer science topics. Students will be expected to engage in rigorous problem solving activities and utilize computer resources outside of class. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% OR better in AP Computer Science A (Java)

CYBERSECURITY, ADVANCED PLACEMENT

Credit: 1

366 | GRADE 11-12

AP Cybersecurity is a broad introduction to the field of cybersecurity that aligns closely with a standard first-year college introductory cybersecurity course. Students learn about common threats and vulnerabilities and how those combine to create risk. Students study the ways that individuals and organizations manage risk and how risk can be mitigated through a defense-in-depth strategy. Students explore specific vulnerabilities, attacks, mitigations, and detection measures across a variety of domains, including physical spaces, computer networks, devices, and data and applications. Throughout the course, students consider the impact of cybersecurity on individuals, organizations, societies, and governments. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Algebra 1 and either Programming 1 OR AP Computer Science Principles

DRIVER EDUCATION DEPARTMENT

Driver Education is a required course and a graduation requirement. Driver Education emphasizes personal and social problems related to the safe and efficient movement of traffic.

DRIVER EDUCATION

Credit: .25

DE2 | GRADE 10-12 ONLY

Driver Education is a required course usually taken in the sophomore year. Driver Education emphasizes personal and social problems related to the safe and efficient movement of traffic. Major aims are to emphasize the desirable role of the pedestrian and driver in traffic and to develop the knowledge and attitudes needed for safe use of traffic facilities. Students will take this course in a face-to-face format, unless a student registers and is approved to take the course online.

DRIVER TRAINING

AGES 16, 17, 18

Driver Training is an elective course offered to 16-year-old students. Each student must have parental permission to drive a motor vehicle. A learner's permit must be obtained by the student. Driver Training consists of nine hours of simulation, and three hours of behind-the-wheel instruction. The purpose of the twelve-hour course is to develop, through the use of realistic situations, the knowledge, attitudes and skills necessary for safe and efficient operation of the automobile in urban, rural and superhighway traffic. There is an additional fee associated with Driver Training. Interested students must register for this course on the **Driver's Training page** on the EHS website.

PA DRIVER'S EXAMINATION

Emmaus High School has been certified by the Pennsylvania Department of Transportation to administer the PA Driver's Examination. We are able to test our students and determine whether they meet the state standards for driver licensing.

In order for a student to take the Driver's Examination, the following guidelines must be satisfied:

- Currently enrolled in Driver Training
- Attendance at simulation classes must be up-to-date
- Successfully completed Driver Education
- Registration fee for Driver Training has been paid
- Regular permit (not a temporary permit)
- Form 180C must be signed in the presence of an instructor or be notarized
- Recommended by the driving instructor
- Demonstrated the skills and maturity for a driver's license

ENGLISH DEPARTMENT

Each high school student must take and pass a ninth, a tenth, an eleventh, and a twelfth grade English course to graduate. Students should choose, with the help of parents, teachers, and school counselors, the program best suited to their abilities and future plans. Each student should choose the appropriate English course offered in a grade level. In addition to a literature survey component, all non-elective English courses provide writing activities and research, vocabulary study, study skills and career awareness instruction. Those who are undecided about going to college should choose college preparatory English. Note that all elective courses will not be counted toward meeting English graduation requirements.

Summer reading assignments are required for all Emmaus High School English courses. The summer reading assignment list can be found on the Emmaus High School website.

NINTH GRADE ENGLISH

Credit: 1

111 | NCAA

In the 9th grade course, students will respond to literary works orally through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, which may take the form of homework, journaling, and informal and formal essays. Through the workshop model, students will explore the elements of brainstorming, outlining, writing, peer-editing, revising and proofreading, and publishing their work. Research and analysis will emphasize a scaffold approach in which students develop skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher-selected titles, the study of literature will be augmented with student selections during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. The literature of this course will focus on high-interest touchstones of American, British, and World literature, including novels, plays, poems, short stories, and nonfiction. This curriculum of this course is aligned to the PA Core Standards. Students in this course will focus on foundational, conceptual, and exploratory learning targets in reading, writing, and communications in preparation for successful performance in a college setting. The course includes a self-selected summer reading requirement.

NINTH GRADE ENGLISH, HONORS

Credit: 1

150 | NCAA

In the 9th grade honors English course students will respond to literary works orally through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, with a focus on expository, argumentative, and analytical essay writing. Through the workshop model, students will explore the elements of brainstorming, outlining, writing, peer-editing, revising and proofreading, and publishing their work. Research and analysis will emphasize a scholarly approach in which students practice skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher-selected titles, the study of literature will be augmented with student selections during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. The literature of this course will focus on high-interest touchstones of American, British, and World literature, including novels, plays, poems, short stories, and nonfiction. The curriculum of this course is aligned to the PA Core Standards. The ninth grade English honors course has been developed as the first level of the secondary honors/Pre-Advanced Placement track in the language arts area. Students selecting this course exhibit a high level of independence and motivation appropriate for accelerated curricula and have demonstrated strengths in English Language Arts. Honors courses will extend the depth of study through more rigorous materials and activities promoting higher-level thinking skills such as analysis, synthesis, and evaluation. The course includes assigned summer reading requirements.

TENTH GRADE ENGLISH

Credit: 1

118 | NCAA

In the 10th grade course, students will respond to literary works orally through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, which may take the form of homework, journaling, and informal and formal essays. Through the workshop model, students will explore the elements of brainstorming, outlining, writing, peer editing, revising and proofreading, and publishing their work. Research and analysis will emphasize increasing independence as students reinforce skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher selected titles, the study of literature will be augmented with student selections during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. The literature of this course will focus on high-interest touchstones of American, British, and World literature, including novels, plays, poems, short stories, and nonfiction. The curriculum of this course is aligned to the PA Core Standards. Students will focus on further developing foundational, conceptual, and exploratory learning targets in reading, writing, and communications. The literary rigor of selections and student work will increase appropriately for a student following a college-bound track. The course includes a self-selected summer reading requirement. The Keystone exam will be administered while students are enrolled in this course.

ENGLISH DEPARTMENT (CONT'D.)

TENTH GRADE ENGLISH, HONORS

Credit: 1

151 | NCAA

In the 10th grade honors course, students will respond to literary works orally through inquiry based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, with a focus on expository, argumentative, and analytical essay writing. Through the workshop model, students will reinforce the elements of brainstorming, outlining, writing, peer-editing, revising and proofreading, and publishing their work. Research and analysis will emphasize a scholarly approach in which students practice skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher-selected titles, the study of literature will be augmented with student selections during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. The literature of this course will focus on high-interest touchstones of American, British, and World literature, including novels, plays, poems, short stories, and nonfiction. The curriculum of this course is aligned to the PA Core Standards. The tenth grade English honors course has been developed as the second level of the secondary honors/Pre-Advanced Placement track in the language arts area and is intended for students who will pursue college-level courses in the eleventh and twelfth grade. Students selecting this course exhibit a high level of independence and motivation appropriate for accelerated curricula and have demonstrated strengths in English Language Arts. Honors courses will extend the depth of study through more rigorous materials and activities promoting higher-level thinking skills such as analysis, synthesis, and evaluation. The course includes assigned summer reading requirements. The Keystone exam will be administered while students are enrolled in this course.

ELEVENTH GRADE ENGLISH

Credit: 1

128 | NCAA

In the 11th grade course, students will respond to literary works orally through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, which may take the form of homework, journaling, and informal and formal essays. Through the workshop model students will practice the elements of brainstorming, outlining, writing, peer-editing, revising and proofreading, and publishing their work. Research and analysis will emphasize independence as students reinforce skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher-selected titles, the study of literature will be augmented during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. The literature of this course will focus on high-interest touchstones of American literature, including novels, plays, poems, short stories, and nonfiction. The curriculum of this course is aligned to the PA Core Standards. Students will focus on developing and mastering foundational, conceptual, and exploratory learning targets in reading, writing, and communications. The literary rigor of selections and student work will increase appropriately for a student following a college-bound track. The course includes a self-selected summer reading requirement.

ELEVENTH GRADE ENGLISH, HONORS DC

Credit: 1

152DC | NCAA

In the 11th grade honors course, students will respond to literary works through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis with an emphasis on research; this course will emphasize a scholarly approach to writing in which students further develop skills such as finding and evaluating secondary sources, synthesizing primary and secondary source information, and integrating sources. Students will strive for sound logic, effective use of details, appropriate diction, and correct grammar and mechanics.Students will study models of writing, including student essays and professionally-written essays.Honors courses will extend the depth of study through more rigorous materials and activities promoting higher level thinking skills such as analysis, synthesis, and evaluation. The course includes assigned summer reading requirements. Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

! **Prerequisite: Passing score of LCCC placement test during the course may be required for Dual Credit designation**

ENGLISH DEPARTMENT (CONT'D.)

ELEVENTH GRADE ENGLISH, ADVANCED PLACEMENT LANGUAGE AND COMPOSITION

Credit: 1

162 | NCAA

Advanced Placement course syllabi are approved by the district and the College Board. As designated by the College Board, "The AP English Language and Composition course aligns to introductory college-level rhetoric and writing curriculum, which requires students to develop evidence-based analytic and argumentative essays that proceed through several stages or drafts. Students evaluate, synthesize, and cite research to support their arguments. Throughout the course, students develop a personal style by making appropriate grammatical choices. Additionally, students read and analyze the rhetorical elements and their effects in non-fiction texts, including graphic images as forms of text, from many disciplines and historical periods." The course also includes vocabulary study and a formal research paper. The course prepares students to take the AP Exam, the successful completion of which can serve as college credit. The course includes assigned summer reading requirements.

! Prerequisite: Recommendation of English department and recommended 80% or better in Tenth Grade English, Honors

TWELFTH GRADE ENGLISH

Credit: 1

139 | NCAA

In the 12th grade course, students will respond to literary works orally through inquiry-based class discussion, peer to peer discussion, and more formal presentation activities. Additionally, students will respond to literature in writing on a regular basis, which may take the form of homework, journaling, and informal and formal essays. Through the workshop model students will practice the elements of brainstorming, outlining, writing, peer-editing, revising and proofreading, and publishing their work. Research and analysis will emphasize independence as students reinforce skills such as writing a thesis, finding and evaluating secondary sources, and synthesizing primary and secondary source information. Besides teacher-selected titles, the study of literature will be augmented during independent reading time and Literature Circles. Grammar and vocabulary instruction will be utilized to assist students in the processes of reading and writing. This course will focus on high-interest touchstones of World literature, including novels, plays, poems, short stories, and nonfiction. The curriculum of this course is aligned to the PA Core Standards. Students in College Preparatory courses will focus on developing and mastering foundational, conceptual, and exploratory learning targets in reading, writing, and communications in preparation for successful performance in a college setting. The literary rigor selections and student work will increase appropriately for a student following a college-bound track. The course includes a self-selected summer reading requirement.

TWELFTH GRADE ENGLISH, HONORS DC

Credit: 1

154DC

The 12th grade honors course is a survey of literature depicting a wide range of human experiences, introducing concepts useful for analyzing and interpreting fiction, poetry, and drama. Students will consider relevant, credible resources as they examine relationships between literary significance and social position, inequality, cultural contexts, and political power. Students will respond to literature in writing on a regular basis, and will extend their depth of study through more rigorous materials and activities promoting higher level thinking skills such as analysis, synthesis, and evaluation. The course includes assigned summer reading requirements. Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

! Prerequisite: Passing score of LCCC placement test during the course may be required for Dual Credit designation

Students interested in the dual credit option for this course must first successfully complete the ENG 105 (11 Honors English) through LCCC.

SENIOR HUMANITIES, HONORS

950 | GRADE 12 | NCAA

SOCIAL STUDIES: Credit: 1 ENGLISH: Credit: 1

Senior Humanities Honors is an interdisciplinary exploration of the ideas, works, and questions that have shaped human experience. Drawing from literature, philosophy, history, art, music, and other forms of expression, students examine how people have understood themselves and their world across time.The course includes assigned summer reading requirements.

Students will:

- Read and discuss significant works from the ancient, medieval, and modern worlds
- Explore philosophical, cultural, historical, and ethical questions
- Analyze literature, art, music, and other forms of cultural expression
- Develop sophisticated critical-thinking and problem-solving skills
- Write analytically and reflectively across disciplines
- Conduct interdisciplinary research and synthesize sources
- Collaborate on complex projects and presentations
- Develop visual, musical, and cultural literacy

Course focus: Connecting literature, history, philosophy, art, and culture to explore enduring questions about the human experience.

! Prerequisite: Application required

ENGLISH DEPARTMENT (CONT'D.)

TWELFTH GRADE ENGLISH, ADVANCED PLACEMENT LITERATURE AND COMPOSITION

Credit: 1

160 | NCAA

Advanced Placement course syllabi are approved by the district and the College Board. As designated by the College Board, "The AP English Literature and Composition course aligns to an introductory college-level literary analysis course. The course engages students in the close reading and critical analysis of imaginative literature to deepen their understanding of the ways writers use language to provide both meaning and pleasure. As they read, students consider a work's structure, style, and themes, as well as its use of figurative language, imagery, symbolism, and tone. Writing assignments include expository, analytical, and argumentative essays that require students to analyze and interpret literary works." The course also includes an exploration of literary theory, an intertextual research component, and vocabulary study. The course prepares students to take the AP Exam, the successful completion of which may serve as college credit. The course includes assigned summer reading requirements.

Prerequisite: Recommendation of English department and recommended 80% or better in eleventh grade English Honors or AP Language and Composition

The following elective courses are available to all students in any of the English programs:

JOURNALISM 1

Credit: 1

100 | GRADE 9-12 | NCAA

Through an emphasis on print journalism, students develop the traits typical of and essential for all beginning reporters and writers as they develop an increasing awareness of their world. They achieve that goal through a mixture of instruction and writing of news, features, and opinion pieces. This is a writing class, and students are expected to conduct interviews and write stories on an ongoing basis. On average, a new story is completed within three weeks. Public relations and advertising are also explored in the class. Upon completion of the course, students will have developed a writing portfolio of journalistic pieces.

JOURNALISM 2

Credit: 1

110 | GRADE 10-12

Through an emphasis on print journalism, students develop the traits typical and essential for all good reporters and writers as they develop an increasing awareness of their world. They achieve that goal through a mixture of instruction and production tied to the planning and writing of news, features, sports, and opinion stories. The course is writing-project based. During the course, students jointly or independently plan and produce original stories of the following types: spot news (a press conference), round-up, poll, follow-up, sidebar, brief, meeting, district and community feature, trend story, review, speech, sports advance, game story, player profile, column, and editorial perspective. Students are encouraged to develop articles suitable for publication in The Stinger.

Prerequisite: Recommended 70% or better in Journalism 1

JOURNALISM 3

Credit: 1

120 | GRADE 11-12

This is largely a section editor's course for print journalism students. Page design and production is the core of the instruction and hands-on work. Students, who work on or lead editorial teams, thrive on planning, preparing, and contributing to each issue of The Stinger. Students are exposed formally and informally to career options for those interested in pursuing further study of working in the communications field. Students will submit numerous layouts and designs on school, as well as community-based topics and are encouraged to develop articles suitable for publication in The Stinger.

Prerequisite: Recommended 80% or better in Journalism 2

JOURNALISM 4

Credit: 1

130 | GRADE 12

Students work more independently to lead publication teams in regular planning, editing, and production of The Stinger. Interested students must apply and be approved for editor positions as they will individually and collaboratively plan and produce in-depth projects for real-world publications as well as electronic, new media initiatives based upon student interest and demand in ongoing deadline situations. Additional media avenues are open because of the smaller corps of students.

Prerequisite: Recommended 80% or better in Journalism 3 and approval of The Stinger Advisor

THEATER 1

Credit: 0.5

101 | GRADE 9-12

This course will show students that theater is a vital and exciting art form. Students will explore and participate in pantomime, improvisation, acting, scene design, stagecraft, lighting, and costume design. The history, development, and elements of theater will be examined.

THEATER 2

Credit: 0.5

102 | GRADE 9-12

This course continues the study of the performance skills introduced in Theater 1. Students will develop additional techniques of concentration, pantomime, improvisation, sense recall, emotional recall, stage movement and characterization. Students will then progress to comprehensive scene study with the emphasis on utilizing those skills mastered.

Prerequisite: Theater 1

ENGLISH DEPARTMENT (CONT'D.)

THEATER 3/ ACTING STUDIO

Credit: 0.5

103 | GRADE 10-12

This course will continue the development of skills introduced in Theater 1 and Theater 2. Theater 3/Acting Studio will focus on an intensive approach to character development and scene study with an emphasis on the Stanislavski approach to acting. Students will study a variety of acting and directing styles. Each student will develop a portfolio of monologues and scenes suitable for the audition process. The course will offer each student the opportunity to perform in the classroom and for public audiences.

Prerequisite: Theater 2

PUBLIC SPEAKING AND DEBATE

Credit: 0.5

104DC | GRADE 10-12 | NCAA

Students will experience and use techniques involved in both formal and informal speaking situations. They will be introduced to the various purposes of speaking to an audience: to inform, to convince, to entertain, to impress, and to motivate. Methods of presentation will involve impromptu, extemporaneous, and scripted speeches, as well as debate. Instruction will be provided in gathering material necessary for some of the speech situations.

Prerequisite: Successful completion of 9th grade English

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

INTRO TO BROADCAST STUDIO AND FILM PRODUCTION

Credit: 1

105 | GRADE 9-12

This course provides the foundation for future courses of study that will prepare our students to communicate more effectively in a world where media technologies – video, film, Internet, smartphone, etc. are converging into an inter-related digital mosaic. The course will begin with a study of man's quest to communicate and will focus on the convergence of media and culture from a historical perspective. Students will learn the basic pre-production skills of researching, storyboarding, and script writing, and will advance to learning various production and post-production skills including the operation of audio, video, and editing equipment. Students develop skills such as filming, directing, editing, and film analysis. Students create various video projects across multiple genres. Whether a student is interested in pursuing a career in media or simply has an interest in communications, this course will provide the necessary basics.

BROADCAST STUDIO AND FILM PRODUCTION 2

Credit: 1

115 | GRADE 10-12

The goal of this course is to provide students with an authentic experience working in a television studio to contribute to our ETV broadcast. Our broadcast includes school announcements, weather, sports, local and national news events, and student-created features involving our school and community. Students write and produce all segments of the broadcast and run the technical aspects of our show as well. Students produce broadcast-ready "packages" of school and community events to air during our broadcast. Our tech team and on-air team work together to produce a high quality show each day. Students develop and refine skills such as lighting and sound studies, filming, directing, editing, and film analysis. In addition to the production of our morning broadcast, students create various films across multiple genres. Any student who has successfully completed Intro to Broadcast Studio and Film Production is eligible to sign up for this course

Intro to Broadcast Studio and Film Production

BROADCAST STUDIO AND FILM PRODUCTION 3/ETV

Credit: 1

125 | GRADE 11-12

This course is a continuation of Broadcast Studio and Film Production 2 that provides students with an authentic experience working in a television studio to produce a live broadcast each morning. Our broadcast includes school announcements, weather, sports, local and national news events, and student-created features involving our school and community. Students write and produce all segments of the broadcast and run the technical aspects of our show as well. Students produce broadcast-ready "packages" of school and community events to air during our broadcast. Our tech team and on-air team work together to produce a high quality show each day. In addition to creating a portfolio of film projects, Broadcast Studio and Film Production 3 students will lead production teams in the creation of segments and packages for our live newscast, and will lead and direct teams in the production of creative and documentary films. Students refine and master skills such as lighting and sound studies, filming, directing, editing, and film analysis. In addition to the production of our morning broadcast, students create various films across multiple genres. Any student who has successfully completed Intro to Broadcast Studio and Film Production AND Broadcast Studio and Film Production 2 is eligible to sign up for this course. However, each year's team is selected via an audition/interview process.

BROADCAST STUDIO AND FILM PRODUCTION 4/ETV

Credit: 1

135 | GRADE 12

This course is a continuation of Broadcast Studio and Film Production 3/ETV studio that provides students with an authentic experience working in a television studio to produce a live broadcast each morning. Our broadcast includes school announcements, weather, sports, local and national news events, and student-created features involving our school and community. Students write and produce all segments of the broadcast and run the technical aspects of our show as well. Students produce broadcast-ready "packages" of school and community events to air during our broadcast. Our tech team and on-air team work together to produce a high quality show each day. In addition to creating a portfolio of film projects, Broadcast Studio and Film Production 4 students will lead production teams in the creation of segments and packages for our live newscast, and will lead and direct teams in the production of creative and documentary films, interface with local businesses to produce news segments and commercials to be aired on our school newscast, lead production responsibilities for our daily newscast, and generate project ideas based on the needs of our school and community. Students master skills such as lighting and sound studies, filming, directing, editing, and film analysis. In addition to the production of our morning broadcast, students create various films across multiple genres. Any student who has successfully completed Intro to Broadcast Studio and Film Production, Broadcast Studio and Film Production 2, and Broadcast Studio and Film Production 3 is eligible to sign up for Broadcast Studio and Film Production 4. However, each year's team is selected via an audition/interview process.

ENGLISH DEPARTMENT (CONT'D.)

READING SEMINAR

Credit:
0.5

RSEM

In the Reading Seminar course, students will refine their reading skills through an emphasis on reading strategies, systematic reading behaviors, and writing about reading. This course employs research-based practices with the goal of helping students to learn and to apply the skills of an effective reader, not only in reading class, but as they read across the curriculum. Students are placed in this course based on individual student data and scheduled as available. This course can be taken multiple times, as needed.

ENGLISH LANGUAGE DEVELOPMENT (ELD)

The English Language Development (ELD) program offers curricular experiences designed to support Multilingual Learners (MLs) in developing their English language skills for success in school and beyond. ELD classes are available to Multilingual Learners who qualify based on state criteria for inclusion in the program.

ENGLISH LEARNER 1

Credit: 2

EL1

English Learner 1 is a course for newcomer English Learners. Learners will utilize the **National Geographic Edge Fundamentals** curriculum including the textbook and supporting materials. This course provides students with beginning exposure to the English language in the areas of reading, writing, speaking, and listening. Students will be exposed to various types of fiction and non-fiction texts as well as begin to develop their academic writing through vocabulary studies. Assessments and instruction incorporate strategies for meeting the needs of beginning English learners and are aligned with the Common Core State Standards and National Geographic's Fundamentals.

! Enrollment in Fundamentals is dependent upon WIDA scores and teacher recommendation.

ENGLISH LEARNER 2

Credit: 2

EL2

Beginner English Learners will utilize the **National Geographic Edge A** curriculum including the textbook and supporting materials. This course provides students with a broad exposure to the English language in the areas of reading, writing, speaking, and listening. Students will develop solid English reading skills, be exposed to various genres of text, and will learn to incorporate increasingly sophisticated and complex writing skills to bolster success in all academic classes. Assessments and instruction incorporate strategies for meeting the needs of Intermediate English language learners and are aligned with the Common Core State Standards and National Geographic's Edge, Level A.

! Enrollment in the class is dependent upon WIDA scores and teacher recommendation.

ENGLISH LEARNER 3

Credit: 2

EL3

Intermediate English Learners will utilize the **National Geographic Edge B** curriculum including the textbook and supporting materials. In this course, students will engage in all language domains (listening, speaking, reading, and writing) so that they can further improve and refine their overall communication and academic language in English. Students will read and respond to increasingly challenging literature and non-fiction texts, with vocabulary and grammar instruction interwoven throughout. Assessments and instruction incorporate strategies for meeting the needs of intermediate English learners and are aligned with the Common Core State Standards and National Geographic's Edge, Level B.

! Enrollment in the class is dependent upon WIDA scores and teacher recommendation.

FAMILY & CONSUMER SCIENCES DEPARTMENT

Family and Consumer Sciences education empowers individuals and families across the life span to manage the challenges of living and working in a diverse, global society. Our unique focus is on families, work, and their interrelationships.

CHILD DEVELOPMENT 1

Credit: 0.5

800 | GRADE 9-12

Students will learn about the developing child from the prenatal stage through age 5. They will be able to distinguish and understand the interrelatedness of a child's development. Students will evaluate the roles and responsibilities of parenting and discuss the societal trends at different stages of the life cycle.

CHILD DEVELOPMENT 2

Credit: 0.5

810 | GRADE 10-12

Child Development 2 comprises a practical early childhood experience based in the Emmaus High School Preschool program. Students develop, plan, teach, and evaluate activities for 3, 4 and 5 year old children and conduct observations to learn more about the cognitive, social, emotional, and physical development of young children.

Prerequisite: 75% or better in Child Development 1 AND application process is required.

** Application can be found on the Program of Studies website

CHILD DEVELOPMENT 3

Credit: 0.5

820 | GRADE 11-12

This course will expand on the knowledge and experience gained in Child Development 2. Students continue their interaction and participation in the on-site preschool for 3, 4 and 5 year olds. Students will evaluate preschoolers' physical, intellectual, emotional and social development. Students plan, teach and evaluate lessons in the preschool setting using Developmentally Appropriate Practices (DAP's).

Prerequisite: 75% or better in Child Development 2 AND application process is required.

** Application can be found on the Program of Studies website

FOOD FUNDAMENTALS

Credit: 0.5

806 | GRADE 9-12

This course introduces students to the essential skills and knowledge needed for everyday cooking. Students learn safe and efficient cooking techniques, how to plan and prepare balanced meals, and how to work collaboratively using common kitchen tools and equipment. Hands-on labs allow students to practice these skills in a practical, real-life kitchen setting, building a strong foundation for future cooking experiences. ***Please be aware that there is potential exposure to common food allergens.***

FASHION DESIGN

Credit: 0.5

804 | GRADE 10-12

This course brings the exciting world of fashion and sewing to life through an in-depth look at how the apparel industry works. It is designed for students who have interests in the field of design, apparel, textiles and clothing construction. Individual projects will provide students an opportunity to demonstrate acquired knowledge.

INTERNATIONAL FOODS

Credit: 0.5

805 | GRADE 10-12

In this course, students will prepare a selection of dishes from around the world. They will explore a variety of foods unique to different countries and use them in dishes that represent the cuisine of Europe, Africa, the Middle East, Asia, Australia and Russia. Students will understand the similarities and differences in global food choices, and, by studying the geography, climate, history and customs of a country, will develop an awareness, respect and acceptance of different cultural groups from different parts of the world. Course includes a theory and lab component. ***Please be aware that there is potential exposure to common food allergens.***

Prerequisite: Successful completion of Creative Foods OR Food Fundamentals

BAKING AND PASTRY ARTS

Credit: 0.5

808 | GRADE 10-12

This course introduces students to the fundamental techniques, science, and artistry of baking and pastry. Through hands-on lab experiences, students will examine ingredient interaction, precise measurement techniques, and foundational methods behind successful baked goods. Key units of study include quick breads, cookies, yeast breads, cakes, pastries, pies, and plated desserts. . ***Please be aware that there is potential exposure to common food allergens.***

Prerequisite: Successful completion of Creative Foods OR Food Fundamentalss

FARM TO TABLE

Credit: 0.5

809 | GRADE 10-12

In this course, students prepare seasonal dishes using fresh, locally sourced ingredients. Building on skills learned in Food Fundamentals, students focus on regional food choices, seasonal menu planning, and practical kitchen techniques. Activities emphasize safe food handling, cooking with local products, and understanding how regional food choices impact health and the community. ***Please be aware that there is potential exposure to common food allergens.***

Prerequisite: Successful completion of Creative Foods OR Food Fundamentals

SKILLS FOR INDEPENDENCE

Credit: 0.5

825 | GRADE 9-11

This course helps students build practical skills for everyday life and future independence. Units include planning for the future, understanding community resources, developing employability skills, and exploring food and nutrition. Students will also learn to manage responsibilities at home by caring for their spaces and belongings, building routines, and making choices that support wellness. Through real-world applications, students gain confidence in handling responsibilities and making informed decisions for responsible living.

FAMILY & CONSUMER SCIENCES DEPARTMENT (CONT'D.)

POSITIVE WELL-BEING

Credit:
0.5

830 | GRADE 11-12

This course seeks to enhance a student's quality of life by focusing on increasing one's physical and mental well-being and overall happiness. Topics include happiness, nutrition, stress management, mindfulness, relationships, and self-esteem. Students will practice lifestyle changes such as gratitude, random acts of kindness, movement, exposure to nature, and reductions of social media to boost mood and manage stress. Students will learn how to create and maintain meaningful relationships, make healthy meals, overcome adversity, and improve one's self-esteem. This course is a half credit course and is available for students grades 11-12.

GIFTED SUPPORT PROGRAM

Please note that scheduling of all courses in this program is reserved for students who have been identified as gifted.

THE HISTORY OF WESTERN PHILOSOPHY, HONORS

Credit: 0.5

980 | GRADE 9-12 | NCAA

This course explores the fundamentals of western philosophy. Students will read about and discuss the thoughts of philosophers from ancient Greece to modern times. Students will be encouraged to share their thoughts on questions that men and women have been pondering probably since the development of language. Primary sources from the major western philosophers will be utilized. Roundtable discussions and symposiums will be the staples of the course. The book, **The Republic**, by Plato will be read and analyzed throughout the semester.

THE QUEST FOR THE DISTANT PAST, HONORS

Credit: 0.5

982 | GRADE 9-12

This offering emphasizes an interdisciplinary approach to trace the development of human history and culture throughout the Paleolithic and Neolithic time periods. The timeframe for this course includes the emergence of certain hominids around 4.5 million years ago to the dawn of civilization in the Fertile Crescent around 5,000 years ago. Topics include famous fossil discoveries, important archeological discoveries and cultural and artistic breakthroughs. The course is not lecture based but instead will emphasize discovery learning. There will also be a local history piece relating to the Native Americans of the Lehigh Valley. The book, Guns, Germs and Steel, by Jared Diamond is read and analyzed throughout the semester.

MATHEMATICS DEPARTMENT

The mathematics department is committed to mathematical literacy for all students at various levels of content depth. Students are strongly encouraged to complete Algebra 1, Algebra 2, and Geometry by the end of Grade 11. Calculators are permitted for use in most math classes. Scientific calculators are satisfactory for Algebra 1, Algebra 2 and Geometry. Graphing calculators, including the TI-84, or TI-84 Plus, and are used frequently in Precalculus, Statistics and Calculus. Prerequisites are stated as recommendations for success by most students.

FOUNDATIONS OF MATH

Credit: 1

300

This course reinforces foundational math concepts needed for success in Fundamentals of Algebra and Algebra 1. Students are placed into this course based on individual data, teacher recommendation, and data based on their 3-8 performance on state standardized testing. Through ongoing data collection, students will receive instruction designed to challenge them based on their needs and to provide remediation and/or enrichment when appropriate. The topics include arithmetic operations, number system, fractions, math facts, ratios, proportions, expressions, exponents, basic geometry, statistics, probability, graphing coordinates and deciphering word problems. The focus is on learning the conceptual understandings of mathematical processes and basic computational procedures. (Fulfills STEM requirement for graduation)

FUNDAMENTALS OF ALGEBRA

Credit: 1

Note: this course is not available for students who have completed Algebra 1.

303

The course is designed to introduce students to the fundamentals of Algebra. The course will focus on the development of algebraic concepts while integrating the use of technology. This course will further develop students' mathematical skills, enhance their math proficiency, and teach students the skill set necessary for success in Algebra 1. Note: Students will be placed in this course based on teacher recommendation, previous course grades, and standardized test and benchmark scores that are below proficient. (Fulfills STEM requirement for graduation)

ALGEBRA 1

Credit: 1

306 | NCAA

This course is recommended as the first course for high school students and is a continuation of the topics that were started in Middle Level Algebra. The content includes solving equations and inequalities, linear graphs and functions, systems of equations and inequalities, exponents, polynomials, radicals and an introduction to data analysis. Students will complete the Keystone Exam at the end of this course. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended "C" or higher in Math Course 3 OR successful completion of Fundamentals of Algebra

*ALGEBRA 1

Credit: 1

306 | GRADE 9 | NCAA

This course is also offered as a double period semester class and MUST be taken in conjunction with the semester 314 Algebra 2 CP. The course is designed for students wishing to accelerate in math in order to take Calculus their senior year. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 90% OR better in Math Course 3 OR teacher recommendation

APPLICATIONS OF ALGEBRA 2

Credit: 1

308 | GRADE 10-11 | NCAA

This course builds upon the skills learned in Algebra 1 and focuses on the application of those skills. The course will include the study of functions, quadratic and polynomial functions and their graphs, exponential functions, modeling data, and probability. (Fulfills STEM requirement for graduation).

Prerequisite: Successful completion of Algebra 1

MATHEMATICS DEPARTMENT (CONT'D.)

ALGEBRA 2, COLLEGE PREPARATORY

Credit: 1

314 | NCAA

This course builds upon the skills learned in Algebra 1. The course includes study of real numbers and complex numbers, quadratic equations, polynomials, factoring, logarithmic and exponential functions, rational expressions and equations, and radical expressions and equations. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Algebra 1 Honors OR recommended 70% or better in Algebra 1

*ALGEBRA 2, COLLEGE PREPARATORY

Credit: 1

314 | GRADE 9 | NCAA

This course is also offered as a double period semester class and MUST be taken in conjunction with the semester 306 Algebra 1 CP. The course is designed for students wishing to accelerate in math in order to take Calculus their senior year. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 90% or better in Math Course 3 OR teacher recommendation

ALGEBRA 2, HONORS

Credit: 1

351 | NCAA

This course is an extension of the Algebra 2, College Preparatory course with inclusion of additional topics on quadratic and polynomial functions, joint variations, rational zeros, rationalizing the denominator, and probability and statistics. An entire unit on algebraic proofs is also included to adequately prepare the students for advanced mathematics courses. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Algebra 1 Honors OR recommended 90% OR better in Algebra 1

GEOMETRY CONCEPTS

Credit: 1

310

This course employs an interactive, workplace-centered approach to learning geometric concepts. It is ideal for contextual learners. Geometric concepts are introduced, practiced, and applied in the context of the workplace. Students are encouraged to become active learners as they interact with the text to discover how a concept works, while increasing their capacity for problem solving. This course does not include the rigor of the Geometry CP course, but covers many of the same concepts including points, lines, planes, angles, congruence, triangles, circles, area, volume, right angle relationships, and similarity.

Prerequisite: Recommended completion of Algebra 1 AND Algebra 2 (Fulfills STEM requirement for graduation)

GEOMETRY, COLLEGE PREPARATORY

Credit: 1

312 | NCAA

This course gives considerable attention to developing an understanding of the nature of deductive proof, the role of definitions and the meanings and uses of assumptions in writing proofs. Students are encouraged to think of geometry as a system requiring logic of thought as opposed to a less precise system based only upon observation and measurement. This course includes the study of both plane and solid figures. It is recommended that students take Algebra 1, Algebra 2, and Geometry, in that order, to ensure success on SAT's and upper level courses. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 70% or better in Algebra 2 CP OR recommended 80% or better in Applications of Algebra 2

GEOMETRY, HONORS

Credit: 1

350 | NCAA

This course is designed for those students with an exceptional background in mathematics. The course promotes spatial perception and provides a more challenging approach to Euclidean geometry. Topics are studied in depth. In addition to the topics covered in Plane and Solid geometry, units on analytic proof and logic are included. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Algebra 1, Honors AND recommended 80% or better in Algebra 2, Honors

PROBABILITY AND STATISTICS, COLLEGE PREPARATORY

Credit: 1

315DC | GRADE 11-12 | NCAA

This course is designed to introduce students to the methods of collecting data for the purpose of analyzing and making inferences. Students will utilize real-life situations from the scientific and business communities to help reinforce the statistical methods applied in this course. Students will use graphing calculators and statistical software to enhance their understanding of the statistical methods taught in this course. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 70% or better in Algebra 2 CP AND recommended 70% or better in Geometry CP

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

INTERMEDIATE ALGEBRA

Credit: 1

319DC | GRADE 10-12

An overview of basic algebraic concepts to prepare students for more advanced work in mathematics. Emphasizes fundamental operations, special products and factors, fractional expressions, functions and graphs, systems of equations, integer and fractional exponents, radicals, and quadratic equations and functions. **Requires use of LCCC's EdReady program at the beginning of the course.**

Prerequisite: Successful completion any level of Algebra 2 or Geometry

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

* Passing score of LCCC placement test during the course is required for Dual Credit designation

** NCAA eligibility may apply. Speak to your counselor for more information.

MATHEMATICS DEPARTMENT (CONT'D.)

PRECALCULUS, COLLEGE PREPARATORY

Credit: 1

330DC | NCAA

This course contains the mathematics intended for students preparing for higher education. Topics covering polynomial, exponential, logarithmic, trigonometric and circular functions, real numbers, algebraic manipulations, and sequences and series are studied. Completion of a summer review packet will be required. A graphing calculator is recommended, but not required. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Geometry CP OR recommended 70% or better in Geometry Honors AND recommended 80% or better in Algebra 2 CP OR recommended 70% or better in Algebra 2 Honors OR 80% or better in Intermediate Algebra

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

PRECALCULUS, ADVANCED PLACEMENT

Credit: 1

359 | NCAA

In this AP course, students will explore everyday situations and phenomena using mathematical tools and lenses. Students will build deep mastery of modeling and functions, and they examine scenarios through multiple representations. This course will prepare students for other college-level mathematics and science courses. The course will study each function type through their graphical, numerical, verbal, and analytical representations and their applications in a variety of contexts. Furthermore, students apply their understanding of functions by constructing and validating appropriate function models for scenarios, sets of conditions, and data sets, thereby gaining a deeper understanding of the nature and behavior of each function type.

Prerequisite: Recommended 80% or better in Geometry, Honors OR recommended 90% or better in Geometry CP AND recommended 80% or better in Algebra 2, Honors.

BUSINESS CALCULUS

Credit: 1

345DC | GRADE 11-12 | NCAA

Designed for students in business programs. Topics covered include linear, quadratic,polynomial, rational, exponential and logarithmic functions, differential and integral calculus of a single variable; and various applications to business and economics.

Prerequisite: Recommended 80% or better in Precalc, CP OR recommended 70% in AP Precalculus

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

ANALYTIC GEOMETRY AND CALCULUS (AB), ADVANCED PLACEMENT

Credit: 1

360 | NCAA

This course is intended for students with thorough backgrounds in mathematics who plan to pursue higher mathematics or science in college. Students who satisfactorily complete this course will be prepared to take the College Board's A.P. Calculus (AB) exam. A full first semester college course will be presented including an extensive study of functions and graphs, limits, derivatives and methods of integration. Students who wish to take Advanced Calculus (Course #353) should plan to take AP Calculus (BC). This course requires frequent use of graphing calculators. It is strongly recommended that students have their own graphing calculator. **This course is not a prerequisite for Advanced Calculus (AP weighted). (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in AP Precalculus OR recommended 85% or better in Precalculus, CP OR recommended 80% or better in Calculus, CP

ANALYTIC GEOMETRY AND CALCULUS (BC), ADVANCED PLACEMENT

Credit: 1

362 | NCAA

This course is intended for students with an exceptional knowledge of analytic geometry, elementary functions, algebra, geometry and trigonometry. Students who satisfactorily complete this course will be eligible to take the Advanced Placement Mathematics (BC) examination for possible college credit. Calculus (BC) is considerably more extensive than Calculus (AB) and represents the equivalent of Calculus 1 and Calculus 2 courses taught in one year. Topics to be studied include differentiation and applications, integration and applications, transcendental functions, methods of integration, polar coordinates, vectors and equations, infinite series and differential equations. **This course is a prerequisite for Advanced Calculus AP (weighted). This course requires frequent use of graphing calculators. It is strongly recommended that students have their own graphing calculator. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 90% or better in AP Precalculus

ADVANCED CALCULUS (AP WEIGHTED)

Credit: 1

353DC | (AP WEIGHTED) | NCAA

(AP weighted) This course is designed for those students who wish to study additional topics in Calculus but do not wish to matriculate to a local college. It is open to all students who have had AP Calculus BC. "C level" topics will be reviewed, paying particular attention to applications. Many facets of curve sketching will be examined including rectangular and spherical coordinates, vector analysis, and quadric surfaces. Multivariate Differential Calculus, including partial differentiation, gradients, and directional derivatives, and Integral Calculus, including iterated integration and line and flux integrals, will be studied. (Fulfills STEM requirement for graduation)

Prerequisite: AP Calculus BC (only)

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program.

STATISTICS, ADVANCED PLACEMENT

Credit: 1

364 | NCAA

This course is designed for those students who want a solid background in statistics prior to attending college. Many college majors require a course in statistics; especially engineering, business, and social sciences. Four main components of the course include exploring data to discover patterns or departures from patterns, planning a study and deciding what and how to measure, anticipating patterns and

producing models using probability theory and simulation, and drawing statistical inferences in order to select and confirm appropriate models. The course will include frequent use of technology and it is strongly recommended that students have their own graphing calculator. Students who satisfactorily complete this course will be eligible to take the Advanced Placement Statistics exam for possible college credit. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Precalculus, CP OR recommended 70% or better in AP Precalculus

MUSIC DEPARTMENT

CONCERT CHOIR

731/731A | GRADE 9-12

731A: Credit: 0.5

731: Credit: 1

Concert choir is a non-auditioned ensemble that provides a choral singing experience to any students in grade 9-12. Emphasis will be placed on developing basic skills in tone production, performance technique and etiquette, music literacy, and appreciation of music and the arts. There is one required evening concert performance per semester.

BELLA VOCE

733 | GRADE 9-12

Credit: 1

Bella Voce is an intermediate auditioned treble choir comprised of students from grades 9-12. Bella Voce is a stepping stone for students who eventually want to join Chorale, or a place for more advanced treble singers who have already taken Concert Choir. There will be an emphasis on music literacy, including sight-singing skills. Bella Voce mostly performs at in-school events, though there may be some opportunities for outside-of-school performances.

Required auditions take place the previous school year.

JAZZ ENSEMBLE

732 | GRADE 9-12

Credit: 1

The EHS Jazz Ensemble is a premier instrumental group, chosen through a competitive audition process the previous year, and comprised primarily of students with proficiency in jazz style, ensemble performance, and strong academic and musical records. A wide variety of literature will be studied, including jazz, swing, rock, blues, Latin, funk, and popular music. Emphasis is placed on the development of individual and ensemble musicianship, with particular attention to jazz articulation, style, and improvisation. Students are encouraged to improvise regularly as part of the ensemble experience. Jazz Band performs literature of various styles and genres and requires an extensive commitment to both in-school and outside-of-school community performances. Any student who wishes to be placed in Jazz Ensemble must first select 1.0 Symphonic Band (750 or 752). Entrance into Jazz Ensemble is based upon audition.

Required auditions take place the previous school year.

EHS CHORALE

734 | GRADE 9-12

Credit: 1

The EHS Chorale is a premier mixed choir, chosen by a competitive audition process the previous year, made up of students with proficiency in sight-reading, and an outstanding academic and music performance record. Challenging choral literature from many historical periods and styles will be studied. Emphasis is placed on the development of individual and ensemble musicianship skills, and students will be required to audition for PMEA District 10 Chorus. Chorale performs literature of various styles and genres and requires an extensive commitment to both in-school and outside-of-school community performances.

Required auditions take place the previous school year.

ORCHESTRA

737 / 747 | GRADE 9-12

737 Credit: 0.5

747 Credit: 1

The orchestra is comprised of students who play string instruments and desire to perform in an orchestra and improve their instrumental skills. Emphasis is placed on the development of individual instrumental technique as well as small ensemble practice and skills. The orchestra performs a variety of orchestral literature from many styles and periods. Students with no prior string instrument experience must receive permission from the director.

SYMPHONIC BAND

750 / 750S | GRADE 9-10

752 / 752S | GRADE 11-12

750S / 752S Credit: 0.5

750 / 752 Credit: 1

This course is designed for students who desire to continue their musical education or to start on a new musical instrument. Students will learn beginner to intermediate level technical and ensemble skills necessary for performance on a musical instrument. Music literacy and the ability to perform expressively on a musical instrument are the primary goals of this ensemble. Students will perform a wide variety of musical literature. Emphasis is placed on the development of ensemble skills and individual instrumental technique.There is one required evening concert performance per semester.

MUSIC THEORY 1

744 | GRADE 9-12

Credit: 0.5

This course is offered to students who have been introduced to the elements of music in general music course work, but who desire to continue their study of music in a detailed, comprehensive program. The materials and structure of music are defined and analyzed; the content of the course challenges the student/musician to demonstrate musical literacy in their listening skills. Activities include sight singing, melodic and rhythmic dictation and harmonic analysis.

PERCUSSION ENSEMBLE

751 | GRADE 9-12

Credit: 1

The objective of this lab is to develop the student rhythmically and melodically by emphasizing the fundamentals of melodic and battery percussion. The students will study the history of percussion, both in the U.S. and abroad. Students will continue to hone their abilities on the following instruments: Marching Percussion, Concert Percussion, Drum Set and Auxiliary Percussion. The lab will perform at both the winter and spring instrumental concerts. Some after-school rehearsals may be required.

Percussion experience

MUSIC DEPARTMENT (CONT'D.)

MODERN MUSIC MAKING

Credit: 0.5

755 | GRADE 9-12

This course is designed for students interested in exploring popular music styles such as pop, rock, funk, ska, and hip-hop. Students may form ensembles to rehearse and perform covers or compose original songs, or they may focus on studio recording, live sound, or the business side of music. Playing an instrument is not required—students can participate as performers, sound engineers, or managers. Emphasis is placed on creativity, collaboration, and developing practical skills for making and sharing modern music.

MUSIC THEORY, ADVANCED PLACEMENT

Credit: 1

760 | GRADE 10-12

This course is designed to provide an intensified study of music. Music composition, listening skills and some music history will be included in this course. Students majoring in music, as well as students who have an interest in music study are encouraged to enroll. Although students who enroll in this course should have a strong interest in music, it is not necessary to have an instrumental or vocal background.

! **Prerequisite: Teacher recommendation required**

SCIENCE DEPARTMENT

The Emmaus High School Science Department, through a diversity of course offerings, provides students with the knowledge and skills base needed to meet the PA Academic Standards in the following areas: Unifying Themes of Science, Inquiry and Design, Biological Sciences, Physical Science, Chemistry, Physics, Science Technology and Human Endeavors, Earth Sciences, Environment and Ecology, Technology Education, and Technology Design.

To meet the PA Academic Standards, each student should successfully complete at least one course in Biological Sciences and one course in Physical Sciences before the senior year at Emmaus High School.

SCIENCE PATHWAYS

9th Grade Honors Biology

9th Grade GSI → **10th Grade Biology or 10th Grade Honors Biology**

10th, 11th, and 12th Grade

If interested in a STEM career, it would be beneficial to complete at least 4 credits of science. These credits should include at least one course from each of the categories below. If you are not interested in a STEM career, consider taking the courses that most interest you.

Biology

- Anatomy & Physiology
- Botany
- Zoology
- Genetics Honors
- Microbiology Honors
- AP Biology

Earth & Environmental

- Environmental Science
- AP Environmental Science
- Geology of the National Parks
- Astronomy
- Advanced Astronomy
- Oceanography
- Meteorology

Physical Science

- Chemistry Matters
- Chemistry CP
- Chemistry Honors
- AP Chemistry
- Physics Matters
- Physics 1 CP
- Physics 2 CP
- Physics Honors
- AP Physics 1
- AP Physics 2
- AP Physics C: Electricity & Magnetism
- AP Physics C: Mechanics

Things to consider:

- Students must successfully complete 3.0 credits of science to graduate.
- One credit of Biology is required
- Some courses have prerequisites that must be taken before enrolling
- College bound students should familiarize themselves with admission requirements for individual colleges and choose courses accordingly

Science Pathways are a recommended guide for student program planning. They are not required pathways.

GLOBAL SCIENCE INQUIRY

Credit: 1

411 | GRADE 9 | NCAA

Global Science Inquiry is a 9th grade science course. The course is taught in an inquiry manner utilizing both scientific and engineering practices to address integrated concepts of earth science, life science, and physical science. Students will use problem solving and critical thinking to evaluate data, create simulations, and analyze scientific writing regarding change, adaptation, and ecology. This is a college preparatory course aligned to the Next Generation Science Standards. (Fulfills STEM requirement for graduation)

BIOLOGICAL SCIENCES

BIOLOGY 1

Credit: 1

417 | GRADE 10-12 | NCAA

This class provides an introduction into the study of general biology, starting from basic scientific concepts to biochemistry, and the natural laws that govern life and all living things. The course aims to improve student understanding of living things, from the tiny and simple to the complexities of plants and animals, ending with a basic understanding of ecology and the study of population dynamics. Students will complete the Keystone Exam at the end of this course.

Prerequisite: Successful completion of Global Science Inquiry

BIOLOGY 1, HONORS

Credit: 1

453 | GRADE 9-12 | NCAA

The students' understanding and appreciation for the living world will be enhanced through the study of general biology, starting from basic scientific concepts to biochemistry, and the natural laws that govern life and all living things. During the course, students are expected to develop the skills of an independent and collaborative learner, critical thinker, conscientious researcher, and problem-solver. Students will complete the Keystone Exam at the end of this course. (Fulfills STEM requirement for graduation)

Prerequisite: 8th Grade Science teacher recommendation or recommended 90% or better in Global Science Inquiry

ZOOLOGY

Credit: 0.5

432 | GRADE 10-12

This specialized second level biology course is intended for students wanting to pursue a passion for studying all animals. The course focuses on the classification of animal phyla where major characteristics, structures and anatomy, reproduction and life cycles, and evolutionary advancements will be discussed for each. Students will be taught the necessary anatomical terms and directions to perform multiple dissections. Students should have a solid understanding of basic biological principles, cellular structures, and evolution. (Fulfills STEM requirements for graduation.)

Prerequisite: Successful completion of Biology

BOTANY

Credit: 0.5

434 | GRADE 10-12

This specialized second-level biology course is intended for students wanting to pursue a passion for studying all plants. The course focuses on the classification of plant phyla where major characteristics, structures and anatomy, reproduction and life cycles, and evolutionary advancements will be discussed for each. Students will be taught the necessary microscope skills and dissection techniques. Students should have a solid understanding of basic biological principles, cellular structures, and evolution. (Fulfills STEM requirements for graduation.)

Prerequisite: Successful completion of Biology

HUMAN ANATOMY/PHYSIOLOGY

Credit: 1

433 | GRADE 10-12 | NCAA

Specialized biology 2 class intended for students who want to pursue a career in the health or medical fields. Course includes in-depth study of anatomical terminology, histology, and various body systems (skeletal, muscular, nervous, integumentary, etc) as well as homeostatic diseases, diagnostic techniques, and treatments. Extensive microscope skills will be required to explore cells and tissues of the human body. Students will use models and preserved specimens of organs and systems to further their studies and dissection of a sheep eye occurs. (Fulfills STEM requirement for graduation)

Prerequisite:Recommended 75% or better in Biology or Biology Honors

GENETICS, HONORS

Credit: 0.5

458 | GRADE 11-12

Students apply biological concepts to gain in-depth knowledge of the foundations of genetics. Genetics explores Mendelian and Non-Mendelian principles of heredity. Students will explore human pedigrees and research genetic disorders. Laboratory investigations include use of living specimens including fast plant and/or fruit fly genetic studies and applications of biotechnologies. (Fulfills STEM requirement for graduation)

Recommended: 75% or better in any 1-credit Biology AND 1-credit Chemistry course

MICROBIOLOGY, HONORS

Credit: 0.5

459 | GRADE 11-12

Students apply biological concepts to gain in-depth knowledge of the foundations of microbes. Microbiology emphasizes microscopic organisms that impact health and ecology. Students will learn how viruses, bacteria, protists, and fungi are studied through proper aseptic techniques. Exploration of how to culture and identify bacteria will be the main focus of this course. Laboratory work includes advanced microscope skills, bacterial staining, growth controls, and identification. (Fulfills STEM requirement for graduation)

Recommended: 75% or better in any 1-credit Biology AND 1-credit Chemistry course

BIOLOGY, ADVANCED PLACEMENT

Credit: 2

461 | GRADE 10-12 | NCAA

AP Biology is an introductory college-level biology course designed to prepare students for the AP Biology Exam. Students cultivate their understanding of biology through inquiry-based investigations as they explore the following topics: evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and interactions. It is equivalent to a two-semester college introductory biology course for biology majors. 25 percent of the instructional time will be spent in hands-on laboratory work, with an emphasis on inquiry-based investigations that provide students with opportunities to apply the science practices. Students should have successfully completed high school courses in biology and chemistry. This course includes a summer assignment. (Fulfills STEM requirement for graduation)

Prerequisites: Recommended 80% or better in Biology, Honors and Chemistry 1, Honors, or 90% or better in Biology and Chemistry 1 CP

PHYSICAL SCIENCES

CHEMISTRY MATTERS

Credit: 0.5

404

This introductory chemistry course explores the fundamental concepts of chemistry through the lens of real-life applications and contexts. Students will gain foundational knowledge of key chemical concepts such as atoms, molecules, reactions, and the periodic table.This course aims to not only educate students about chemical principles but also to foster a deeper appreciation for the role chemistry plays in shaping the world around us. This course is suitable for all students interested in understanding the role of chemistry in their lives. (Fulfills STEM requirement for graduation)

CHEMISTRY 1, COLLEGE PREPARATORY

Credit: 1

421 | GRADE 9-12 | NCAA

Chemistry is a physical science that is known as the central science because it is a foundation for many science and technological fields such as engineering, environmental sciences, forensics, medicine, nursing, and all health fields. The course focuses on the composition, structure, behavior, and properties of matter and with the changes matter undergoes during, and as a result of, chemical reactions. It involves study of substances in all of the states of matter (solid, liquid and gas) and knowledge and understanding of the various structures of matter (incl. e.g. atoms, molecules, crystals and other aggregates) whether in isolation or in combination with others. Inquiry-based laboratory experiments will be used to explore these topics.(Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Algebra 1

* PROJECT- BASED CHEMISTRY 1, COLLEGE PREPARATORY

Credit: 1

421PB | GRADE 9-12

This course studies matter and energy through project-based learning and explanatory modeling. Through this course students will learn chemistry content in the context of real-life topics. Course content aligns to Next Generation Science Standards and includes atomic structure, energy, periodic law, chemical reactions, stoichiometry, solutions, kinetic molecular theory, gas laws, chemical bonding and nuclear chemistry. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Algebra 1

CHEMISTRY 1, HONORS

Credit: 1

452 | GRADE 9-12 | NCAA

Chemistry is a physical science that is known as the central science because it is a foundation for many science and technological fields such as engineering, environmental sciences, forensics, medicine, nursing, and all health fields. The course focuses on the composition, structure, behavior, and properties of matter and with the changes matter undergoes during, and as a result of, chemical reactions. It involves study of substances in all of the states of matter (solid, liquid and gas) and knowledge and understanding of the various structures of matter (incl. e.g. atoms, molecules, crystals and other aggregates) whether in isolation or in combination with others. Inquiry-based laboratory experiments will be used to explore these topics. Students are expected at the honors level to work more independently and cover a greater depth of understanding of the topics. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 90% or better in Algebra 1 or successful completion of Algebra 2

CHEMISTRY, ADVANCED PLACEMENT

Credit: 2

463 | GRADE 10-12 | NCAA

This course is designed to be the equivalent of a first-year college chemistry course. It differs from the usual secondary course with respect to the amount of topics studied, the depth of study, the emphasis on calculations and the type and variety of laboratory work completed by the student. Laboratory work will include the use of sensitive balances, spectrophotometers, pH meters, and other analytical equipment. Unknown samples will be identified through analytical and qualitative chemistry. Each laboratory report will include a sophisticated analysis of the experiment. A summer assignment is required in this course. The course will prepare a student for the Advanced Placement Examination in Chemistry. (Fulfills STEM requirement for graduation)

Math Prerequisite: Recommended 90% or better in Algebra 2 CP OR 80% or better in Algebra 2 Honors

Science Prerequisite: Recommended 80% or better in Biology Honors AND 80% or better in Chemistry 1 CP or Honors

PHYSICS MATTERS

Credit: 0.5

405

This is an introductory course to physics using minimal mathematics. The topics include motion, energy, waves, sound, light, and electricity. This course is to give the students an understanding of real-life applications to the topics of the course. (Fulfills the STEM requirement for Graduation.)

Prerequisite: Successful completion of Algebra 1

PHYSICS 1, COLLEGE PREPARATORY

Credit: 1

425 | GRADE 10-12 | NCAA

Students will learn to mathematically analyze forces, motion, momentum, work, and energy. This algebra-based introduction to physics will include fundamental explanations of motion, including graphs and algebraic analysis of real-world applications. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Algebra 2 CP AND concurrent enrollment in Geometry, CP

PHYSICS, HONORS

Credit: 1

455 | GRADE 10-12

This course covers topics of motion, Newton's laws, circular motion, energy, and rotational motion to a higher mathematical analysis than CP, but not to the extent of AP Physics 1. This course is intended for the student who prefers a higher scope and sequence than CP, but not as high as AP Physics. This course does not cover all topics in AP Physics 1 and does not prepare the student to take the AP Physics 1 Exam. This course can be used as a prerequisite for AP Physics 2 and C. (Fulfills the STEM requirement for Graduation.)

Recommended 80% or better in Algebra 2 CP AND 80% or better in Geometry CP

SCIENCE DEPARTMENT (CONT'D.)

PHYSICS 1, ADVANCED PLACEMENT

Credit: 1.5

464 | GRADE 10-12 | NCAA

Students will cultivate their understanding of physics through inquiry-based and data analysis investigations as they explore these topics: kinematics, dynamics, circular motion and gravitation, energy, momentum, simple harmonic motion, torque and rotational motion. Students will have opportunities to demonstrate the foundational physics principles and apply science practices. The student will be prepared to take the AP Physics 1: Algebra Based Exam. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Algebra 2, 80% or better in Geometry AND concurrent enrollment in Precalculus

PHYSICS 2, COLLEGE PREPARATORY

Credit: 0.5

428 | GRADE 10-12 | NCAA

This laboratory-based course will focus on new concepts which are not included in Physics 1 CP, Honors, and Physics 1 AP. This course is intended for the student who has an interest in physics and wants to learn more about the subject. Topics will include Electricity, Magnetism, Waves, and Optics. Students will NOT be prepared to take any AP Physics Exam at the end of the course. (Fulfills STEM requirement for graduation).

Prerequisite: 70% or better in Physics 1 CP OR concurrent enrollment in Physics Honors OR any AP Physics course

PHYSICS 2, ADVANCED PLACEMENT

Credit: 1.5

470 | GRADE 10-12 | NCAA

Students will cultivate their understanding of physics through inquiry-based and data analysis investigations as they explore these topics: thermodynamics, electricity, magnetism, optics, and modern physics. Students will have opportunities to demonstrate the foundational physics principles and apply science practices. The student will be prepared to take the AP Physics 2: Algebra Based Exam. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Precalculus and AP Physics 1 OR 85% or better in Physics Honors

PHYSICS C: MECHANICS, ADVANCED PLACEMENT

Credit: 1

473 | GRADE 10-12

This course is for students who have a strong background in science and math. The topics in mechanics are comparable to a first-year calculus based college physics course taken by science and engineering students. The topics include motion, forces, energy, momentum, rotation, and gravitation. This course is a prerequisite for Electricity and magnetism. This course will prepare students for the AP Physics C exam in Mechanics. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended 80% or better in Precalculus with a recommended 80% or better in AP Physics 1 OR 90% in Honors Physics AND concurrent enrollment in Calculus

PHYSICS C: ELECTRICITY AND MAGNETISM, ADVANCED PLACEMENT

Credit: 1

474 | GRADE 10-12

This course is for students who have a strong background in science, math, and mechanics and taken by students studying science and engineering. The topics in electricity and magnetism are comparable to a first-year calculus based college physics course which includes Coulomb's law, circuits, magnetism, and induction. This course will prepare students for the AP Physics C exam in Electricity and Magnetism. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of AP Physics C: Mechanics OR 80% or better in AP Physics 1 OR 90% in Honors Physics AND concurrent enrollment in Calculus

ENVIRONMENTAL SCIENCE

ENVIRONMENTAL SCIENCE

Credit: 1

418DC | GRADE 10-12 | NCAA

Ecological principles and sustainability will provide the basis for exploring numerous environmental issues. Human impacts on the quality of air, water, and land will be discussed with the goal of helping students understand possible solutions to create a sustainable future world environment. The use of energy resources will include discussions of conservation and alternative energy sources. The production of waste, and potential solutions to our ever-growing accumulation of waste will be explored. The impacts of world and local population growth on environmental quality will be integrated throughout the course. (Fulfills STEM requirement for graduation)

Note: *Students may be able to take this course for undergraduate college credits through LCCC Dual Credit Program*

Prerequisite: Successful completion of Biology or Biology Honors

ENVIRONMENTAL SCIENCE, ADVANCED PLACEMENT

Credit: 1.5

468 | GRADE 11-12 | NCAA

The AP Environmental Science course is designed to engage students with the scientific principles, concepts, and methodologies required to understand the interrelationships within the natural world. The course requires that students identify and analyze natural and human-made environmental problems, evaluate the relative risks associated with these problems, and examine alternative solutions for resolving or preventing them. Environmental science is interdisciplinary, embracing topics from geology, biology, environmental studies, environmental science, chemistry, and geography. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Biology and successful completion or concurrent enrollment in Chemistry 1 CP

EARTH AND SPACE SCIENCE

ASTRONOMY

Credit: 0.5

408ADC | GRADE 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY | NCAA

Using an inquiry-based approach, students will gain an understanding of the basics of our solar system and the processes that shape it, including planets, constellations, moons, stars, telescopes, and galaxies. Students will get hands-on experiences using the planetarium and the observatory to gain an introduction to the night sky. (Fulfills STEM requirement for graduation)

Students may be able to take this course for undergraduate college credits through LCCC Dual Credit Program

ADVANCED ASTRONOMY, COLLEGE PREPARATORY

Credit: 1

422DC | GRADE 10-12 | NCAA

Students will apply concepts such as time, celestial motion, stellar evolution, and astrophysics, to gain a more in-depth understanding of the processes that shape our universe. This class will use the Planetarium and Observatory extensively throughout the course, incorporating multiple branches of science. (Fulfills STEM requirement for graduation)

Students may be able to take this course for undergraduate college credits through LCCC Dual Credit Program

Prerequisite: Recommended 75% or better in Algebra 2

OCEANOGRAPHY

Credit: 0.5

410ADC | GRADE 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY | NCAA

This course applies biology, chemistry, geology, and physics to our shorelines. Students will learn about the different ecosystems on our beaches, and how they help and are impacted by humans. Coral reefs, barrier islands, volcanic islands, and rocky shores are examples of these environments. Students will also learn how waves, currents, and tides support these ecosystems, and how humans can harness this energy as well. (Fulfills STEM requirement for graduation)

Note: *Students may be able to take this course for undergraduate college credits through West Chester University's Dual Credit by Exam program. See page 11 for more information.*

METEOROLOGY

Credit: 0.5

412BDC | GRADE 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY | NCAA

This course is the study of the atmosphere. Included in this course will be a study of the Earth-Sun relations, atmosphere compositions, structure and circulation, elements and control of weather and air pollution. The use of meteorological instruments and the interpretation of weather maps will be an important part of this course. (Fulfills STEM requirement for graduation)

Note: *Students may be able to take this course for undergraduate college credits through West Chester University's Dual Credit by Exam program. See page 11 for more information.*

GEOLOGY OF THE NATIONAL PARKS

Credit: 0.5

414BDC | GRADE 10-12 OR CONCURRENT ENROLLMENT IN HONORS BIOLOGY | NCAA

This course is focused on the national parks of the United States and presents various geological concepts through these incredible places. By focusing on the parks, students will be given tools to help them become critical observers and participants in the Earth Sciences. Emphasis is placed on understanding and interpreting landscapes and their origin. This course will illustrate how geologic phenomena (mountains, volcanoes, earthquakes, etc.) result from processes that occurs within or on the surface of the Earth. There is also an opportunity to learn how humans and animals have been affected by geology and the national parks, which will help in appreciating natural science. (Fulfills STEM requirement for graduation)

Note: *Students may be able to take this course for undergraduate college credits through West Chester University's Dual Credit by Exam program. See page 11 for more information.*

PROJECT LEAD THE WAY (PLTW)

Project Lead the Way (PLTW) courses provide students with a rigorous and innovative Science, Technology, Engineering, and Mathematics (STEM) education curricular programs at the high school level. Developed by PLTW teachers, university educators, engineering professionals and school administrators, the program empowers students by placing student in the role of an engineer. The program's courses engage students in compelling, real-world challenges that help them become better collaborators, problem solvers, and critical thinkers. Students take from the courses in-demand knowledge and skills they will use in high school and for the rest of their lives, on any career path they take. Students who complete PLTW coursework and the national end of course exam with high achievement could be eligible to receive college credits for a fee. Please see your school counselor for more information.

PLTW BIOMEDICAL PATHWAYS

Environmental Sustainability

Principles of Biomedical Science

Human Body Systems

Medical Interventions

Biomedical Innovation

PROJECT LEAD THE WAY (PLTW)

ENVIRONMENTAL SUSTAINABILITY (ES), HONORS

Credit: 1

954ST | GRADE 10-12 | NCAA

Environmental Sustainability (ES), Honors is a high school level course that is appropriate for students who are interested in investigating and designing solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. Students will research and design potential solutions to these true-to-life challenges facing the world today. Students will apply their knowledge through hands-on activities and simulations. This course can be used to satisfy one science graduation credit. (Fulfills STEM requirement for graduation)

Prerequisite: Recommended completion of Principles of Engineering (POE), or Introduction to Engineering Design (IED), OR recommended successful completion in Biology 1 or Biology Honors, and interest in environmental/biological engineering

Recommended: 75% or better in any 1-credit Biology AND 1-credit Chemistry course

PRINCIPLES OF BIOMEDICAL SCIENCE

Credit: 1

960ST | GRADE 9 -11

PLTW Principles of Biomedical Science (PBS) is a full-year introductory course of the PLTW Biomedical Science pathway. Students explore concepts of biology and medicine to determine factors that led to the death of a fictional person. While investigating the case, students examine autopsy reports, investigate medical history, and explore medical treatments that might have prolonged the person's life. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems.

Prerequisite: Successful completion of Biology 1, OR concurrent enrollment in Biology 1, Honors

HUMAN BODY SYSTEMS

Credit: 1

961ST | GRADE 10 -12

Human Body Systems provides foundational knowledge and skills in anatomy and physiology, clinical medicine, and laboratory research. Students examine the interactions of human body systems as they explore identity, power, movement, protection, and homeostasis. Exploring science in action, students build organs and tissues on a skeletal Maniken®; use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration; and take on the roles of biomedical professionals to solve real-world medical cases.

Prerequisite: Recommended 75% or better in Principles of Biomedical Science

Note: We will not be offering this class in 27-28 because students need prerequisites first

MEDICAL INTERVENTIONS

Credit: 1

962ST | GRADE 10 -12

Medical Interventions allows students to investigate the variety of interventions involved in the prevention, diagnosis, and treatment of disease as they follow the lives of a fictitious family. A "How-To" manual for maintaining overall health and homeostasis in the body, the course explores how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose, and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics. Each family case scenario introduces multiple types of interventions, reinforces concepts learned in the previous two courses, and presents new content. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. These interventions are showcased across the generations of the family and provide a look at the past, present, and future of biomedical science. Lifestyle choices and preventive measures are emphasized throughout the course as well as the important role that scientific thinking and engineering design play in the development of interventions of the future.

Prerequisite: Recommended 75% or better in Principles of Biomedical Science

Note: We will not be offering this class in 27-28 because students need prerequisites first

BIOMEDICAL INNOVATION

Credit: 1

963ST | GRADE 11 -12

Students in Biomedical Innovation apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent project and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

Prerequisite: Successful completion of all previous PLTW Biomedical courses

Note: We will not be offering this class in 27-28 because students need prerequisites first

SOCIAL STUDIES DEPARTMENT

The Emmaus High School Social Studies program is based on the Pennsylvania Academic Standards for History, Civics and Government, Economics, and Geography. History is the unifying discipline and includes designated strands of geography, civics, government relations, economics, political science, and contemporary issues. These strands provide students with the skills and knowledge necessary to make informed decisions. Skills include critical thinking and problem solving techniques, which lead to negotiation and resolution of social conflicts. Students should choose, with the help of parents, teachers, and school counselors, the program best suited to their abilities and future plans.

Note: All students are required to complete four credits of Social Studies. One of the credits also fulfills one of the two required credits in Arts/ Humanities.

As students select courses to fulfill the four- credit requirement, they must complete all of the following:

1. American Studies (American Studies 1 and 2 OR U.S History, Advanced Placement)
2. World Studies (World Studies; European History, Advanced Placement; or World History, Advanced Placement)
3. Government (Government and Economic Literacy, Government; U.S. Government, Advanced Placement; U.S. History, Advanced Placement; or Humanities)

AMERICAN STUDIES 1

Credit: 1

201 | GRADE 9 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore the time period leading up to the Civil War through The Great Depression. The incorporation of many perspectives and voices are studied in their historical context. The cause and effect relationships of historical events will be emphasized throughout the course through the applications of historical principles and concepts, as well as primary source analysis. Connections to current events will be highlighted to examine continuity throughout history through writing, presentation and debate.

AMERICAN STUDIES 1, HONORS

Credit: 1

250 | GRADE 9 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore the time period leading up to the Civil War through The Great Depression. The incorporation of many perspectives and voices are studied in their historical context. The cause and effect relationships of historical events will be emphasized throughout the course through the applications of historical principles and concepts, as well as primary source document analysis through writing, research, presentation and debate and highlight the methods used by historians to interpret the past.

AMERICAN STUDIES 2

Credit: 1

211 | GRADE 10 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore the history, global interactions, and changing patterns in the culture and people of the United States from World War II to 2010. Cause and effect relationships of historical events will be emphasized, as well as the everyday application of historical principles to current events. A focus on the analysis and application of primary sources will be interwoven into the course.

Prerequisite: Recommended successful completion of American Studies 1 (9th grade)

AMERICAN STUDIES 2, HONORS

Credit: 1

251 | GRADE 10 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore the history, global interactions, and changing patterns in the culture and people of the United States from World War II to 2010. Cause and effect relationships of historical events will be emphasized, as well as the everyday interpretation and application of historical principles and concepts. A focus on the research, analysis and interpretation of detailed primary sources as well as historical writing tasks will be interwoven into the course.

Prerequisite: Recommended successful completion of American Studies 1 (9th grade)

SOCIAL STUDIES DEPARTMENT (CONT'D.)

WORLD STUDIES

Credit: 1

224 | GRADE 11 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore world history from the Italian Renaissance to the present. Students will examine major world events from Europe, Africa, Asia, and Latin America; such as the age of exploration, the French revolution, the Industrial revolution, and the independence movements of African and Latin American nations, establishing connections between different regions of the world and between the past and present. Students will analyze major social, political, and economic events in the world using current events to establish connections to the past through various primary sources.

WORLD STUDIES, HONORS

Credit: 1

252 | GRADE 11 | NCAA

Through discussion, written response, and inquiry-based approaches students will explore world history from the Italian Renaissance to the present. Students will examine major world events from Europe, Africa, Asia, and Latin America; such as the age of exploration, the French revolution, the Industrial revolution, and the independence movements of African and Latin American nations, establishing connections between different regions of the world and between the past and present. Students will analyze major social, political, and economic events in the world using current events to establish connections to the past through various primary sources, research and academic articles.

GOVERNMENT AND ECONOMIC LITERACY

Credit: 1

235 | GRADE 12 | NCAA

This is a course designed to enable newly-emerging citizens to understand and participate in American society. For the government portion of the course, students analyze and discuss the function of government at the national, state and local levels, as well as the role of citizens in the political process. For the economics portion of the course, students explore basic economic theory and practical applications in everyday life including financial and economic literacy through real world examples. Current issues are interwoven into the curriculum to relate theory to practice

GOVERNMENT

Credit: 0.5

237DC | GRADE 12 | NCAA

Through discussion, debate, written-response and real world application, students will explore the basics of political theory and structure of the United States government and will assess the role of American citizenry in governmental structure. Major emphasis will be given to a study of the structure and operation of the U.S. government, a citizen's role in government, development and functions of political parties and civil liberties in society. Current issues will be interwoven into the curricular information to relate theory to practice.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.

ECONOMICS

Credit: 0.5

234 | GRADE 12 | NCAA

Students will analyze, discuss and apply basic knowledge of micro and macroeconomics. Major emphasis will be given to the economic way of thinking, market behavior, firm behavior in market economies, economic policy and consumer affairs. Students will utilize economic concepts to interpret policy actions. Current events will be interwoven into the curricular information to relate theory to practice.

Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.

PSYCHOLOGY

Credit: 0.5

236DC | GRADE 12 | NCAA

This is a course designed to introduce students to the basic concepts important to general psychology. Students will apply the experimental method to solve problems posed in class. Concepts such as history and systems of psychology, sensation and perception, memory, cognition, learning and common disorders will be introduced to students.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.

SOCIAL STUDIES DEPARTMENT (CONT'D.)

SOCIOLOGY

Credit: 0.5

238DC | GRADE 12 | NCAA

This is an introductory course that examines our complex social environment with special emphasis on the problems of everyday group living. Students will gain a better knowledge of human relationships and an understanding of why we act the way we do in different situations; student interests are to be considered for more in-depth research of a particular social problem. This course is intended to give the student a broad understanding of culture and society, and addresses topics including race, gender, and sexuality.

Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit Program.

Note: 11th grade students who have completed their American Studies and World Studies requirements may take this course.

U.S. HISTORY, ADVANCED PLACEMENT

Credit: 1

260 | GRADE 9-12 | NCAA

The AP U.S. History course focuses on the development of historical thinking skills and an understanding of content learning objectives organized around seven themes, such as identity, peopling, and America in the world. In line with college and university U.S. history survey courses increased focus on early and recent American history and decreased emphasis on other areas, the AP U.S. History course expands on the history of the Americas from 1491 to 1607 and from 1980 to the present. It also allows teachers flexibility across nine different periods of U.S. history to teach topics of their choice in depth. Students will read, analyze and discuss selected documents and selections from the major 20th century historians. Students will pursue independent projects, both oral and written, with emphasis on writing and research. Students will review the major concepts of U.S. history and prepare for the Advanced Placement Examination in U.S. History.

AMERICAN GOVERNMENT AND POLITICS, ADVANCED PLACEMENT

Credit: 1

262 | GRADE 10-12 | NCAA

The Advanced Placement course in American Government and Politics is designed to give students a critical perspective on politics and government in the United States. This course involves both the study of general concepts used to interpret American politics and the analysis of specific case studies. It also requires familiarity with the various institutions, groups, beliefs, and ideas that make up the American political reality. Further, students will learn to engage specific information critically to evaluate general propositions about politics and government. Students also learn to present basic data relevant to government and politics in sustained written arguments. Students will prepare for the Advanced Placement Examination in U.S. Government and Politics.

EUROPEAN HISTORY, ADVANCED PLACEMENT

Credit: 1

264 | GRADE 10-12 | NCAA

The AP European History course focuses on cultural, economic, political, and social developments. These focus areas provide context for understanding the development of contemporary institutions, the role of continuity and change in present-day society and politics, and the evolution of current forms of artistic expression and intellectual discourse. Students will be expected to critically read, write, view and analyze European History from 1450 to present. Included in this course will be how the art, music, literary, economic, social and political aspects of the various periods interact and impact history. Students will pursue independent projects aimed at the critical analysis of historical writings. Students will prepare for the Advanced Placement Examination in European History.

WORLD HISTORY, ADVANCED PLACEMENT

Credit: 1

265 | GRADE 10-12 | NCAA

World History, AP is a college-level non-western history (from 1200 C.E. to the present) course that relies on college-level texts, primary and secondary sources. This course is broken up into nine time periods with a focus on examining each time period through six themes interwoven throughout human history. Historical, political, social, economic, and religious developments will be covered through historical writing, essays, document based questions and objective evaluations and projects. Attention will be given to prepare students for the World History AP exam.

ECONOMICS, ADVANCED PLACEMENT

Credit: 1

266 | GRADE 10-12 | NCAA

This course is intended for selected students with a strong mathematical background, or who have shown evidence of superior academic ability. The purpose of this course is to give students a thorough understanding of the principles of economics that apply to our economic system. The course places particular emphasis on the study of national and international economic studies. It also places familiarity with both macro and microeconomics in developing a student understanding of economic performance measures. Students will be expected to read, analyze, and discuss both the primary and supplemental sources in addition to independent projects involving problem-solving situations. Students will prepare for the Advanced Placement Examinations in both micro and macroeconomics.

SOCIAL STUDIES DEPARTMENT (CONT'D.)

PSYCHOLOGY, ADVANCED PLACEMENT

Credit: 1

268 | GRADE 10-12 | NCAA

This is a rigorous and demanding course requiring students to have a strong work ethic, to read at a rigorous pace, and to complete a variety of writing based assignments. Students are expected to demonstrate strong writing and analytical skills. Statistical analysis will be introduced as well. This year-long Advanced Placement Psychology course follows the APA guidelines and is designed to introduce students to the systematic and scientific study of the behavior and mental processes of human beings and other animals. Students are exposed to the psychological facts, principles, and phenomena associated with each of the major sub-fields within psychology. Areas covered include but are not limited to: the history and systems of psychology; research methods; ethics; statistical analysis; sensation and perception; physical, social and emotional development; social psychology; and abnormal behavior and therapies. Upon completion of the course students may take the AP Psychology exam in May. This course requires a summer assignment.

! Prerequisite: Strong foundational skills in reading comprehension, analytical thinking, and writing are essential. Honors level course experience suggested

AFRICAN AMERICAN STUDIES, ADVANCED PLACEMENT

Credit: 1

269 | GRADE 10-12 | NCAA

AP African American Studies is an interdisciplinary elective course that examines the diversity of African American experiences through direct encounters with rich and varied sources. Students explore key topics that extend from early African kingdoms to the ongoing challenges and achievements of the contemporary moment. Upon completion of the course, students may take the AP African American Studies exam in May.

SENIOR HUMANITIES, HONORS

SOCIAL STUDIES: Credit: 1 **ENGLISH: Credit: 1**

950 | GRADE 12 | NCAA

Senior Humanities Honors is an interdisciplinary exploration of the ideas, works, and questions that have shaped human experience. Drawing from literature, philosophy, history, art, music, and other forms of expression, students examine how people have understood themselves and their world across time.The course includes assigned summer reading requirements.

Students will:

- Read and discuss significant works from the ancient, medieval, and modern worlds
- Explore philosophical, cultural, historical, and ethical questions
- Analyze literature, art, music, and other forms of cultural expression
- Develop sophisticated critical-thinking and problem-solving skills
- Write analytically and reflectively across disciplines
- Conduct interdisciplinary research and synthesize sources
- Collaborate on complex projects and presentations
- Develop visual, musical, and cultural literacy

Course focus: Connecting literature, history, philosophy, art, and culture to explore enduring questions about the human experience.

! Prerequisite: Application required

SPECIAL EDUCATION DEPARTMENT

PATHWAYS TO POSSIBILITIES

Secondary transition skills are of paramount importance in facilitating successful employment outcomes for individuals post high school graduation. These skills encompass a wide range of abilities, including communication, problem-solving, time management, and self-advocacy, which are essential for navigating the complexities of the job market and workplace. Equipping students with these skills not only enhances their employability but also fosters independence, self-confidence, and the ability to adapt to evolving career opportunities. Moreover, for individuals with disabilities, these skills are particularly crucial as they can bridge the gap between academic learning and real-world employment, ultimately promoting inclusivity and equal access to meaningful work opportunities. In sum, the cultivation of secondary transition skills is a cornerstone in empowering graduates to embark on fulfilling career paths and lead self-sufficient lives beyond their high school years.

HORNET PERKS COFFEE SHOP

Credit: 1

ZPERK | GRADE 9-12+

Through an emphasis on career readiness preparation, soft and trade aligned skills are folded into the establishment and implementation of a fully functioning school based-coffee shop called the Hornet Perks. Students will have the opportunity to generalize core standards-based Math, Science, and English skills in functional ways that allow the demonstration of core-content skill acquisition as detailed in each students' individualized education plan. Students will also have opportunities to problem solve and engage in collaborative team-based activities that culminate in the successful implementation of a school-based coffee shop modeled after industry standards for implementation. Ongoing assessment of student skills, strengths, and interests will support future career exploration.

STUDY SKILLS

Credit: 1

ESSTUDY | GRADE 9-12+

This course is designed to help students develop effective study skills and strategies that promote confidence, independence, and success across content areas. Students are introduced to a variety of learning strategies and modalities to identify the methods that best support their individual learning needs. Through guided practice and individualized support, students build confidence in their ability to approach academic tasks, make informed choices, recognize strategies that work best for them, and increasingly manage their learning independently. Emphasis is placed on developing transferable skills, self-advocacy, and consistent study habits.

MATH LAB

Elective

Credit: 1

ZMALAB

In this course, grade level standards will be reviewed and practiced, providing students additional time and direct instruction in the area of general math and Algebra.Students are placed in this course based on individual student data and scheduled as available. This course can be taken multiple times, as needed.

ENGLISH LAB

Credit: 1

ZENLAB | GRADE 11-12

In this course, grade level standards will be reviewed and practiced, providing students additional time and direct instruction in the area of English. Students are placed in this course based on individual student data and scheduled as available. This course can be taken multiple times, as needed.

EXECUTIVE SKILLS DEVELOPMENT

Credit: 1

ZXSD

This course is designed to develop students' executive functioning skills, including organization, time management, planning, and self-monitoring, as a foundation for sustained academic achievement. Instruction is individualized to support the acquisition of core content skills while fostering effective, student-specific study habits. Students are introduced to a range of learning modalities in order to identify and apply the strategies best suited to their individual learning profiles, with an emphasis on skills that transfer across academic disciplines.

HORNET CAREER EXPLORATION

Credit: 1

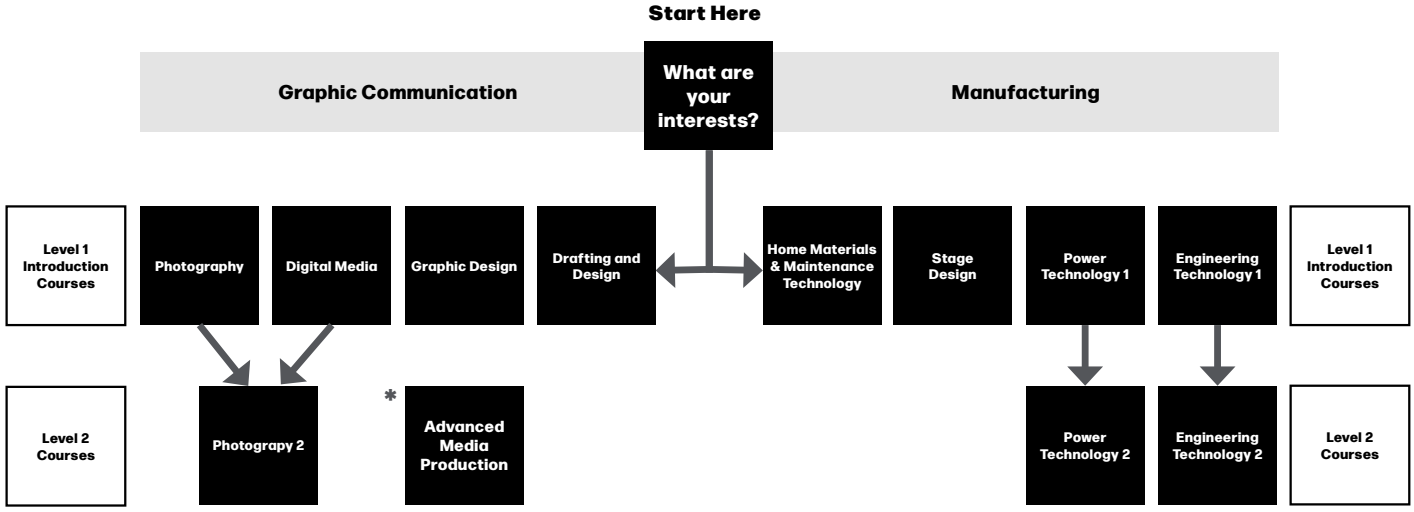
ZCAREX | GRADE 9-12+

Through an emphasis on career readiness preparation and ongoing transition assessment, soft and vocational skills are folded into a variety of identified Emmaus High School Academic Department specific job simulated opportunities. Academic and Functional skill acquisition and generalization opportunities are provided as students explore career specific pathways detailed within each participating academic department. Technology, Art, Business, Athletics, Family and Consumer Science, and the Science Department provide vocational opportunities for students to explore. The career connections seminar component provides the platform for resume writing, interview preparation, financial literacy and reflection on pathway exploration. Skills, strengths, and interests are continually assessed providing critical information to IEP teams to support potential postsecondary outcomes.

TECHNOLOGY AND ENGINEERING EDUCATION DEPARTMENT

Technology and Engineering are vital parts of our everyday lives. Everything from the construction of our homes to the most advanced computer systems on the planet rely on technological design processes to create the world around us. The Technology and Engineering Education Department at Emmaus High School provides students with a wide range of opportunities. The hands-on courses focus on project based learning experiences in the areas of photography, graphic communications, materials and processes, transportation, drafting and architecture. In addition to our Technology Education courses, we are also part of Project Lead the Way (PLTW). In this pathway, students gain an exposure to civil engineering, architecture, electronics, robotics and product development. Students learn about problem solving, leadership and teamwork in these exciting courses.

TECHNOLOGY AND ENGINEERING EDUCATION PATHWAYS



Note: *Teacher recommendation may be required to move on to a level 2 courses.*

** Application required.*

DRAFTING AND DESIGN

Credit: 0.5

920 | GRADE 9-12

This is an introductory course to mechanical drawing, CAD drafting, and 3D modeling. In the first part of this course, the students will learn how to use drawing instruments to create basic mechanical drawings. The second part of the course will include instruction in AutoCAD. The students will develop technical and architectural drawings using this software. In the last part of the course, the students will work with 3D modeling software to create isometric and orthographic drawings, along with modeling three-dimensional figures. Throughout the course, students will develop projects that will utilize our laser cutter and 3D printers. (Fulfills STEM requirement for graduation)

DIGITAL MEDIA

Credit: 0.5

901 | GRADE 9-12

This is an introductory course giving the student a basic understanding of the production of new media, the communication and display of information, and the development of interactive applications. The students will use critical and innovative thinking skills to produce meaningful and relevant digital media in the areas of photography, graphic design, video production and web design. Emphasis will be placed on the importance of illustration, design and layout, and creativity. Process learning and problem solving are key points in this class. (Fulfills STEM requirement for graduation)

PHOTOGRAPHY 1

Credit: 0.5

904 | GRADE 9-12

Students will be exposed to digital photography and its technological impact in media today. Film concepts will be applied to the world of digital photography. Adobe Lightroom and Adobe Photoshop will make digital images come to life. Emphasis is placed on composition, lighting techniques and studio lighting. Students will develop an understanding and appreciation for digital photography's impact in today's ever changing digital society. (Fulfills STEM requirement for graduation)

PHOTOGRAPHY 2

Credit: 0.5

905 | GRADE 10-12

Photography 2 expands on the core principles of photography that were taught in Photography 1. Students will learn how to work in a studio environment, advanced Photoshop techniques, and professional skills from working with clients to planning photo shoots. This course focuses on the technical and business aspects of photography while still encouraging creative thinking and problem-solving.

! Prerequisite: Teacher recommendation AND successful completion of Photography 1 or Digital Media

TECHNOLOGY AND ENGINEERING EDUCATION DEPARTMENT (CONT'D.)

ENGINEERING TECHNOLOGY 1

Credit: 0.5

906 | GRADE 9-12

This course is divided into two areas of study. The first area covers basic electricity and electronics. The topics covered will be electrical theories and practices, electrical and electronic experiments, and the construction of electronic projects. The second area covers creative problem solving and experimentation through the use of the Engineering Design Process.This unit will include a study of robotics, gear ratios, electrical wiring, and sheet metal fabrication. The material in this course is presented through lecture, demonstration, and hands-on activities. Careers and occupations in the various fields of technology are explored. (Fulfills STEM requirement for graduation)

ENGINEERING TECHNOLOGY 2

Credit: 0.5

907 | GRADE 9-12

In the first part of this course, students will learn how to operate CNC machines. Emphasis will be placed on design, programming, and running part programs. Students will also learn and apply finishing techniques using various materials. The second part of this course allows a greater exploration of engineering studied in Engineering Technology 1. Students will investigate the principles of automotive design and safety and the forces involved in a front impact crash. Students will be challenged to design and fabricate a model crash test car that can protect the driver in a front-end impact. Material will be presented with a hands-on problem-solving approach. Related careers and occupations will be explored. (Fulfills STEM requirement for graduation)

Prerequisite: Successful completion of Engineering Technology 1

POWER TECHNOLOGY 1

Credit: 0.5

908 | GRADE 9-12

This course explores energy, power, and transportation systems through three basic areas of study. The first area is external combustion engine theory and operation. A pulsating water engine boat is designed, fabricated, and tested with an emphasis on sheet metal fabrication skills. The second area of study is internal combustion engine theory and operation. A four cycle engine is disassembled; components and systems will be studied and evaluated, reassembled and test-run. The third area of study covers alternative forms of transportation through the design, fabrication, racing, and evaluation of an electric powered dragster. The material is presented through lectures, demonstrations, and hands-on lab activities. Related careers and occupations will be explored. (Fulfills STEM requirement for graduation)

POWER TECHNOLOGY 2

Credit: 0.5

909 | GRADE 9-12

This course is an extension of Power Technology 1. Self-directed areas of study may include alternative forms of energy and transportation, small engine maintenance and repair, and gear train analysis which will be presented in a hands-on problem solving approach. Students will fabricate and test an electric motor, focusing on electromagnet and electric motor theory and operation. The final project involves engineering teams designing, fabricating and testing an electric powered pulling tractor or hill climb vehicle. Sheet metal fabrication skills build on skills learned in Power Technology 1. Related careers and occupations will be explored. (Fulfills STEM requirement for graduation)

Successful completion of Power Technology 1

GRAPHIC DESIGN

Credit: 0.5

915 | GRADE 9-12

This is an introductory course to the concepts of Graphic Design. Emphasis is placed on the design process, digital design, screen printing, offset lithography and the production of online content. Experiences include layout and design, computerized layout composition, digital imagery, vector graphics, and dye sublimation printing. (Fulfills STEM requirement for graduation)

ADVANCED MEDIA PRODUCTION

Credit: 1

923 | GRADE 10-12

This course provides experienced students with an opportunity to apply and expand their skills through authentic, multidisciplinary media production and specialized areas of study. Students will pursue specialized media projects based on individual interests in areas such as photography, graphic design, digital media, print production, video, marketing, copywriting, or other forms of visual and written communication. Through collaborative and independent projects, students develop skills in designer/client relationships, project management, creative problem solving, effective communication, content creation, and professional media production. Students will also be part of school-wide projects, including yearbook production, and other projects. Students will be collaborating in photography, graphic design, visual and written storytelling, copywriting, interviewing, editing, marketing, and publication while managing real-world production schedules and deadlines. (Fulfills STEM requirement for graduation)

Prerequisite: Admission by application

STAGE DESIGN

Credit: 0.5

925 | GRADE 9-12

The Stage Design course introduces students to a variety of "behind the scenes" activities as they learn to integrate set design, construction, painting, lighting, sound, special effects, and stage management for stage performances. Teamwork and collaboration will be emphasized in all aspects of technical theater, specifically with respect to set change choreography. Course content includes scale drawing and modeling, set construction techniques, scenic painting, sound and light board operation, and lighting design. Safety will be emphasized and practiced on stage and in the scene shop. The course offers optional extracurricular opportunities for students to participate in Emmaus High School's stage productions. (Fulfills STEM requirement for graduation)

HOME MAINTENANCE AND MATERIALS TECHNOLOGY

Credit: 0.5

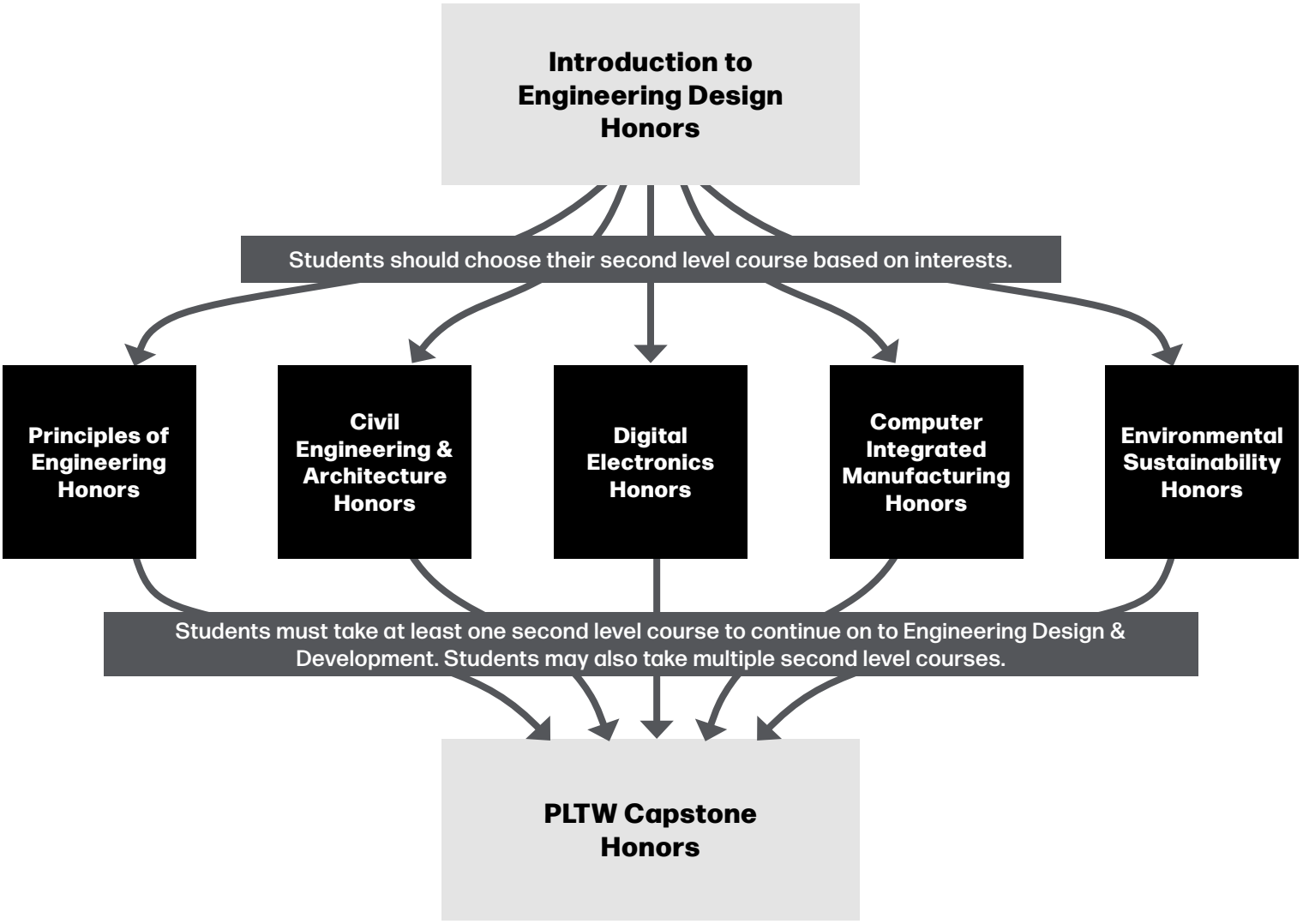
930 | GRADE 9-12

For many of our students, the investment of purchasing a home will be the largest financial investment they make and this course will help prepare our students to become better prepared to maintain and repair that investment. This course is a practical study of basic home maintenance repairs and renovations in electrical, plumbing, construction, and landscaping. Students will be learning how to use many different tools in an authentic, real-world situation. The tools will be introduced to the students as they are needed to perform the tasks in electrical, plumbing, construction, and landscaping. Safety is a major theme of this course and regardless of the topic, students will be learning how to safely use tools to perform the maintenance or repair. Students will be required to complete projects in this course that range from Do-It-Yourself videos to small fabrication projects. (Fulfills STEM requirement for graduation)

PROJECT LEAD THE WAY (PLTW)

Project Lead the Way (PLTW) courses provide students with a rigorous and innovative Science, Technology, Engineering, and Mathematics (STEM) education curricular programs at the high school level. Developed by PLTW teachers, university educators, engineering professionals and school administrators, the program empowers students by placing student in the role of an engineer. The program's courses engage students in compelling, real-world challenges that help them become better collaborators, problem solvers, and critical thinkers. Students take from the courses in-demand knowledge and skills they will use in high school and for the rest of their lives, on any career path they take. Students who complete PLTW coursework and the national end of course exam with high achievement could be eligible to receive college credits for a fee. Please see your school counselor for more information.

PROJECT LEAD THE WAY PATHWAYS



PROJECT LEAD THE WAY (CONT'D.)

INTRODUCTION TO ENGINEERING DESIGN (IED), HONORS

Credit: 1

950ST | GRADE 9-12

Introduction to Engineering Design (IED), Honors is a high school level course that is appropriate for students who are interested in design and engineering. The major focus of the IED course is to expose students to the design process, research & analysis, teamwork, communication methods, global & human impacts, engineering standards and technical documentation. IED gives students the opportunity to design solutions to a variety of problems using 3D modeling software and use of an engineering notebook to document their work. (Fulfills STEM requirement for graduation)

Note: Students who complete this course and the national end-of-course exam with high achievement may be eligible to receive college credit for a fee. Please speak with your teacher for more information.

PRINCIPLES OF ENGINEERING (POE), HONORS

Credit: 1

951ST | GRADE 10-12

Principles of Engineering (POE), Honors is a high school-level survey course of engineering. Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, robotics and automation. Students will develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation. (Fulfills STEM requirement for graduation)

! Prerequisites: Completed or concurrently enrolled in Algebra 2 Honors OR completed Algebra 2 CP with 80% or better, Successful completion of Introduction to Engineering Design (IED)

Note: Students who complete this course and the national end-of-course exam with high achievement may be eligible to receive college credit for a fee. Please speak with your teacher for more information.

DIGITAL ELECTRONICS (DE), HONORS

Credit: 1

952ST | GRADE 10-12

Digital Electronics (DE), Honors is a high school level course that is appropriate for students who are interested in utilizing applied logic in digital circuitry and devices. Students explore the foundations of computing by engaging in circuit design processes to create combinational logic and sequential logic (memory) as electrical engineers do in industry. This course requires the student to have a solid background in Algebra. Algebraic rules, laws and theorems will be used to manipulate and simplify logic expressions. Some topics include: Basic Electron Theory, Simple Circuits, Ohm's Law, Capacitance, Frequency, Number Systems, Gates, Combinational Circuit Design, Binary Addition, Flip-Flops, Shift Registers and Counters, Families and Specifications, and Microprocessors. (Fulfills STEM requirement for graduation) Prerequisite: Successful completion of Principles of Engineering (POE) or Introduction to Engineering Design (IED)

! Prerequisite: Successful completion of Introduction to Engineering Design (IED)

Note: Students who complete this course and the national end-of-course exam with high achievement may be eligible to receive college credit for a fee. Please speak with your teacher for more information.

CIVIL ENGINEERING AND ARCHITECTURE (CEA), HONORS

Credit: 1

953ST | GRADE 10-12

Civil Engineering and Architecture (CEA), Honors is a high school level course that is appropriate for students who are interested in learning the inter-relationship and mutual dependence of the civil engineering and architecture. Students learn important aspects of building and site design and development, and then they apply what they know to design a commercial building. By the end of the course, students will be able to present a comprehensive plan including three-dimensional renderings of buildings, building improvements, zoning and ordinance constraints, infrastructure requirements, and other essential project documentation. (Fulfills STEM requirement for graduation)

! Prerequisite: Successful completion of Introduction to Engineering Design (IED) OR completion of Drafting Design with Drafting teacher's recommendation

Note: Students who complete this course and the national end-of-course exam with high achievement may be eligible to receive college credit for a fee. Please speak with your teacher for more information.

ENVIRONMENTAL SUSTAINABILITY (ES), HONORS

Credit: 1

954ST | GRADE 10-12 | NCAA

Environmental Sustainability (ES), Honors is a high school level course that is appropriate for students who are interested in investigating and designing solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. Students will research and design potential solutions to these true-to-life challenges facing the world today. Students will apply their knowledge through hands-on activities and simulations. This course can be used to satisfy one science graduation credit. (Fulfills STEM requirement for graduation)

! Prerequisite: Recommended completion of Principles of Engineering (POE), or Introduction to Engineering Design (IED), OR recommended successful completion in Biology (1 or Honors), and interest in environmental/biological engineering

PROJECT LEAD THE WAY (CONT'D.)

COMPUTER INTEGRATED MANUFACTURING (CIM), HONORS

Credit: 1

955ST | GRADE 10-12

The purpose of this course is to teach the fundamentals of computerized manufacturing technology. It builds on the solid modeling skills developed in the introductory courses. Students use 3-D computer software to solve design problems. They assess their solutions through mass property analysis (the relationship of design, function and materials), modify their designs, and use prototyping equipment to produce 3-D models. The course includes the following concepts: Computer modeling with 3-D software for property analysis; Computer Numerical Control (CNC); Computer-Aided Manufacturing (CAM); Rapid Prototyping; Robotics; Flexible Manufacturing Systems; Programmable Logic Control; CIM Cell Construction. (Fulfills STEM requirement for graduation)

! Prerequisite: Successful completion of Introduction to Engineering Design (IED)

Note: Students who complete this course and the national end-of-course exam with high achievement may be eligible to receive college credit for a fee. Please speak with your teacher for more information.

PLTW CAPSTONE, HONORS

Credit: 1

957ST | GRADE 12

PLTW Capstone, Honors is the final course in the PLTW high school engineering program. It is an open-ended engineering research course in which students work in teams to design and develop an original solution to a well-defined and justified open-ended problem by applying an engineering design process. Students will perform research to select, define, and justify a problem. After carefully defining the design requirements and creating multiple solution approaches, teams of students select an approach, create, and test their solution prototype. Student teams will present and defend their original solution to an outside panel. While progressing through the engineering design process, students will work closely with experts and will continually hone their organizational, communication and interpersonal skills, their creative and problem solving abilities, and their understanding of the design process. This is a high school level course that is appropriate for 12th grade students. It should be taken as the final capstone PLTW course, since it requires application of the knowledge and skills introduced during the PLTW foundation courses and is appropriate for students who are interested in any technical career path. (Fulfills STEM requirement for graduation)

! Prerequisite: Successful completion of Introduction to Engineering Design (IED) and one or more additional PLTW courses

WELLNESS/FITNESS DEPARTMENT

Wellness/Fitness is designed to expose students to a variety of physical activities throughout the course. With the exposure to activity options, students can establish exercise preferences and make independent choices based on personal enjoyment. This will hopefully translate into a continuation of being physically active throughout their lifetime. Course units include: lifetime fitness, mindfulness, racquet sports, team sports, and weight training.

The ultimate goals of this program are to maximum participation and enjoyment, and to gain an understanding of the value physical activity has on mental and physical health. Students must pass a minimum of 3 courses in wellness/fitness during years 9th, 11th and 12th grades. Aquatics will be in 10th grade.

PARTICIPATION

The ultimate goals are maximum participation and enjoyment, and an understanding of the value of physical fitness in adult life.

Students are required to select one course in Wellness/Fitness each year. During the 9th, 10th, 11th and 12th grades, students must pass a minimum of 3 courses in wellness/fitness and 1 course of aquatics, as well as .50 credits in health in order to graduate.

Students must furnish their own athletic attire and/or swim suits, towels, bathing caps, nose clips, ear plugs, and goggles as necessary. Appropriate athletic attire consists of a shirt and shorts that are compliant with the EHS dress code. Appropriate bathing suits for females are a one piece or a tankini.

The safety of our students is foremost in our teachers' minds. Footwear must be sneakers that are athletic in nature with a closed front and back. Sneakers must be tied and laced as designed by the manufacturer. No platform/elevated soles will be permitted.

Showers after classes are available. Students taking aquatics are strongly encouraged to shower before and after entering the pool. All students are responsible for putting their equipment and valuables into their lockers and locking them. Each student will be issued a school combination lock. The replacement cost of a lost lock is $10.00.

WELLNESS/FITNESS DEPARTMENT (CONT'D.)

CO-ED COURSES

CE1	CE2	CE4	CE5	CE7	CE10	CE9	CE11
9th Grade Wellness/ Fitness	10th Grade Aquatics	10th Grade Aquatics, Adaptive	11th/12th Grade Wellness/ Fitness	Adaptive Wellness/ Fitness	11th/12th Grade Advanced Wellness/ Fitness	Lifeguarding	Weight Training

AQUATICS

Credit: .25

CE2 | GRADE 10

This course is required by all students for one marking period. The course consists of water survival, Red Cross Basic strokes, basic water safety, snorkeling and water games. Students enrolled in this course can be of all different swimming abilities.

AQUATICS, ADAPTIVE

Credit: .25

CE4 | GRADE 10

This course is offered to those students with aquatic fears and limitations, and in need of an Individualized Educational Program (IEP). Students will be admitted to the program after screening by the staff and the student's IEP team.

ADAPTIVE WELLNESS/FITNESS

Credit: .25

CE7

This course is for students who are disabled and currently have an Individualized Education Program (IEP) and may be eligible for this adaption. The IEP team would determine the appropriateness of this service.

ADVANCED WELLNESS/FITNESS

Credit: .25

CE10 | GRADE 11-12

This course is designed for students who thrive on competition and want to push their athletic performance to the next level. Building on foundational fitness and sport skills, students will engage in higher-intensity training, advanced strategy, and structured competitive play across a range of team and individual sports (e.g., basketball, volleyball, soccer, badminton and Tchoukball). This course can be used as the graduation required Wellness/Fitness 11/12 (CE5) course.

! **Prerequisite: Teacher recommendation**

LIFEGUARDING

Credit: .25

CE9 | GRADE 10

The primary purpose of the American Red Cross Lifeguarding course is to provide entry-level lifeguard participants with the knowledge and skills to prevent, recognize and respond to aquatic emergencies and to provide life-saving skills. At the conclusion of the course, students are eligible to take the American Red Cross Lifeguard test for a fee determined by The American Red Cross. If a student fails to pass the Red Cross test and obtain their lifeguard certification (due to earning unsatisfactory marks on the Red Cross scoring rubrics), they may still pass this EHS course and earn credit for completing the course work. This course can be used as the graduation required aquatics course.

! **Prerequisite: Students must be 15 years of age on or before the last scheduled session of the course, or they will be ineligible for obtaining their Red Cross Lifeguard certification.**

If a student is not successful on the first attempt at the prerequisite skills (distance test), they only have one more opportunity to meet the prerequisites after sufficient rest, prior to the first scheduled class session.

If the student does not successfully perform any of the prerequisite skills, they are ineligible to participate in the class.

WEIGHT TRAINING

Credit: .25

CE11 | GRADE 11-12

This course introduces students to the fundamentals of safe and effective weight training. Students learn proper lifting technique, spotting procedures, and equipment safety while building strength using free weights, body weight and resistance machines. Emphasis is placed on developing sound training habits, including proper warm-up, form, and progression, so students can train safely and effectively both in and out of the weight room. Students will also learn basic principles of program design, such as sets, reps, and rest intervals, to help them build a foundation for lifelong strength training. By the end of the course, students will be able to demonstrate proper technique on core lifts and apply basic strength-training principles to their own fitness goals. This course can be used as the graduation required Wellness/Fitness 11/12 (CE5) course.

WELLNESS/FITNESS DEPARTMENT (CONT'D.)

HEALTH A

Credit: .25

HE9

This is the first half of a 2-part course that is provided to students during the 9th grade year. It is designed to provide students with the information and skills needed to make healthy lifestyle choices. The units covered in this course include Wellness, Substances and Communicable Diseases. Students will be actively engaged in various methods of learning in order to develop the skills necessary to exhibit and maintain positive behaviors. The goal of the course is for the students to apply what they have learned in order to make healthy lifestyle choices.

HEALTH B

Credit: .25

HE10

This is the second half of a 2-part course that is provided to students during the 10th grade year. It is designed to provide students with the information and skills needed to make healthy lifestyle choices. The units covered in this course include First Aid/CPR/AED, Nutrition and Diseases. Students will be actively engaged in various methods of learning in order to develop the skills necessary to exhibit and maintain positive behaviors. The goal of the course is for the students to apply what they have learned in order to make healthy lifestyle choices.

ADVANCED HEALTH

Credit: 0.5

HE6

Advanced Health is an experience and discussion- based class that uses a variety of activities, project based learning, and authentic learning opportunities to discover the world of Health. Students interested in this course should be motivated to engage themselves in all discussions. Topics include but are not limited to: mental health, nutrition and nutritional choices of adults and the impact it has on health status, and examining issues relating to the use/non-use of drugs. Students will also have the opportunity to get certified in adult, child and infant First Aid and CPR. Guest speakers from a variety of health care fields, addiction recovery, and other life experiences may be incorporated into the course to provide authenticity. This course provides the opportunity for students to examine the health field with a deeper understanding. Students will have the opportunity to investigate a career they are interested in through an interview and possible shadowing experience.

! **Prerequisite: Successful completion of Health (HE9 and HE10)**

Note: Advanced Health is an elective and does not meet student graduation requirement for health.

WORLD LANGUAGE DEPARTMENT

The World Language Department strongly recommends that college-bound students study at least THREE, preferably FOUR, years of the same World Language. Students have the opportunity to complete five years of French, German or Spanish, and four years of Latin.

1. Students who receive an 80% or above in a level 1 World Language at the Middle School Level must move on to level 2 at the high school or choose a different level 1 World Language.
2. Beginning with Level 2 World Language courses, and continuing through levels 3, 4, 4 Honors, 5, and AP, the majority of classroom interactions will occur in the target language.
3. World language classes will resemble English classes in that they emphasize and focus on grammar, vocabulary, reading, writing, listening and speaking.
4. While students are encouraged to take three or four years of the same language, the world language courses are electives; world language is NOT required for graduation.

AMERICAN SIGN LANGUAGE

AMERICAN SIGN LANGUAGE 1

Credit: 1

GRADE 11-12

In this introductory sign language course, students will learn to master an array of signs and confidently engage in conversations using phrases and full sentences. Silent instructional videos throughout the sign language training course provide an immersion in the Deaf experience to showcase proper sign techniques, highlight the importance of facial expressions, and develop fluency for meaningful conversations in this expressive language. Throughout this online sign language training course, students will learn to fingerspell the alphabet, sign colors, numbers, objects, and family members. Students will acquire a wide range of useful, everyday vocabulary that will enable you to engage in meaningful conversations with members of the Deaf community. Using video demonstrations, students will understand how to form correct signs and incorporate facial expressions to communicate in sign language.

! **This is an asynchronous online opportunity only via LCCC (Fall semester). It is taken outside the school day but does count towards EHS graduation requirements but is not included in GPA calculation.**

FRENCH

FRENCH 1

Credit: 1

500 | NCAA

This course focuses on speaking and listening in a communication-oriented program. Students will acquire a solid linguistic foundation on which to build more advanced communication skills. Basic oral expression will be emphasized. By combining language and culture, students will strengthen their communication skills and expand their appreciation of French and Francophone cultures.

FRENCH 2

Credit: 1

510 | NCAA

This course reinforces the French language through authentic speech patterns and maintains an emphasis on communication skills for everyday situations. The students continue to develop an appreciation of the arts and a cultural awareness of daily life in French-speaking countries. Students are expected to use French as much as possible in the classroom.

! **Prerequisite: Recommended 70% or better in French 1**

FRENCH 3

Credit: 1

520 | NCAA

This course continues to reinforce the four skills of listening, speaking, reading, and writing. Students will build on the communicative foundation that was established in French 1 and 2, and will be expected to use the French language as much as possible in all classroom activities. French and Francophone culture will be integrated into most activities, and students will read several poems written by noted French and Francophone authors.

! **Prerequisite: Recommended 70% or better in French 2**

FRENCH 3, HONORS

Credit: 1

525 | NCAA

This course is an accelerated course designed to build upon the foundation of French 2 and prepare the student for French 4 Honors and the Advanced Placement program. In order to expand listening, speaking, reading, and writing skills, students will complete the normal French 3 curriculum, while working with authentic sources, giving short presentations, and completing required writing assignments. We will work towards the goal of communicating exclusively in French in the classroom.

! **Prerequisite: Recommended 80% or better in French 2 (or teacher recommendation).**

FRENCH 4

Credit: 1

530 | NCAA

This course continues the study of grammar and vocabulary, providing ample opportunity for oral/aural practice and comprehension. In addition to the basic text, supplemental readings, and cultural/conversational texts will be used for reading comprehension and to encourage writing. Students will read short stories written by selected French authors, as well as magazine and newspaper articles. Compositions and oral reports are in French.

! **Prerequisite: Recommended 70% or better in French 3**

WORLD LANGUAGE DEPARTMENT (CONT'D.)

FRENCH 4, HONORS

Credit: 1

550DC | NCAA

This course is an accelerated course designed to prepare the student for the Advanced Placement program. There will be required readings and writing assignments. French is the primary language in class. Students will make oral presentations and perform a variety of skits and/or plays. Authentic materials and novels will be used regularly. ***Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program***

Prerequisite: Recommended 80% or better in French 3

FRENCH 5

Credit: 1

540 | NCAA

This course will allow students to continue to improve their level of proficiency in the language by focusing on speaking, listening, reading and writing skills. Students will read short stories, poems and novels, will watch French films, and will listen to music in the target language. Vocabulary and grammar will be included in thematic units to encourage students to discuss and write about the course content. There will be an emphasis on several well-known French and Francophone authors.

Prerequisite: Recommended 70% or better in French 4 or French 4, Honors

FRENCH, ADVANCED PLACEMENT (LANGUAGE)

Credit: 1

560 | NCAA

This course is designed to achieve the highest possible degree of language proficiency. Students who take this course should already have a good command of grammar and considerable competency in listening, reading, writing and speaking. The course syllabus follows the standards set forth by the AP College Board, and reflects the three modes of communication- Interpretive, Interpersonal and Presentational- defined in the World Readiness Standards for Learning Languages, that are foundational to the course. Students will read and listen to authentic literary and informational texts, will write emails and essays, and will engage in both simulated conversations and presentational speaking. This course is taught entirely in French.

Prerequisite: Recommended 70% or better in French 4 or French 4, Honors

GERMAN

GERMAN 1

Credit: 1

502 | NCAA

German 1 focuses on speaking and listening with a grammar-supported, communication-oriented program. All activities will primarily develop speaking and listening skills with secondary emphasis on reading and writing. Students will acquire a solid linguistic base on which to build communication skills, while they develop a knowledge and appreciation of the German speaking world.

GERMAN 2

Credit: 1

512 | NCAA

German 2 reinforces and expands upon the four language skills of listening, speaking, reading, and writing. Students will build on the communicative foundation established in German 1. Students are expected to stay in the target language as much as possible. Students will begin reading and writing more at the German 2 level. German culture will be presented throughout every phase of language learning.

Prerequisite: Recommended 70% or better in German 1

GERMAN 3

Credit: 1

522 | NCAA

German 3 continues to reinforce and expand the four skills of listening, speaking, reading, and writing. Vocabulary and grammar topics increase in complexity throughout the year. The majority of instruction will be conducted in German, and students are expected to use German as much as possible. At the end of this course, students will decide whether to move on to German 4 or German 4, Honors.

Prerequisite: Recommended 70% or better in German 2

GERMAN 3, HONORS

Credit: 1

523 | NCAA

This course is an accelerated course designed to build upon the foundation of German 2 and prepare the student for German 4 Honors and the Advanced Placement program. In order to expand listening, speaking, reading, and writing skills, students will complete the normal German 3 curriculum, while working with authentic sources, giving short presentations, and completing required writing assignments. We will work towards the goal of communicating exclusively in German in the classroom.

Prerequisite: Recommended 70% or better in German 2

GERMAN 4

Credit: 1

532 | NCAA

German 4 is designed for students who do not plan on taking the AP German exam. The level of vocabulary and grammar instruction continues to become more complex, but students have more time to master the concepts than they would in the German 4 Honors course. There is an increased concentration on cultural topics in the German 4 classroom. Instruction will be conducted almost entirely in German.

Prerequisite: Recommended 70% or better in German 3

GERMAN 4, HONORS

Credit: 1

552DC | NCAA

This course is an accelerated course designed to prepare the student for the Advanced Placement program. There is a strong focus on current topics in the German speaking world as we explore advanced grammar and vocabulary. German is used almost exclusively in the classroom. ***Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program***

Prerequisite: Recommended 70% or better in German 3

WORLD LANGUAGE DEPARTMENT (CONT'D.)

GERMAN 5

Credit: 1

542 | NCAA

German 5 continues to work on the four language skills, with a strong emphasis on cultural topics, history, and literature. Some of the most advanced grammar and vocabulary topics are addressed, but they play a secondary role. This course is perfect for students who enjoy the language and culture, but who aren't looking for an intense exploration of grammar and vocabulary.

Prerequisite: Recommended 70% or better in German 4 or German 4, Honors

GERMAN, ADVANCED PLACEMENT (LANGUAGE)

Credit: 1

562 | NCAA

This course is designed to achieve the highest possible degree of proficiency. Students who take this course should already have a good command of grammar and considerable competency in listening, reading, speaking and writing. The course syllabus follows the standards set forth by the AP College Board, and reflects the three modes of communication- Interpretive, Interpersonal and Presentational- defined in the World Readiness Standards for Learning Languages, that are foundational to the course. Students will read and listen to authentic literary and informational texts, will write emails and essays, and will engage in both simulated conversations and presentational speaking. This course is taught entirely in German.

Prerequisite: Recommended 80% or better in German 4, Honors

LATIN

LATIN 1

Credit: 1

506 | NCAA

This course develops the student's ability to read and comprehend Latin through the systematic mastery of grammar and syntax. By emphasizing the relationship between the original Latin roots and English, the course gives students a better understanding and appreciation of their own language. The course covers history, religion, and literature of Rome to enhance the students' awareness of the contributions of the Romans.

LATIN 2

Credit: 1

516 | NCAA

This course continues and reinforces the principles of grammar and syntax as well as vocabulary introduced in the first year of Latin. Students read narrative accounts of a typical Roman family, gaining insights into Roman culture and customs. The same methodology is employed in mastering their relationship with the English vocabulary. Students gain additional expertise by translating sentences from English to Latin, and by learning appropriate and common Latin phrases, inscriptions, and mottoes.

Prerequisite: Recommended 70% or better in Latin 1

LATIN 3

Credit: 1

526 | NCAA

This course focuses upon advanced grammar, vocabulary and syntax, culminating with the reading of ancient authors. Students will use the linguistic foundations already established in the earlier levels to translate and analyze demanding passages of poetry and prose. Special emphasis will be placed on the relationship between the literature and the political and social events of Roman life.

Prerequisite: Recommended 70% or better in Latin 2

LATIN 4

Credit: 1

536 | NCAA

Latin 4 uses authentic Roman literature as a vehicle for learning new grammar concepts. in addition to language acquisition, students will make connections between literature and the sociopolitical climate of Rome's golden age which will foster an appreciation for ancient Mediterranean cultures and their influences on a global scale.The focus of the course is translation and interpretation of the works of ancient Romans as they apply to both the ancient and modern world.

Prerequisite: Recommended 70% or better in Latin 3

SPANISH

SPANISH 1

Credit: 1

504 | NCAA

This course focuses on communication through reading, writing, listening and speaking of the target language. Basic oral expression will be emphasized and students will produce meaningful and comprehensible language. There will also be a focus on Hispanic culture.

SPANISH 1 FOR NATIVE AND HERITAGE SPEAKERS

Credit: 1

514N

This course is designed for students who are being raised in homes where Spanish is spoken. While they may have never received any formal instruction in their heritage language, they have attained some level of oral proficiency and internalized some basic grammatical concepts. This course will expand upon the skills the heritage speakers already possess, as well as focus on challenging reading and writing assignments which will allow the students to explore their own cultures more fully. Admission to this course is flexible and can include LEP/ESL students as well as those enrolled in English GP or English/Reading. Eligible students should understand at least 80% of spoken Spanish.

SPANISH 2

Credit: 1

514 | NCAA

Students in Spanish 2 will continue to build on the communicative foundation established in Spanish 1, and will produce meaningful and comprehensible (target) language. Students are expected to use Spanish as much as possible in the classroom. Current information on Hispanic culture will be presented throughout every phase of language learning.

Prerequisite: Recommended 70% or better in Spanish 1

WORLD LANGUAGE DEPARTMENT (CONT'D.)

SPANISH 2 FOR NATIVE AND HERITAGE SPEAKERS

Credit: 1

524NDC

This course will continue to expand the skills learned in level one. More emphasis will be given to writing, listening and reading skills in Spanish, but expanding speaking skills beyond those learned in level 1 will be of great importance. Students will be challenged to think and express themselves in Spanish using the grammar and vocabulary learned through the use of the following instructional resources and activities: short films, movies, essays, readings, etc. Furthermore, students will explore topics that are relevant to the 21st century. Topics such as science and science fiction, TV and media, globalization and immigration will be discussed in Spanish. Spanish culture will also be an integral part of the course, allowing students to not only understand their own cultures, but also to examine the many cultural issues that affect the Spanish speaking world. Students who successfully complete this course will be eligible to take Spanish, Advanced Placement. ***Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program***

Prerequisite: Recommended 70% or better in Spanish for Native Speakers 1

SPANISH 3

Credit: 1

524 | NCAA

This course continues to reinforce and expand the four skills of listening, speaking, reading and writing. Students will produce meaningful and comprehensible written and spoken (target) language. Students will be expected to use Spanish as much as possible in all classroom situations. Spanish culture will be integrated into all activities.

Prerequisite: Recommended 70% or better in Spanish 2

SPANISH 3, HONORS

Credit: 1

527 | NCAA

This course is an accelerated course designed to build upon the foundation of Spanish 2 and prepare the student for Spanish 4, Honors and the Advanced Placement program. In addition to expanding listening, speaking, reading, and writing skills using textbook-related materials (such as ¡Avancemos! 2), students will work with authentic sources, give presentations, and complete required writing assignments. All classes will work towards the goal of communicating exclusively in Spanish in the classroom.

Prerequisite: Recommended 80% or better in Spanish 2 (or teacher recommendation).

SPANISH 4

Credit: 1

534 | NCAA

This course emphasizes listening, reading, writing and speaking skills in Spanish. Students will give presentations and write compositions and other assignments in Spanish. Students will read and listen to a variety of textbook-related and authentic sources.

Prerequisite: Recommended 70% or better in Spanish 3

SPANISH 4, HONORS

Credit: 1

554DC | NCAA

This course is an accelerated course designed to prepare the student for the Advanced Placement program. In addition to the material completed in the textbook, there will be required readings and frequent writing assignments. Students will make presentations and will read articles and listen to audio from a variety of sources. All classes will work towards the goal of communicating exclusively in Spanish in the classroom. ***Students may take this course for undergraduate college credits through Lehigh Carbon Community College's Dual Credit program***

Prerequisite: Recommended 80% or better in Spanish 3

SPANISH 5

Credit: 1

544 | NCAA

This course will continue the development of proficiency in speaking, listening, reading, and writing the Spanish language. Emphasis will center on the exclusive use of the language in the classroom. Students will present original dialogues using relevant vocabulary, and they will write original compositions and personal journals. Also, students will read and discuss excerpts from informational readings and Spanish literature, incorporating the historical and geographical concepts for these genres.

Prerequisite: Recommended 70% or better in Spanish 4 or Spanish 4, Honors

SPANISH, ADVANCED PLACEMENT (LANGUAGE)

Credit: 1

564 | NCAA

This course is designed to achieve the highest degree of language proficiency for students who choose to develop their abilities in Spanish for active communication, without special emphasis on literature. Students who enroll should have already attained a high degree of proficiency in listening comprehension, speaking, reading and writing. This course stresses oral skills, composition and grammar, and has the following objectives: the ability to comprehend formal and informal spoken Spanish; the acquisition of vocabulary, and a grasp of structure to allow the easy, accurate reading of relevant, current texts, as well as modern Hispanic literature; the ability to compose expository passages; the ability to express orally with accuracy and fluency. This course prepares the students for the Advanced Placement Examination.

Prerequisite: Recommended 80% or better in Spanish 4, Honors

LEHIGH CAREER & TECHNICAL INSTITUTE

LCTI prepares students for success in high school, college, and careers through career and technical education (CTE). CTE is a hands-on approach to learning that connects classroom instruction with career exploration, technical training, and real-world experience. At LCTI, students combine strong academics with practical, career-focused learning. They build technical skills, earn industry-recognized credentials, pursue college credit, explore careers, strengthen leadership skills, and gain experience in professional settings.

LCTI helps students graduate with a plan and a head start on their future. Whether their next step is college, an apprenticeship, workforce training, military service, or entering a meaningful career, students leave LCTI better prepared, more confident, and ready to pursue the pathway that fits their goals. CTE does not require students to choose between college and career preparation. It helps them prepare for both.

Operating with the support of all nine Lehigh County school districts, LCTI offers dozens of CTE programs taught by industry experts in five areas of study: Arts & Humanities, Business & Communication Technology, Engineering & Advanced Manufacturing, Health & Human Services and Industrial Technology. We are the largest career and technical school in Pennsylvania and, thanks to the support of our education and industry partners, among the best equipped nationwide. LCTI's campus is adjacent to Lehigh Carbon Community College in the Schnecksville section of North Whitehall Township and boasts a 450,000-square-foot facility outfitted with the latest software, tools and equipment

ENROLLMENT OPTIONS

Academic Center Full-day enrollment: The Academic Center offers full-day enrollment for students in grades 9-12 with the opportunity to take both their academic and career & technical coursework at LCTI . These rigorous college-prep academic courses will satisfy graduation requirements and complement each student's career & technical program. Students may also choose to enroll in any one of our eight dual credit courses, which can earn them up to 21 credits through Lehigh Carbon Community College toward an Associate's Degree. Students will still graduate from their resident school districts and are encouraged to participate in extracurricular activities back at their sending school. Students can register for the full-day program in the Academic Center by contacting their homeschool counselor and applying at lcti.org.

Half-day enrollment: Students in grades 9-12 may also choose the half-day enrollment option. The half-day option provides students with career & technical education at LCTI and the required academics at their respective school districts. Students are encouraged to take high-level coursework at the sending district, which will provide the academic background necessary to be successful in today's highly technical careers.

ACADEMIC CENTER COURSE OFFERINGS

All courses in the LCTI Academic Center are college-prep and meet graduation requirements. Courses are assigned based on classes completed at the sending district prior to attending LCTI. All science courses are lab-based. This rigorous, standards-aligned coursework, along with advanced technical instruction, helps students build the knowledge, skills, and confidence needed to succeed in college, apprenticeships, credential programs, military service, and the workforce. The courses offered in the Academic Center are listed below.

ENGLISH	MATHEMATICS	SCIENCE	SOCIAL STUDIES	OTHER
ELA I	**Algebra I**	**Principles of Scientific Inquiry**	**American Studies I**	
ELA II	**Algebra II**	**Biology**	**American Studies II**	**Wellness/ Fitness 11**
ELA III	**Geometry**	**Chemistry**	**World Cultures**	**Wellness & Fitness 12**
ELA IV	**Pre-Calculus Calculus**	**Physics I** **Environmental Science**	**The Responsible Citizen:** Government & Civics **The Responsible Citizen:** Economics & Personal Finance	
Dual Credit: LCCC ENG 105 - Research and Composition	**Dual Credit: LCCC MAT 160 - College Algebra**	**Dual Credit LCCC BIO 135 - Intro to Environmental Science**	**Dual Credit: LCCC GEO 110 - Cultural Geography**	**Dual Credit: LCCC HPE101 - Personal Community Health PED 143 Weight Training and Fitness**
Dual Credit LCCC ENG 106 - Introduction to Literature			**Dual Credit: LCCC PSC 141 - American Federal Government**	

LCTI ACADEMIC CENTER COURSE SCHEDULE 2027-2028

GRADE 9	
SEMESTER I	SEMESTER II
Math	
Science	
ELA I	
American Studies I	

GRADE 10	
SEMESTER I	SEMESTER II
Math	
Science	
ELA II	
American Studies II	

GRADE 11	
SEMESTER I	SEMESTER II
Math	
Science	
ELA III	
*World Cultures or *Wellness/Fitness	

GRADE 12	
SEMESTER I	SEMESTER II
ELA IV	
The Responsible Citizen: Government & Civics* AND The Responsible Citizen: Economics & Personal Finance*	
Wellness & Fitness	
Math or Science	

*Semester Course

LCTI ACADEMIC OPTIONS FOR HALF-DAY STUDENTS

Lehigh Career & Technical Institute (LCTI) provides academic courses to some half-day students depending on their sending district. It is very important for students to be successful in both their academic and technical coursework. The courses taken at LCTI are necessary to meet the student's graduation requirements. If a student does not complete an academic course with a passing grade, the course must be retaken. LCTI does not offer a summer school; however, this option may be available through the sending high school. If the student does not complete the coursework, graduation from high school may be jeopardized. T

he following academic courses for half-day students may be required while attending LCTI.

AMERICAN STUDIES II:

The American Studies II course addresses the development of the United States throughout the twentieth century. This course is aligned to the Pennsylvania Core Standards for Social Studies as well as Reading, Writing, and Listening and Speaking. Through various activities and lessons, these standards will be met to understand the development of the United States as a world power, focusing on economic and industrial development, political trends, society and cultural problems and achievements. Students will develop an understanding of technological progress and social groups. They will be expected to evaluate the changes of culture in society and analyze the political contributions of individuals and events of the periods studied. American Studies assignments also include the integrated concepts between this history course and various Career & Technical programs. Students will be assessed formally and informally to determine mastery of the content for the duration of the academic year.

WELLNESS & FITNESS:

Course Overview: The Wellness Program provides students with life-changing information on nutrition and stress-management techniques they can use throughout life. The most common mental disorders will be researched and students will receive training on suicide prevention. During nutrition, students will investigate the harmful ingredients found in the foods they eat on a daily basis, analyze products served by several fast food chains and research healthy alternatives.

The Fitness Program is designed to acquaint students with the benefits of physical activity in their lives and to promote lifelong wellness and fitness. The course, which is held in the state-of-the-art LCTI Fitness Center, will feature various strength and conditioning principles, such as specificity, progression and overload, along with multiple training techniques, such as CrossFit, Tabata, Yoga, and an assortment of technology-based exercises.

LCTI CAREER & TECHNICAL EDUCATION OPTIONS

At Lehigh Career & Technical Institute, students learn by doing. Teachers guide students from instruction to action, helping them tackle projects that mirror on-the-job challenges as they develop the knowledge and skills necessary to secure industry credentials, earn college credit or both. For example, marketing students manage a store on their way to earning National Retail Federation certification. LCTI programs are designated as either Program of Study (POS) or Career & Technical based on the postsecondary credit opportunities available to students. Students in POS programs may earn college credit through the statewide SOAR (Students Occupationally and Academically Ready) agreements while students in Career & Technical programs may earn college credit through local articulation agreements with participating postsecondary institutions.

LCTI's programs fall into five areas of study:

ARTS AND HUMANITIES

ADVERTISING DESIGN/COMMERCIAL ART:

Students will learn the latest Adobe graphic design software currently used in the professional workplace. The emphasis of the program is based on Adobe Photoshop, Illustrator and InDesign and creating a printed and electronic portfolio of work produced through these programs. Students are able to receive certification for Adobe Photoshop, Illustrator and InDesign through Adobe-endorsed Certiport. In addition to the Adobe Creative Cloud, students will learn traditional illustration skills such as pencil drawing and shading, watercolor, color pencil, scratchboard and various other mediums. Photography for advertising is used in class and students will learn the use of a Digital Single Lens Reflex camera and the setup of strobe lights. Students are able to concentrate in three different career objectives, which are Graphic Design, Sign-Making or Illustration. (POS)

EMERGING DIGITAL MEDIA & SOCIAL COMMUNICATIONS:

Social media is big business and video content is king. In our Emerging Digital Media program, students learn about the creative and technical processes that drive video production for multimedia platforms ranging from Snapchat and TikTok to YouTube and Netflix. They also explore deejaying and electronic dance music production as they master a variety of concepts, software and skills. (POS)

BUSINESS AND COMMUNICATION TECHNOLOGY

COMPUTER INFORMATION TECHNOLOGY:

Students will be at the forefront of cyber-security related issues as a means to safeguard sensitive data and preserve confidentiality. CIT challenges students to develop meaningful business solutions through computer programming in Visual Basic, C+, C#, and Java. Students learn to use data in order to produce information that moves organizations forward and solves problems.*This program participates in the IT Academy* (POS)

MARKETING & ENTREPRENEURSHIP:

Students learn about finance, retail marketing, banking, entrepreneurship, promotions and other important aspects of marketing through virtual business software and retail experience in the school's store. They examine what is necessary to run a business, promote a product or manage a department. Students gain practical experience through the student-managed school store and community internship opportunities. (POS)

PRINT TECHNOLOGY/GRAPHIC IMAGING:

Students creatively design printed materials such as full-color books, posters, packaging, displays, stationery, as well as specialty items like mugs and shirts. Using the most current versions of Adobe Creative Cloud software on Apple Macintosh computers, students then reproduce their attractive projects on state-of-the-art copiers, printing presses, and bindery machines in a real production environment. (POS)

WEB DESIGN/WEB PROGRAMMING:

Students learn the fundamentals related to web page design and website development, graphics, multimedia, and HTML coding. Students are taught the tools for rapid web page production and basic server-side programming techniques to handle everything from forms transmittal to building dynamic interactive web pages, intranet, extranet and e-commerce applications. *This program participates in the IT Academy* (POS)

ENGINEERING & ADVANCED MANUFACTURING

AUTOMATED INDUSTRIAL TECHNOLOGIES:

This program introduces students to the electrical, mechanical, and computerized systems that power modern automation. Students build, wire, program, test, and troubleshoot circuits, motors, sensors, fluid-power systems, robotics, and automated equipment using industry-style tools and equipment. Through hands-on projects, students learn to solve real-world problems, read blueprints and schematics, and work as part of a technical team. It is a great fit for students interested in robotics, advanced manufacturing, engineering, industrial maintenance, and technology careers that keep today's automated world moving. (POS)

ENGINEERING DRAFTING & DESIGN:

Students utilize computer-aided drafting and design software to create accurate representations of solutions to engineering design challenges. They hone their skills by designing and then producing three-dimensional models for machine parts, home additions, bridges and more. In the process, students learn to use 3D and wide-format printers, as well as common model-building materials. (POS)

PRECISION MACHINE TOOL TECHNOLOGY:

LCTI's Precision Machine program is recognized as a Haas Technical Education Center and incorporates lessons and demonstrations, as well as extensive applications training in reading blueprints, operating a digital lathe, milling machine, drill press and other machine shop operations in the curriculum. Students train on state-of-the-art CNC machine tools installed by Haas Automation. (POS)

LCTI CAREER & TECHNICAL EDUCATION OPTIONS (CONT'D.)

PRE-ENGINEERING & ENGINEERING TECHNOLOGY:

This pre-engineering program is a sequence of courses which, when combined with traditional mathematics and science courses, introduces students to the world of engineering. Students study the principles of engineering, engineering design, digital electronics and computer-integrated manufacturing. (POS)

SUPPLY CHAIN MANAGEMENT & LOGISTICS TECHNOLOGY:

In this program, students learn how products move from suppliers around the world to our local businesses and consumers. In LCTI's state-of-the-art 17,000-square-foot distribution center, students gain hands-on experience with receiving, inventory control, picking, packing, shipping, transportation, and warehouse operations. Students train with current industry technology, including hand-held track pads and computers, vertical and horizontal carousels, a computer-controlled conveyor and a computer-integrated warehouse management system . Students also explore how global sourcing, e-commerce, third-party logistics, automation, sustainability, and reverse logistics shape today's supply chains. The program prepares students for careers and continued education in logistics, transportation, warehousing, purchasing, inventory management, and supply chain operations. (CAREER & TECHNICAL)

WELDING TECHNOLOGY:

This course teaches students shielded metal arc welding, gas metal arc welding, flux cord arc welding, welding inspection, testing, and safety/emergency procedures. The program operates under entry-level certification authorization by the American Welding Society and a special arrangement with Lehigh Carbon Community College permits students to earn a national skills certificate and an Associate Degree. (POS)

HEALTH AND HUMAN SERVICES

ANIMAL SCIENCES:

The Animal Sciences program provides high school seniors with the opportunity to explore a variety of veterinary and animal-centric careers in a professional setting while taking Lehigh Carbon Community College science courses for college credit. In a typical school week, students spend one half day immersed in the program curriculum at LCTI, two half days in dual enrollment courses (Fundamentals of Biology, Introduction to Veterinary Technology, and Veterinary Terminology) at LCCC and two half days shadowing professionals or participating in other activities at Lehigh Valley Zoo and local veterinary clinics. Successful participants complete the program with at least seven readily-transferable college credits. Students also get the chance to earn industry credentials that signal their readiness for higher learning to college admissions officers. This program is only available to senior students. (CAREER & TECHNICAL)

BIOMEDICAL / BIOTECHNOLOGY:

Students learn the science behind human health, medical terminology, agriculture, and everyday products. Through hands-on laboratory experiences, students explore cells, genetics, and microorganisms while developing skills in laboratory testing, data analysis, safety, and quality control. Projects connect biomedical science with pharmaceutical production, food science, agricultural innovation, and modern manufacturing. This program prepares students for further education and a range of career pathways in laboratory science, biotechnology, and the Lehigh Valley's growing manufacturing industries. (CAREER & TECHNICAL)

COMMERCIAL BAKING:

Cake decorating, breads, rolls, sweet goods, pastries, pies, doughnuts and nutrition are all part of this course. Students learn the fundamental principles and procedures of operating a fully functioning bakery and retail bake shop, including preparation, display and management. With attention to both theory and practice, this course is designed to prepare students for entry-level positions in the commercial baking industry. LCTI's program is certified by the American Culinary Federation and is nationally recognized as exemplary across the curriculum. (POS)

COSMETOLOGY:

Students learn hair styling, hair cutting, hair coloring, chemical texturizing, nail/skin care and salon business operations. Students learn these skills through clinical practices offered at the school salon. Preparation for the Pennsylvania State Board Examination will enable students to become licensed as a cosmetologist and will allow them to work in a challenging and creative profession. (CAREER & TECHNICAL)

CRIMINAL JUSTICE:

Students learn Pennsylvania criminal and traffic laws, the legal use of force, search/seizure/evidence procedures, arrests and other aspects of law enforcement. Students also train in a firearms simulator and conduct mock disaster drills to gain practical emergency skills. The program includes opportunities to earn Emergency Medical Responder (EMR) and Emergency Medical Technician (EMT) certifications. (POS)

CULINARY ARTS:

Stocks, soups, sauces, appetizers, desserts, main dishes, menu planning and nutrition are just some of the aspects of this program. Students learn front-of-the-house and back-of-the-house skills working in the school restaurant. LCTI's program is certified by the American Culinary Federation and is nationally recognized as exemplary in all areas of the curriculum. (POS)

DENTAL TECHNOLOGY:

Students who enroll in this program learn a variety of skills that will enable them to become a dental assistant, dental laboratory technician, and/or pursue a career as a dental hygienist. The major areas of study in the course include: dental radiology, oral pathology, chair-side dental assisting, anatomy and physiology, dental materials, sterilization, and dental office business procedures. (CAREER & TECHNICAL)

EARLY CHILDHOOD EDUCATION:

Students in the Early Childhood Education program prepare for rewarding careers supporting and educating young children. As they progress through the curriculum, students learn to provide high-quality care that meets children's physical, social, emotional, and developmental needs; collaborate with peers to create safe, inclusive, and engaging learning-through-play environments; and plan and lead meaningful educational activities for preschool-aged children in an on-site child care center. Students also have opportunities to earn dual-enrollment college credits and may earn the Child Development Associate (CDA) credential, building a strong foundation for continued education and careers in early childhood education and care. (POS)

LCTI CAREER & TECHNICAL EDUCATION OPTIONS (CONT'D.)

EMERGENCY HEALTH SERVICES:

Students in the Emergency Health Services program prepare for careers as first responders and for a range of health care pathways. As they progress through the program, students build essential CPR, first-aid, and emergency medical services skills and may have the opportunity to earn EMT certification. They gain hands-on experience using an ambulance simulator, medical manikins, and other high-tech training equipment, and collaborate with future first responders and health care providers during realistic simulated emergencies . (POS)

EMERGING HEALTH PROFESSIONALS:

The Emerging Health Professionals Program provides high school seniors with an opportunity to experience a variety of health care careers in a hospital setting and take Penn State/Lehigh Carbon Community College science courses for college credit. Students spend one day a week rotating among various departments of a hospital. Students will experience these departments throughout the three Lehigh Valley Hospital & Health Network facilities, St Luke's University Health Network Allentown Campus, Country Meadows, and Good Shepherd Rehabilitation Network. The hospital portion of the program provides students with observational experience that enables students to observe various health care professionals as they work with patients. Also, students have the opportunity to meet various health career professionals during presentations within the LVHN community. In addition to these experiences, students are given an overview of the health care industry and all that it entails throughout their coursework at LCTI. This program is only available to senior students. (POS)

FUTURE EDUCATORS:

This dual-enrollment program is designed for 12 th graders who aspire to be educators. It gives students a head start on college while exposing them to a variety of education careers. Students job shadow or train with teachers at LCTI and other Lehigh County schools. They also earn fourteen credits by taking several courses through Lehigh Carbon Community College. **This program is only available to senior students. (POS)**

HEALTH & MEDICAL SCIENCES:

The Health & Medical Sciences program prepares students to explore a broad range of professional opportunities in the fast-growing health care industry. Students learn about the practical applications of medical science while investigating careers in physical therapy, athletic training, and related fields. They can earn CPR, AED, and other certifications through the American Heart Association; have opportunities to earn dual-enrollment college credits; and may pursue internship and co-op placements at local health care facilities. (CAREER & TECHNICAL)

PROTECTIVE SERVICES:

The Protective Services Program prepares students for future careers in fire services, emergency medical services (EMS), and law enforcement. Through a combination of classroom instruction, hands-on skills training, and industry-recognized certifications, students gain foundational and advanced knowledge in emergency response, public safety, and community protection. (POS)

TEACHER EDUCATION:

This program prepares students to explore careers in teaching and other education-related fields while developing the knowledge and skills needed to support student learning. Students examine how children and adolescents develop, learn, and engage in school; build communication, leadership, collaboration, and classroom-management skills; and learn to plan age-appropriate lessons and activities. Through classroom observations, guided field experiences, and hands-on projects, students gain a practical understanding of effective teaching, positive learning environments, and the role educators play in helping students succeed. Students also have opportunities to earn dual-enrollment college credits, providing a strong foundation for continued education and future careers in teaching, educational support services, coaching, counseling, and related fields. (POS)

VETERINARY TECHNOLOGY:

Students who enroll in this program prepare for careers in animal care and veterinary medicine. As students move through the program curriculum, they will: care for gerbils, guinea pigs, and rabbits while studying animal anatomy; assist with veterinary procedures and grooming for staff members' dogs and cats; examine animals for behavior and symptoms that could indicate illness or injury. (CAREER & TECHNICAL)

INDUSTRIAL TECHNOLOGY

AUTO COLLISION REPAIR TECHNOLOGY:

Students learn about the tools and equipment associated with the collision repair industry, while learning welding, non-structural and structural damage analysis, estimating, and repair techniques, along with paint preparation and refinishing systems used on today's technologically advanced automobiles. This comprehensive course of study and the volume of exposure students receive allows them to step into the workforce immediately following graduation or continue studies at the post-secondary level. (POS)

AUTO TECHNOLOGY:

Students in this program are prepared to diagnose and repair automobile systems, including electrical systems, ignition and emission systems, engine cooling and lubrication, front ends, air conditioning, brakes, transmissions, engines and drive trains. Students participate in the nationally recognized Automotive Youth Education Systems (AYES) industry partnership. The program teachers are Master Certified ASE Technicians who utilize state-of-the-art equipment to prepare students to become automotive technicians. (POS)

BUILDING TRADES:

The Building Trades program prepares students for careers in the construction industry by combining classroom instruction with hands-on training. Students learn to work safely with hand and power tools, read blueprints, use measuring and layout techniques, estimate materials, and apply construction math. They develop foundational skills in carpentry, masonry, electrical systems, plumbing, heating and ventilation, painting, and basic building maintenance while completing real-world projects. The program provides a strong foundation for entry-level employment, apprenticeships, technical training, and continued education in the construction trades. (POS)

CARPENTRY:

Blueprints, site work, construction footings, framing floors/walls/ceilings/roofs, radon control, insulation and power tools are some of the areas taught in Carpentry. Students learn how the building industry works, its standards, and what is required to complete a project on time and at cost. (POS)

DIESEL MEDIUM & HEAVY TRUCK TECHNOLOGY:

Students gain experience with drive trains, clutch assemblies, transmissions, diagnostics, steering and other aspects of this industry. Students also study suspension, diesel engines, gasoline engines, bearings and seals. The trucking industry needs professionals to service the truck fleet that keeps industry and commerce moving in the United States. LCTI can provide students with the necessary expertise they need to succeed in this industry. (POS)

LCTI CAREER & TECHNICAL EDUCATION OPTIONS (CONT'D.)

ELECTRICAL TECHNOLOGY:

Students learn residential, commercial, and industrial electrical wiring, as well as fluid power technology planning and wiring. Students are taught to install duplex and split wired duplex receptacles, single pole switches, 3-way and 4-way switches and Ground Fault Circuit Interrupters. Students also have the opportunity to complete a 50-hour electrical pre-apprenticeship, building a strong foundation for employment, apprenticeship, technical training, and continued education in the electrical field. (POS)

HEATING/AIR CONDITIONING & REFRIGERATION:

Students learn to install, troubleshoot and repair air conditioning, heat pumps, commercial refrigeration units and gas and oil heating equipment. Skilled technicians are proficient in reading electrical diagrams, diagnosis of electrical problems, air distribution designs, copper and steel pipe cutting, soldering and fabricating fiberglass and sheet metal duct systems. (POS)

HEAVY EQUIPMENT OPERATIONS & PREVENTIVE MAINTENANCE:

As a student in this fast-paced and diverse program, you will learn the safety, maintenance and operating techniques for a wide variety of earthmoving equipment. Students will also receive instruction in soils, erosion and sediment control, site preparation, aggregate production, concrete and asphalt paving, surveys and grades, and utility installation. In addition, students will learn machine systems, parts identification and ordering, and preventive maintenance techniques in a state-of-the-art facility. **This program is not available to ninth-grade students.** (CAREER & TECHNICAL)

MASONRY:

Students will learn various layouts and pattern designs using brick, concrete masonry units, stone and ceramic tile. This comprehensive program teaches students how to correctly use the necessary tools and equipment to build simple wall structures, fireplaces and brick sculptures. Ceramic tile installation and thin stone veneer applications are also included in the curriculum. (POS)

PAINTING & DESIGN:

Students learn to refresh and highlight interior and exterior spaces (residential and commercial) as well as improve and restore historical buildings. Painting, wallpaper hanging, furniture refinishing, line striping, staining and spraying are among some of the topics emphasized in this program. (CAREER & TECHNICAL)

PLUMBING & HEATING:

In this high-priority occupation program, Students will learn the basic to advanced skills of Plumbing & Pipe Fitting. Repairing and installation of items such as, but not limited to; Faucets, Bathtubs, Toilets, Sump Pumps, Sewage Pumps, Water Heaters, Boilers, Water Softeners, Well Pumps, Solar Heating Systems, Chilled Water, Air Conditioning and Radiant Heating Systems. This program will teach skills such as but not limited to; brazing, soldering, threading, pressed, rolled/grooved, flared, pipe fitting and measurement and fused joints. Students will work with PEX, Copper, Steel, Cast Iron, PP-R, PVC and CVPC Pipe and Tubing. This program incorporates a multi-level and fast-paced, technology-enriched learning environment. (POS)

SMALL ENGINES/RECREATIONAL VEHICLE REPAIR:

Students will learn to diagnose and repair lawn mowers, chain saws, jet skis, motorcycles and go-karts. Students will learn about the small engine and the vital components to effectively make the engine perform to maximum efficiency. Students will also learn about brake systems, transmissions, hydraulics, hydrostatics and drive systems. Students will learn skills that involve welding, cutting with a torch, cylinder honing and boring. (CAREER & TECHNICAL)

OTHER PROGRAM OPTIONS

SERVICE OCCUPATIONS CLUSTER:

The Service Occupations Cluster provides students with supportive, hands-on career training designed to build confidence, independence, and workplace readiness. This cluster offers four different programs: Building Trades Maintenance, Food Services, Indoor/Outdoor Maintenance, and Supply Chain Management & Logistics Technology. Each program helps students move from foundational entry-level skills to advanced technical training or direct employment, based on their strengths, interests, and goals. Students develop practical skills through real-world learning experiences while strengthening communication, teamwork, problem-solving, time management, workplace safety, and professional behavior. A skills screening will be conducted to determine the student's readiness and interest. Results of the screening will be provided to the student's IEP team.

SCHOOL-TO-CAREER

JOB SHADOW

Students accompany a local employer or professional to observe various aspects of a career, including daily responsibilities, workplace expectations, and skills required for success in the field.

INTERNSHIP

Students have the opportunity to work with a local employer for a designated period of time to gain hands-on experience and explore career opportunities related to their field of study.

COOPERATIVE EDUCATION

Junior and senior students may participate in a structured, paid work-based learning experience related to their technical program. Students attend academics for part of the school day and report to an approved job site for the remainder of the day.

Students are expected to maintain good attendance, demonstrate professionalism, follow workplace policies and safety procedures, complete assigned work responsibilities, and communicate appropriately with their employer and LCTI staff. Students are responsible for securing their own employment placement. LCTI may provide job leads and suggestions but does not guarantee employment opportunities or placement.

Participation requires approval from LCTI staff and administration.

CAPSTONE COOPERATIVE EDUCATION:

Provides students with the opportunity to apply their technical and trade skills in a real-world work setting while working four full days per week in their chosen field. Students attend the LCTI Academic Center one day per week for in-person academic instruction and complete virtual assignments throughout the week.

Requirements: Students must be in excellent academic standing, secure their own employment related to their technical program, and receive approval from LCTI administration, homeschool administration, their technical program instructor, and parent/guardian.

LCTI DUAL ENROLLMENT PROGRAM

Did you know you can take college classes while attending LCTI?

OPPORTUNITIES TO EARN COLLEGE CREDIT WHILE STILL IN HIGH SCHOOL

You won't have to break the bank to attend college. Each credit course at Lehigh Carbon Community College (LCCC) costs about half the regular tuition rate and less than a fourth of the cost for a comparable credit course at any one of Pennsylvania's State universities.

WHAT IS A PLACEMENT TEST?

A placement test is given to students who are interested in taking college courses at LCCC. Students must obtain a minimum score to be eligible for college classes. More information regarding placement testing can be found on lccc.edu.

DUAL ENROLLMENT REQUIREMENTS?

Requirements to participate in dual enrollment may vary from course to course. Students should have good attendance and no discipline referrals. The tuition and associated costs for dual enrollment courses must be paid by the student/parent. Grant funding may be available to assist with costs.

WANT TO SEE IF DUAL ENROLLMENT IS RIGHT FOR YOU?

Our free, one credit course "**The College Experience**" is an opportunity to explore dual enrollment. In "**The College Experience**" you'll learn what to expect if you go to college, as well as what will be expected of you. Upon completion of the course, students have the option of taking a placement test to determine eligibility for future classes at a reduced rate paid by the student/parent.

Lehigh Career & Technical Institute has a policy not to discriminate on the basis of race, color, national origin, sex, disability, or age in its programs or activities and provides equal access to the Boy Scouts and other designated youth groups. Inquiries may be directed to LCTI's Title IX and Section 504 Coordinator for students at 4500 Education Park Drive, Schnecksville PA, 18078 or 610-799-1357 (title9@lcti.org) or LCTI's Compliance Officer for personnel at 610-799-1385 (title9@lcti.org).

EMMAUS HIGH SCHOOL

WWW.EASTPENNSD.ORG/EHS

EAST PENN SCHOOL DISTRICT

WWW.EASTPENNSD.ORG

Required	All students in the course will interact with this text as part of the approved curriculum.
Teacher Choice	Teachers may choose supplementary text(s) or an additional anchor text to support student success in navigating the unit.
Student Choice	Students choose the text(s) to meet their needs in navigating the unit successfully.

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
SEL	SEL	K-12th	Panorama	Panorama	Required
SEL	SEL	K-5	Harmony	Harmony Academy	Required
SEL	SEL	6th-8th	Positivity Project (P2)	Positivity Project (P2)	Required
Counseling	SEL	K-8	Erin's Law Curriculum	Erin's Law Foundation Emily Kuhn , Abby Schaber, Rachel Anderson, Dr. Abbi M. Long	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	ELA	6	HMH *Into Literature* Grade 6	**25-26 PILOT**	Required
ELA	Reading	6	HMH *Into Literature* Grade 6	**25-26 PILOT**	Required
ELA			"The Veldt"	Ray Bradbury	Required
ELA	ELA	7	"The Monsters are Due on Maple Street"	Rod Serling	Required
ELA			*Hello, Universe*	Erin Entrada Kelly	Required
ELA			"The Landlady"	Roald Dahl	Required
ELA			"Wish You Were Here"	Frank Jones	Student Choice
ELA			"The Elevator"	William Slater	Student Choice
ELA			"The Monkey's Paw"	W.W. Jacobs	Teacher Choice
ELA			*The Christmas Carol (Drama Version)*	Various	Required
ELA			*The Crossover*	Kwame Alexander	Required
ELA			*House Arrest*	K. A. Holt	Required
ELA			*Anne Frank: The Diary of a Young Girl*	Adapted by Mark Falstein	Required
ELA	Reading	7	*Anne Frank's Diary: The Graphic Edition (Excerpts)*	Ari Folman	Teacher Choice
ELA			*Hidden Figures (Young Reader's Edition)*	Margot Lee Shetterly	Teacher Choice
ELA			*The Outsiders*	S. E. Hinton	Teacher Choice
ELA			*The Hobbit (Excerpts)*	J. R. R. Tolkein	Teacher Choice
ELA			*The Hunger Games*	Suzanne Collins	Teacher Choice
ELA			*Shadow and Bone (Excerpts)*	Leigh Bardugo	Teacher Choice
ELA			*Booked*	Kwame Alexander	Student Choice
ELA			*Rebound*	Kwame Alexander	Student Choice
ELA			*Full Cicada Moon*	Marilyn Hinton	Student Choice
ELA			*Brown Girl Dreaming*	Jacqueline Woodson	Student Choice
ELA			*Lifeboat 12*	Susan Hood	Student Choice
ELA			"Remarks by the President on America's Energy Security" and "Op Ed: President's Clean Energy Plan Must be Refocused"	Barack Obama and Staff Writer	Required
ELA			"The Power of Solar Energy"	Author Unknown	Teacher Choice
ELA			"Outsmart Your Smartphone"	Catherine Steiner-Adair	Required
ELA			"The Trouble With Television"	Robert MacNeil	Required
ELA			"On Woman's Right to Suffrage"	Susan B. Anthony	Teacher Choice
ELA			"Heads Up, Humans"	Claudia Alarcon	Teacher Choice
ELA			"The Automation Paradox"	James Bessen	Teacher Choice
ELA			"The Locavore Myth" and "It's Time to Become a Locavore"	James E. McWilliams & Neal Peirce	Required
ELA			"Is Binge-Watching a Harmless Pleasure or a Harmful Addiction"	NewsELA Staff	Teacher Choice
ELA			*Ground Zero*	Alan Gratz	Required
ELA			"Ambush"	Tim O'Brien	Required
ELA			"Patrol"	Walter Dean Myers	Teacher Choice
ELA			"9/11 Address to the Nation"	George W. Bush	Required
ELA			"September 11th: A Poem"	Kevin Powell	Teacher Choice
ELA			"The War in Vietnam"	Textbook	Teacher Choice
ELA			"September 11 Attacks"	History.com	Required
ELA			"How Technology Has Crowned Music's King"	Bill Dorfton	Required
ELA			"A Glow in the Dark"	Gary Paulson	Required
ELA			"Thank You, Ma'am"	Langston Hughes	Required
ELA			"The Tell-Tale Heart"	Edgar Allan Poe	Required
ELA			"All Summer in a Day"	Ray Bradbury	Required
ELA			*The Giver*	Lois Lowry	Teacher Choice
ELA	ELA	8	*The Adoration of Jenna Fox*	Mary E. Pearson	Student Choice
ELA			*The Limit*	Krisen Landon	Student Choice
ELA			*Matched*	Allie Condie	Student Choice
ELA			*Internment*	Samira Ahmed	Student Choice
ELA			*Unwind*	Neal Shusterman	Student Choice
ELA			*Brave New Girl*	Rachel Vincent	Student Choice
ELA			*Want*	Cindy Pon	Student Choice
ELA			*Illusive*	Emily Lloyd-Jones	Student Choice
ELA			"Harrison Bergeron"	Kurt Vonnegut	Required
ELA			"Pedestrian"	Ray Bradbury	Teacher Choice
ELA			"The Lottery"	Shirley Jackson	Teacher Choice
ELA			"The Machine Stops"	E.M. Forester	Teacher Choice
ELA			"The Fisherman and His Wife"	Brothers Grimm	Teacher Choice
ELA			"Perseus and Medusa"		Teacher Choice
ELA			"Theseus and the Minotaur"		Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA			"Arachne"	Olivia E. Coolidge	Teacher Choice
ELA			"Caged Bird"	Maya Angelou	Teacher Choice
ELA			Greek Myths	Olivia E. Coolidge	Teacher Choice
ELA			"Why are Bees Vanishing?"	Alison Pearce Stevens	Required
ELA			"Can DNA Editing Save Endangered Species?"	Kathiann Kowalski	Required
ELA			"Ithaka"	C.P. Cavafy	Teacher Choice
ELA			"The Odyssey of Homer"	Allen Mandelbaum	Teacher Choice
ELA			"The Rise of Greek City-States: Athens Versus Sparta"	commonlit.org	Required
ELA			"If You Go into the Woods You will Find You have Technology"	Heather Christle	Required
ELA	ELA Honors (additional)	8	*House of the Scorpion*	Nancy Farmer	Student Choice
ELA			*Fahrenheit 451*	Ray Bradbury	Teacher Choice
ELA			*Crossed*	Allie Condie	Student Choice
ELA			*Reached*	Allie Condie	Student Choice
ELA			*The Fox Inheritance*	Mary E. Pearson	Student Choice
ELA			*Fox Forever*	Mary E. Pearson	Student Choice
ELA			*UnWholly*	Neal Shusterman	Student Choice
ELA			*UnSouled*	Neal Shusterman	Student Choice
ELA			*UnDivided*	Neal Shusterman	Student Choice
ELA			*UnBound*	Neal Shusterman	Student Choice
ELA			*Strange New World*	Rachel Vincent	Student Choice
ELA	English 9 English 9 Honors	9	*Long Way Down*	Jason Reynolds	Required
ELA			"Through the Tunnel"	Doris Lessing	Teacher Choice
ELA			"The Scarlet Ibis"	James Hurst	Teacher Choice
ELA			"First Day Fly"	Jason Reynolds	Teacher Choice
ELA			"Eleven"	Sandra Cisneros	Teacher Choice
ELA			"Most Dangerous Game"	Richard Connell	Teacher Choice
ELA			*Of Mice and Men*	Steinbeck	Required
ELA			"To a Mouse"	Robert Burns	Required
ELA			"Abandoned Farmhouse"	Kooser	Teacher Choice
ELA			Blues Ain't No Mocking Bird	Toni Cade Bambara	Teacher Choice
ELA			"I Have a Dream"	Martin Luther King Jr.	Required
ELA			*Night*	Eli Weisel	Required
ELA			"Statement to the House Judiciary Committee on the 9/11 Victim Compensation Fund"	Jon Stewart	Teacher Choice
ELA			"Address to United Nations on Climate Change"	DiCaprio	Teacher Choice
ELA			"The UN Climate Action Summit Speech"	Greta Thunberg	Teacher Choice
ELA			"Senate Statement on PBS Funding"	Fred Rogers	Teacher Choice
ELA			*Romeo and Juliet*	William Shakespeare	Required
ELA			"The Interlopers"	Saki	Teacher Choice
ELA			English Sonnets	William Shakespeare et. al.	Teacher Choice
ELA			*Midsummer's Night Dream*	William Shakespeare	Student Choice
ELA			*Tueday's with Morrie*	Mitch Alboom	Student Choice
ELA	English 9 Honors (additional)		*The Hate U Give*	Angie Thomas	Teacher Choice
ELA			"Glory and Hope"	Nelson Mandela	Required
ELA			*Animal Farm*	George Orwell	Required
ELA	English 10		*A Raisin in the Sun*	Lorraine Hansberry	Required
ELA			"Women"	Alice Walker	Teacher Choice
ELA			"A Song in the Front Yard"	Langston Hughes	Teacher Choice
ELA			"The Kitchenette Building"	Gwendolyn Brooks	Teacher Choice
ELA			"Mother to Son"	Langston Hughes	Teacher Choice
ELA			"Harlem"	Langston Hughes	Required
ELA			*Lord of the Flies*	William Golding	Required
ELA			Ted Talk: A Story of Survival	Hussein A. Bulhan	Teacher Choice
ELA			"What Makes Good People Do Bad Things"	Phillip Zimbardo	Teacher Choice
ELA			"The Stanford Prison Experiments"	Saul McLeod	Teacher Choice
ELA			*To Kill a Mockingbird*	Harper Lee	Required
ELA			"Everyday Use"	Alice Walker	Teacher Choice
ELA			"Strange Fruit"	Billie Holiday	Teacher Choice
ELA			"Lamb to the Slaughter"	Roald Dahl	Required
ELA			"Where are You Going? Where Have You Been?"	Joyce Carol Oates	Required
ELA			"Harrison Bergeron"	Kurt Vonnegut	Teacher Choice

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ELA			"Occurrence at Owl Creek Bridge"	Ambrose Bierce	Teacher Choice
ELA	Engish 10		"On the Rainy River"	Tim O'Brien	Teacher Choice
ELA	English 10		"Where Have You Gone, Charming Billy?"	Tim O'Brien	Teacher Choice
ELA	Honors		"Flowers for Algernon"	Daniel Keyes	Teacher Choice
ELA		10	"Louisa, Please Come Home"	Shirley Jackson	Teacher Choice
ELA			"The Bass, The River, and Shiela Mant"	J.D. Wetherell	Teacher Choice
ELA			*The Joy Luck Club*	Amy Tan	Student Choice
ELA			When the Emperor Was Divine	Julia Otsuka	Student Choice
ELA			*Just Mercy*	Bryan Stevenson	Student Choice
ELA			*Unbroken*	Louis Zamperini	Student Choice
ELA			*Extraordinary Means*	Robyn Schneider	Student Choice
ELA			*Darius the Great is Not Okay*	Adib Khorram	Student Choice
ELA			*Internment*	Samira Ahmed	Student Choice
ELA			*I'm Not Your Perfect Mexican Daughter*	Erika Sanchez	Student Choice
ELA			*Reading Lolita in Tehran*	Azar Nafisi	Student Choice
ELA			"Nothing Gold Can Stay"	Robert Frost	Student Choice
ELA			"Birches"	Robert Frost	Student Choice
ELA			"Song of Myself # 6:	Walt Whitman	Student Choice
ELA	English 10		"We Real Cool"	Gwendolyn Brooks	Student Choice
ELA	Honors		"Mirror"	Sylvia Plath	Student Choice
ELA	(additional)		*The Crucible*	Arthur Miller	Required
ELA			"A Poison Tree"	William Blake	Teacher Choice
ELA			"I'm Nobody! Who are You?"	Dickinson	Teacher Choice
ELA			*A Separate Peace*	John Knowles	Required
ELA			"Aint I a Woman?"	Truth	Teacher Choice
ELA			"Ambush"	O'Brien	Required
ELA			"Black Boy"	Wright	Required
ELA			"A Pair of Silk Stockings"	Chopin	Required
ELA			"The Devil and Tom Walker"	Hawthorne	Required
ELA	English 11		"The Fish"	Elizabeth Bishop	Required
ELA			"The Life You Save May Be Your Own"	O'Connor	Required
ELA			"The Man I Killed"	O'Brien	Required
ELA			"The Secret Life of Walter Mitty"	Thurbefr	Teacher Choice
ELA			"To Build a Fire"	London	Required
ELA			"War is Kind"	Crane	Required
ELA			"Aphorisms"	Ben Franklin	Required
ELA			"Harlem"	Hughes	Required
ELA			"I Hear America Singing"	Whitman	Required
ELA			"I, Too"	Hughes	Required
ELA			"Learned Astroner"	Whitman	Required
ELA			"Miniver Cheevy"	Robinson	Required
ELA			"Mirror"	Plath	Required
ELA			"Richard Cory"	Robinson	Required
ELA			"Self-Reliance"	Emerson	Required
ELA			"Success is Counted Sweetest"	Dickinson	Required
ELA			"Tableau"	Cullen	Required
ELA			"The Masque of the Red Death"	Poe	Required
ELA			"Upon Burning of the House"	Broadstreet	Required
ELA			"Walden"	Thoreau	Required
ELA			*A Girl Called Fearless*	Catherine McKenzie	Student Choice
ELA			*A Tale of Two Cities*	Charles Dickens	Student Choice
ELA			*Brave New World*	Aldous Huxley	Student Choice
ELA			*Curious Incident of the Dog in the Nighttime*	Mark Haddon	Student Choice
ELA	English 11		*Dear Martin*	Nic Stone	Student Choice
ELA	English 11		*Fahrenheit 451*	Ray Bradbury	Student Choice
ELA	Honors		*Fences*	Wilson	Required
ELA			*Forget Tomorrow*		Student Choice
ELA			*Haunting of Hill House*	Shirley Jackson	Student Choice
ELA			*Heart of Darkness*	Joseph Conrad	Student Choice
ELA			*Marley and Me*	John Grogan	Student Choice
ELA			*Monster*	Walter Dean Myers	Student Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA			*One Flew Over the Cuckcoos Nest*	Ken Kesey	Student Choice
ELA			*Project Hail Mary*	Andy Weir	Student Choice
ELA			*Station Eleven*	Emily St. John Mandel	Student Choice
ELA			*Symptoms of Being Human*	Jeff Garvin	Student Choice
ELA			*Testaments*	Margaret Atwood	Student Choice
ELA			*The Bluest Eye*	Toni Morrison	Student Choice
ELA			*The Boys in the Boat*	Daniel James Brown	Student Choice
ELA			*The Forgetting*	Sharon Cameron	Student Choice
ELA			*The Great Gatsby*	Fitzgerald	Required
ELA			*The Hate U Give*	Angie Thomas	Student Choice
ELA			*The Nickel Boys*	Colson Whitehead	Student Choice
ELA		11	*Their Eyes Were Watching God*	Zora Neale Hurston	Student Choice
ELA			*Elements of Literature, Essentials of American Literature*	Various	Teacher Choice
ELA			The Catcher in the Rye	Salinger	Required
ELA			*Easy Writer: with Exercises*	Andrea A. Lunsford	Required
ELA			"Dr. Heidegger's Experiment"	Hawthorne	Required
ELA			"The Raven"	Poe	Required
ELA			Subject & Strategy: A Writer's Reader	Escholz & Rosa	Required
ELA			"Thanatopsis"	Bryant	Required
ELA			"This is just to say"	Dickinson	Required
ELA	English 11 Honors (additional)		"Pathedy"	Ellen Kay	Required
ELA			"Nothing Gold Can Stay"	Frost	Required
ELA			"Sonnet 18"	Shakespeare	Required
ELA			"I dwell in possiblility"	Dickinson	Required
ELA			"The President Flies Over"	Patricia Smith	Required
ELA			"Playground Elegy"	Clint Smith	Required
ELA			*A Worn Path*	Welty	Required
ELA			*The Lottery*	Jackson	Required
ELA			HIlls Like Elephant	Hemingway	Required
ELA			College Board Resources (Non-Fiction Texts)	Various	Teacher Choice
ELA			*The Language of Composition (textbook)*	Various	Teacher Choice
ELA			*Thank You for Arguing*	Jay Heinrichs	Required
ELA			*Foundations of Language and Literature*	Various	Teacher Choice
ELA			*Ideas in Argument*	Various	Teacher Choice
ELA			*American Literature and Rhetoric*	Various	Teacher Choice
ELA			*Back to the Lake*	Various	Teacher Choice
ELA			*Advanced Language and Literature*	Various	Teacher Choice
ELA			*Rhetorical Devices*	Various	Teacher Choice
ELA			*Advanced Composition Skills*	Various	Teacher Choice
ELA			*50 Essays*	Various	Teacher Choice
ELA			*Analysis, Argument, and Synthesis*	Various	Teacher Choice
ELA			*Everything's an Argument*	Various	Teacher Choice
ELA			*AP English Language and Composition Crash Course*	Various	Teacher Choice
ELA	AP Language and Compostion		*Ideas in Argument*	Various	Teacher Choice
ELA			*Current Issues and Enduring Questions*	Various	Teacher Choice
ELA			*The Norton Reader*	Various	Teacher Choice
ELA			*Conversations in American Literature*	Various	Teacher Choice
ELA			*Patterns for College Writing: A Rhetorical Reader and Guide*	Various	Teacher Choice
ELA			*Common Threads*	Various	Teacher Choice
ELA			*How to Read Nonfiction Like a Professor*	Various	Teacher Choice
ELA			"Freedom or Death"	Emmeline Pankhurst	Required
ELA			"What it Means to Be Colored in the Capital of the United States"	Mary Church Terrell	Required
ELA			Plato's *Apology*	Socrates	Teacher Choice
ELA			"Abolishment of Slavery"	Wilbur Wilberforce	Teacher Choice
ELA			"The Golden Speech"	Queen Elizabeth	Teacher Choice
ELA			The First of Fourth Orations	Cicero	Teacher Choice
ELA			"Pericles' Funeral Oration"	Thucydides	Teacher Choice
ELA			"Speech of Alexander the Great, from The Campaigns of Alexander"	Arrian	Required
ELA			Language and Composition: The Art of Voice	Various	Teacher Choice
ELA			English Language and Composition, Advanced Placement Edition	Various	Teacher Choice
ELA			"A Modest Proposal"	Jonathan Swift	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	English 12		"An Irish Airman Forsees His Death"	William Butler Yeats	Required
ELA			"Death Be Not Proud"	John Donne	Teacher Choice
ELA			"Dreamers"	Siegfried Sassoon	Required
ELA			"Dulce et Decorum Est"	Wilfred Owen	Required
ELA			"Meditation 17"	John Donne	Teacher Choice
ELA			"I Wandered Lonely as a Cloud"	William Wordsworth	Teacher Choice
ELA			"The Lamb"	William Blake	Teacher Choice
ELA			"The Nymph's Reply to the Shepherd"	Walter Raleigh	Teacher Choice
ELA			"The Passionate Shepherd to His Love"	Christopher Marlowe	Teacher Choice
ELA			"The Soldier"	Rupert Brooke	Required
ELA			"The Tyger"	William Blake	Teacher Choice
ELA			"The World is Too Much With Us"	William Wordsworth	Teacher Choice
ELA			"Tintern Abbey"	William Wordsworth	Teacher Choice
ELA			"To a Mouse"	Robert Burns	Teacher Choice
ELA			"To His Coy Mistress"	Andrew Marvell	Teacher Choice
ELA			"To the Virgins, To Make Much of Time"	Robert Herrick	Teacher Choice
ELA			*About A Boy*	Nick Hornby	Student Choice
ELA			*Born A Crime*	Trevor Noah	Required
ELA			*Danger of a Single Story*	Chimamanda Ngozi Adichie	Teacher Choice
ELA			*Dog Stars*	Peter Heller	Student Choice
ELA			*Extremely Loud, Incredibly Close*	Jonathan Safran Foer	Student Choice
ELA			*Giannis*	Mirin Fader	Student Choice
ELA			*Good Girl's Guide to Murder*	Holly Jackson	Student Choice
ELA			*Five Days at Memorial*	Sheri Fink	Student Choice
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Infinite In Between*	Carolyn Mackler	Student Choice
ELA			*Macbeth*	William Shakespeare	Required
ELA			*Metamorphosis*	Franz Kafka	Required
ELA			*Nickel and Dimed*	Barbara Ehrenreich	Student Choice
ELA			*Paper Towns*	John Green	Student Choice
ELA			*Sir Gawain & the Green Knight*		Teacher Choice
ELA			*Song of Achilles*	Madeline Miller	Student Choice
ELA			*Sonnets*	Edmund Spenser	Teacher Choice
ELA			*Sonnets*	William Shakespeare	Required
ELA			*The Help*	Kathryn Stockett	Student Choice
ELA			*The Housemaid*	Freida McFadden	Student Choice
ELA			*The Martian*	Andy Weir	Student Choice
ELA			*The Poet X*	Elizabeth Acevedo	Student Choice
ELA			The Language of Literature: World Literature	Various	Teacher Choice
ELA	English 12 Honors		*Beowulf*	Unknown	Required
ELA			*Our House is on Fire*	Greta Thunberg	Student Choice
ELA			*Persuasion*	Jane Austen	Student Choice
ELA			*Remarkable Creatures*	Chevalier	Student Choice
ELA			*Taming of the Shrew*	Shakespeare	Student Choice
ELA			*Glencoe Literature: The Readers Choice, British Literature*	Various	Teacher Choice
ELA			British Literature: 1780-1830	Various	Teacher Choice
ELA			*The Kite Runner*	Hosseini	Student Choice
ELA			*Turning of the Screw*	James	Student Choice
ELA			*Idylls of the King*	Tennyson	Teacher Choice
ELA			"Death Be Not Proud"	John Donne	Required
ELA			"Meditation 17"	John Donne	Required
ELA			*Macbeth*	Shakespeare	Required
ELA			"Ozymandias"	Percy Bysshe Shelley	Required
ELA			"The Lamb"	William Blake	Required
ELA			"The Nymph's Reply to the Shepherd"	Sir Walter Raleigh	Required
ELA			"The Passionate Shepherd to His Love"	Christopher Marlowe	Required
ELA			"The Tyger"	William Blake	Required
ELA			"The World is Too Much With Us"	William Wordsworth	Required
ELA			"To a Mouse"	Robert Burns	Required
ELA			"To Althea, from Prison"	Richard Lovelace	Required
ELA			"To the Virgins, to Make Much of Time"	Robert Herrick	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	English 12 Honors (additional)	12	"When I Have Fears that I May Cease to Be"	John Keats	Required
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Brave New World*	Aldous Huxley	Required
ELA			*Station Eleven*	Emily St. John Mandel	Required
ELA			*The Norton Anthology of English Literature (Volumes A and B)*	Various	Teacher Choice
ELA			*1984*	Orwell	Required
ELA			*The Handmaid's Tale*	Margaret Atwood	Teacher Choice
ELA			*Oryx and Crake*	Margaret Atwood	Teacher Choice
ELA			*Parable of the Sower*	Octavia Butler	Teacher Choice
ELA			*I am Legend*	Richard Matheson	Teacher Choice
ELA			*Klara and the Sun*	Kazuo Ishiguro	Teacher Choice
ELA			*The Testaments*	Margaret Atwood	Teacher Choice
ELA			*The Memory Police*	Yoko Ogawa	Teacher Choice
ELA			*A Clockwork Orange*	Anthony Burgess	Teacher Choice
ELA			*The Road*	Cormac McCarthy	Teacher Choice
ELA			*On the Beach*	Nevil Shute	Teacher Choice
ELA			*Children of Men*	P.D. James	Teacher Choice
ELA			"How Much Land Does a Man Need"	Leo Tolstoy	Teacher Choice
ELA			"Masque of the Red Death"	Edgar Allan Poe	Teacher Choice
ELA			"Ordeal by Cheque"	Wuther Crue	Teacher Choice
ELA			"The Lesson"	Toni Cade Bambara	Teacher Choice
ELA			"The Lottery"	Shirley Jackson	Teacher Choice
ELA			"The Ones that Walk Away from Omelas"	Ursula K. Le Guin	Teacher Choice
ELA			"The School"	Donald Barthelme	Teacher Choice
ELA			"The Yellow Wallpaper"	Charlotte Perkins	Teacher Choice
ELA			"Kitchenette Building"	Brooks	Required
ELA			"Suicide's Note"	Hughes	Required
ELA			"The Last Night that She Lived"	Dickinson	Required
ELA			"Stop all the Clocks"	Auden	Required
ELA			"Ballad of Birmingham"	Randall	Required
ELA			"Break of Day"	Donne	Required
ELA			"Ozymandias"	Shelly	Required
ELA			"I am!"	Clare	Required
ELA			"Golden Retrievals"	Doty	Required
ELA			"Animals are Passing from Our Lives"	Levin	Required
ELA			"Pathedy of Manners"	Key	Required
ELA			"Dessert Places"	Fronst	Required
ELA			"35/10"	Olds	Required
ELA			"Barbie Doll"	Piercy	Required
ELA			"Let No Charitable Hope"	Wylie	Required
ELA			"Ode to the West Wind"	Shelley	Required
ELA			"To Autumn"	Keats	Required
ELA			"Those Winter Sundays"	Hayden	Required
ELA			"Living in Sin"	Rich	Required
ELA			"The Writer"	Wilbur	Required
ELA			"Dream Song 14"	Berryman	Required
ELA			"I Wandered Lonely as a Cloud"	Wordsworth	Required
ELA			"The Lamb"	Blake	Required
ELA			"The Tyger"	Blake	Required
ELA			Sonnets 1-154	Shakespeare	Required
ELA			"Richard Cory"	Robinson	Required
ELA			"The Journey of the Magi"	Eliot	Required
ELA			Holy Sonnets 1-19	Donne	Required
ELA			"Nothing Gold Can Stay"	Frost	Required
ELA			"On the Death of my First and Dearest Child, Hector Philips, born the 23rd of April, and died the 2nd of May 1655."	Philips	Required
ELA			"On My First Son"	Jonson	Required
ELA			"On My First Daughter"	Jonson	Required
ELA			"Inconstancy in Love"	Burns	Required
ELA			"Porphyria's Lover"	Browning	Required
ELA			"My Heart Leaps Up"	Wordsworth	Required

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ELA	AP Literature and Composition		"Sonnet 19"	Milton	Required
ELA			"The World is Too Much With Us"	Wordsworth	Required
ELA			*Amoretti*	Spenser	Required
ELA			"Mad Girl's Love Song"	Plath	Required
ELA			"The Summer Day"	Oliver	Required
ELA			"Mirror"	Plath	Required
ELA			"The Applicant"	Plath	Required
ELA			"Follower"	Heaney	Required
ELA			"Some Boys are Born to Wander"	McDonald	Required
ELA			*The Norton Anthology of Poetry*	Various	Required
ELA			"Introduction to Poetry"	Collins	Required
ELA			Assorted Poetry	Assorted	Teacher Choice
ELA			*Beowulf*	Unknown	Teacher Choice
ELA			*Death of a Salesman*	Arthur Miller	Teacher Choice
ELA			*Fences*	August Wilson	Teacher Choice
ELA			*The Tempest*	Shakespeare	Teacher Choice
ELA			*King Lear*	Shakespeare	Teacher Choice
ELA			*Othello*	Shakespeare	Teacher Choice
ELA			*Hamlet*	William Shakespeare	Teacher Choice
ELA			*Interior Chinatown*	Charles Yu	Required
ELA			*Kindred*	Octavia Butler	Required
ELA			*Macbeth*	William Shakespeare	Required
ELA			*Maus*	Art Spiegelman	Required
ELA			*Persepolis*	Marjane Satrapi	Teacher Choice
ELA			*The Hitchiker's Guide to the Galaxy*	Douglas Adam	Required
ELA			*The Importance of Being Earnest*	Oscar Wilde	Teacher Choice
ELA			*There, There*	Tommy Orange	Required
ELA			*Sound and Sense*	Arp and Johnson	Required
ELA			*Lesson Before Dying*	Gaines	Teacher Choice
ELA			*The Road*	Cormac McCarthy	Teacher Choice
ELA			*The Canterbury Tales*	Chaucer	Required
ELA			*Foster*	Keegan	Teacher Choice
ELA			*All the Light We Cannot See*	Doerr	Teacher Choice
ELA			*The Theban Plays*	Sophocles	Teacher Choice
ELA			*The Norton Anthology of Contemporary Fiction*	Various	Teacher Choice
ELA			*The Norton Anthology of English*	Various	Teacher Choice
ELA			*The Norton Anthology of Modern and Contemporary Poetry*	Various	Teacher Choice
ELA			*The Norton Anthology of World Literature*	Various	Teacher Choice
ELA			*The Norton Anthology of Theory and Criticism*	Various	Teacher Choice
ELA			*The Norton Anthology of Western Literature*	Various	Teacher Choice
ELA			*The Northon Anthology of Literature by Women*	Various	Teacher Choice
ELA			*The Norton Anthology of Short Fiction*	Various	Teacher Choice
ELA			*The Norton Anthology of Drama*	Various	Teacher Choice
ELA			*Homegoing*	Gyasi	Teacher Choice
ELA			*Dubliners*	Joyce	Teacher Choice
ELA			*The Bell Jar*	Plath	Teacher Choice
ELA			*Slaughterhouse-Five*	Vonnegut	Teacher Choice
ELA			*The Handmaid's Tale*	Atwood	Teacher Choice
ELA			*The Stranger*	Camus	Teacher Choice
ELA			*When the Emeror was Divine*	Otsuka	Teacher Choice
ELA			Literature and Composition	Various	Teacher Choice
ELA			*English Literature and Composition*	Abdon and McFarlan	Teacher Choice
ELA			*How to Read Poetry like a Professor*	Foster	Teacher Choice
ELA			*How to Read Novels like a Professor*	Foster	Teacher Choice
ELA			*How to Read Literature like a Professor*	Foster	Teacher Choice
ELA			*The Norton Introdution to Literature*	Various	Teacher Choice
ELA			*England in Literature*	Various	Teacher Choice
ELA			*The Things They Carried*	O'Brien	Teacher Choice
ELA			*Norton Anthology of World Literature*	Martin Puchner	Required
ELA			*The Epic of Gilgamesh*	Sîn-lēqi-unninni	Required
ELA			*The Iliad*	Homer	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
ELA	Humanities Honors	12	*The Odyssey*	Homer	Required
ELA			*The Theban Cycle*	Sophocles	Required
ELA			*The Oresteia*	Aeschylus	Teacher Choice
ELA			*The Divne Comedy*	Dante Alighieri	Required
ELA			*The Aenied*	Virgil	Required
ELA			*Sir Gawain and the Green Knight*	Unknown	Teacher Choice
ELA			*The Canterbury Tales*	Geoffrey Chaucer	Teacher Choice
ELA			*The Tempest*	William Shakespeare	Teacher Choice
ELA			*A Handbook of Mythology*	E.M. Berens	Required
ELA			*The Power of Myth*	Joseph Campbell	Required
ELA			*Mythology*	Edith Hamilton	Required
ELA			*House of Names*	Colm Tóibín	Teacher Choice
ELA			*Silence of the Girls*	Pat Barker	Teacher Choice
ELA			*The Penelopiad*	Margaret Atwood	Teacher Choice
ELA			*A Thousand Ships*	Natalie Haynes	Teacher Choice
ELA			*Song of Achilles*	Madeline Miller	Teacher Choice
ELA			*Circe*	Madeline Miller	Teacher Choice
ELA			*Lavinia*	Ursula K. Leguin	Teacher Choice
ELA			*Cold Mountain*	Charles Frazier	Teacher Choice
ELA			*The Republic*	Plato	Teacher Choice
ELA			*Utopia*	Thomas Moore	Teacher Choice
ELA			*The Prince*	Machievelli	Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Social Studies	Grade 6 Social Studies	6th	World Studies: The Ancient World	Heidi Hayes Jacobs, Michal L. LeVasseur, Kate Kinsella, Kevin Feldman, Inc. Dorling Kindersley	Required
Social Studies	Grade 7 Social Studies	7th	History of our World	Heidi Hayes-Jacobs	Required
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	The American Nation (Beginnings through 1877)	James West Davidson	Required
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Blood on the River	Elisa Carbone	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Chains	Laurie Halse Anderson	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Forge	Laurie Halse Anderson	Teacher Choice
Social Studies	Grade 8 Social Studies (On Level/Honors)	8th	Ashes	Laurie Halse Anderson	Teacher Choice
Social Studies	American Studies 1 (On Level)	9th	America: Pathways to the Present	Cayton, Perry, Reed, Winkler	Required
Social Studies	American Studies 1 (Honors)	9th	The American Pageant	Kennedy, Cohen, Bailey	Required
Social Studies	American Studies 1 (Honors)	9th	The King of Mulberry Street	Donna Jo Napoli	Required
Social Studies	AP United States History	9th-12th	America's History, For the AP* Course (Bedford Integrated Media Edition)	James A. Henretta, Eric Hinderaker, Rebecca Edwards	Required
Social Studies	AP United States History	9th-12th	Documenting United States History: Themes, Concepts, and Skills for the AP* Course	Stacy, James, Heller, Stephen	Required
Social Studies	American Studies 2 (On Level)	10th	America: Pathways to the Present	Cayton, Perry, Reed, Winkler	Required
Social Studies	American Studies 2 (Honors)	10th	The American Pageant	Kennedy, Cohen, Bailey	Required
Social Studies	AP Economics	10th-12th	Economics - Principles and Policy	Baumol, William J and Blinder, Alan S	Required
Social Studies	AP European History	10th-12th	A History of Western Society	John McKay, Clare Crowston,, Merry E. Wiesner-Hanks	Required
Social Studies	AP Government	10th-12th	American Government	Wilson, J.Q. & Dilulio, J.J.	Required
Social Studies	AP Psychology	10th-12th	Myers' Psychology	Myers, David G.; DeWall, C. Nathan; Hammer, Elizabeth Yost	Required
Social Studies	AP World History	10th-12th	Ways of the World	Nelson, E. & Strayer, R. W.	Required
Social Studies	World Studies (On Level)	11th	World History: The Human Journey, Modern World	Holt, Rinehart, Winston	Required
Social Studies	World Studies (Honors)	11th	World History: Connections to Today, Modern World	Ellis, Elisabeth Gaynor; Esler, Anthony; Beers, Burton	Required
Social Studies	AP African American Studies	11th-12th	Freedom on My Mind: A History of African Americans, With Documents	White, Deborah G., Mia Bay, and Waldo E. Martin Jr.	Required
Social Studies	Government (Dual Credit)	12th	Magruder's American Government	Prentice Hall	Required
Social Studies	Government (On Level)	12th	Civics Today: Citizenship, Economics, & You	Remy, Patrick, Shaffell, Clayton	Required
Social Studies	Psychology	12th	Psychology 2e	Rose M. Spielman, William J. Jenkins, Marilyn D. Lovett	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Social Studies	Sociology	12th	Introduction to Sociology	Tonja R. Conerly, Kathleen Holmes, Asha Lal Tamang	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Math	Mathematics	K-5	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 1	6th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 1-2	6th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 2	6th-7th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 2-3	7th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Course 3	8th	i-Ready Classroom Mathematics	Curriculum Associates	Required
Math	Advanced Calc (Honors)	9-12	Calculus (10th Edition Full)	Wiley & Sons	Required
Math	Algebra I CP	9-12	Algebra 1 Common Core	Pearson	Required
Math	Algebra II CP	9-12	Glencoe Algebra 2 (Common Core Edition)	McGraw-Hill	Required
Math	Algebra II Honors	9-12	Glencoe Algebra 2 (Common Core Edition)	McGraw-Hill	Required
Math	Precalculus CP	9-12	Precalculus (4th Edition)	Prentice Hall	Required
Math	AP Calculus AB	9-12	Calculus with Early Transcendentals (10th Edition)	Wiley & Sons	Required
Math	AP Calculus BC	9-12	2024 Sullivan and Miranda Calculus for	Wiley & Sons	Required
Math	Calculus CP	9-12	Calculus with Applications (Brief 10th Edition)	Pearson Prentice Hall	Required
Math	Geometry CP	9-12	Glencoe Geometry (Common Core Edition)	McGraw-Hill	Required
Math	Geometry Honors	9-12	Geometry	Addison Wesley	Required
Math	Probability and Statistics CP	9-12	Elementary Statistics: Picturing the World	Pearson Prentice Hall	Required
Math	Statistics AP	9-12	The Practice of Statistics (6th Edition Up	BFW Publishing	Required
Math	AP Precalculus	9-12	College Board Resources	College Board	Required
Math	AP Calculus AB	9-12	College Board Resources	College Board	Required
Math	AP Calculus BC	9-12	College Board Resources	College Board	Required
Math	AP Statistics	9-12	College Board Resources	College Board	Required
Math	All high school courses	6-12	Delta Math	Delta Math	Required
Math	Foundations of Math	9-11	iXL	iXL	Required
Math	Fundamentals of Algebra	9-11	iXL	iXL	Required
Math	Algebra 1 Lab	9-11	iXL	iXL	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Business/Computers	Grade 6-8 Computers	6-8	Ignition: Digital Wellness and Safety	Everfi	Required
Business/Computers	Grade 6-8 Computers	6-8	Sphero	Sphero	Required
Business/Computers	Grade 6-8 Computers	6-8	Code.org	Code.org	
Business/Computers	Accounting I	9-12	Century 21 Accounting, 11th edition	Cengage	Required
Business/Computers	Accounting II	9-12	Century 21 Accounting, 11th edition	Cengage	Required
Business/Computers	Accounting II	9-12	Microsoft Excel for Accounting	Prentice Hall	Required
Business/Computers	Adobe Photshop/Illustrator	9-12	Adobe® Photoshop Creative Cloud Revealed, 2nd Edition	Cengage	Required
Business/Computers	Advanced Photoshop	9-12	Adobe® Photoshop Creative Cloud Revealed, 2nd Edition	Cengage	Required
Business/Computers	AP Business with Personal Finance	9-12	Business with Personal Finance for the AP Course (High School)	BFW Publishers	Required
Business/Computers	Business Law	9-12	Business and Personal Law	Glencoe	Required
Business/Computers	Intro to Business	9-12	Intro to Business	Cengage	Required
Business/Computers	Marketing 1	9-12	Intro to Marketing	Cengage	Required
Business/Computers	Marketing 2	9-12	MKTG, Principles of Marketing (Lamb, Hair, McDaniel)	Cengage	Required
Business/Computers	Microsoft Excel	9-12	Microsoft Excel 2021 Comprehensive	Cengage	Required
Business/Computers	Microsoft Office	9-12	CompTia	CompTia	Required
Business/Computers	Microsoft PowerPoint	9-12	Microsoft PowerPoint 2013 Comprehensive	Cengage	Required
Business/Computers	Microsoft Word	9-12	Microsoft Word 2013 Comprehensive	Cengage	Required
Business/Computers	Retail Management 1	9-12	Retail Management (Berman, Evans, Chatterjee)	Pearson	Required
Business/Computers	Retail Management 2	9-12	MGMT, Prinicples of Management (Williams)	Cengage	Required
Business/Computers	Web Design	9-12	CodeHS	CodeHS	Required
FCS	6th Grade FCS	6	Discovering Food & Nutrition	Glencoe	Teacher Choice
FCS	6th Grade FCS	6	Take Charge of Your Life	Goodheart-Wilcox	Teacher Choice
HWF	Grade 6 Health	6	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 7 Health	7	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 8 Health	8	Glencoe Teen Health (2014)	McGraw-Hill	Required
HWF	Grade 10 Drivers Ed	10	Drive Right: You are the Driver (10th Edition)	Addison Wesley Ed. Publis	Required
HWF	Grade 10 Drivers Ed	10	Responsible Driving	Glencoe/McGraw Hill	Required
HWF	Grade 10 Drivers Ed	10	Pennsylvania Drivers Manual	PennDOT	Required
HWF	Grade 10 Health	10	Health and Wellness	McGraw-Hill	Required
HWF	Advanced Health	10-12	First Aid/CPR/AED Participant's Manual	American Red Cross	Required
Science	6th Grade Science	6	Open Sci Ed	OpenSciEd	Required
Science	7th Grade Science	7	Open Sci Ed	OpenSciEd	Required
Science	8th Grade Science	8	Open Sci Ed	OpenSciEd	Required
Science	8th Grade Science	8	Progress Learning	Progress Learning	Required
Science	Biology	9-10	Progress Learning	Progress Learning	Required
Science	Biology	9-10	Miller and Levine Biology: On-Level Edition	Pearson	Required
Science	Anatomy	9-12	Elaine Marieb Essentials of Human Anatomy & Physiology (7th Edition)	Benjamin Cummings	Required
Science	Anatomy	9-12	HOLES -Essentials of Human Anatomy and Physiology (6th Edition)	McGraw Hill	Required
Science	Anatomy	9-12	Principles of Anatomy & Physiology (7th Edition)	Tortora & Grabowski	Required
Science	AP Biology	9-12	Campbell Biology in Focus, 3rd Edition	Pearson	Required
Science	AP Biology	9-12	College Board Resources	College Board	Required
Science	AP Chemistry	9-12	Chemistry: The Central Science w/Online (13th Edition, AP Edition)	Pearson/Prentice Hall	Required
Science	AP Chemistry	9-12	College Board Resources	College Board	Required
Science	AP Environmental Science	9-12	Environment: The Science Behind the Story w/ Online (AP Edition, 6th edition)	Pearson	Required
Science	AP Environmental Science	9-12	College Board Resources	College Board	Required
Science	AP Physics 1	9-12	Physics w/ Online (Cutnell and Johnson, 9th Edition)	John Wiley and Sons	Required
Science	AP Physics 1	9-12	College Board Resources	College Board	Required
Science	AP Physics 2	9-12	Physics w/ Online (Cutnell and Johnson, 9th Edition)	John Wiley and Sons	Required
Science	AP Physics 2	9-12	College Board Resources	College Board	Required

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Science	AP Physics C	9-12	Physics for scientists and engineers by Serway and Jewett 10th edition	Cengage	Required
Science	AP Physics C	9-12	College Board Resources	College Board	Required
Science	CP Chemistry	9-12	Prentice Hall Chemistry	Prentice Hall	Student Choice
Science	CP Physics 1	9-12	Holt Physics w/ Online (2012 Edition)	Holt, Rinehart and Winstor	Student Choice
Science	CP Physics 2	9-12	Holt Physics w/ Online (2012 Edition)	Holt, Rinehart and Winstor	Student Choice
Science	Environmental Sustainability	9-12	Project Lead the Way	PLTW	Required
Science	Honors Chemistry	9-12	Modern Chemistry	Holt, Rinehart and Winstor	Student Choice
Technology Education	Capstone	9-12	Project Lead the Way	PLTW	Required
Technology Education	Civil Engineering & Architecture	9-12	Project Lead the Way	PLTW	Required
Technology Education	Digital Electronics	9-12	Project Lead the Way	PLTW	Required
Technology Education	Intro to Engineering Design	9-12	Project Lead the Way	PLTW	Required
Technology Education	Principles of Engineering	9-12	Project Lead the Way	PLTW	Required

Subject	Grade Level	Intervention Title	Author(s)/Publishers	Classroom Use
Reading	K-2	Bridge the Gap	VanHekken & Bottari	Teacher Choice
Reading	K-8	Equipped for Reading Success	Kilpatrick	Teacher Choice
Reading	K-3	Fundations	Wilson Language	Teacher Choice
Reading	K	Heggerty Pre K Program	VanHekken & Bottari	Teacher Choice
Reading	6-12	Lexia Power Up	Lexia Learning	Teacher Choice
Reading	6-12	Leveled Literacy Intervention (LLI)	Fountas & Pinnell	Teacher Choice
Reading	3-8	Orton Gillingham	Wilson Language	Teacher Choice
Reading	K-5	Peer Assisted Learning (PALS)	Vanderbilt	Teacher Choice
Reading	3-5	Read Naturally	Ihnot	Teacher Choice
Reading	6-10	Rewards	Voyager Sopris	Teacher Choice
Reading	K-1	Road to the Code	Brookes Publishing	Teacher Choice
Reading	K-5	Sonday System	Imagine Learning	Teacher Choice
Reading	K-3	Start Up, Build Up, Spiral Up	Benchmark Education	Teacher Choice
Reading	2-5	Voyager Passport	Voyager Sopris	Teacher Choice
Math	K-5	Bridges	Math Learning Center	Teacher Choice
Math	K-8	i-Ready Classroom Mathematics	Curriculum Associates	Teacher Choice
Math	2-8	Foundations	Moving With Math	Teacher Choice
Math	K-5	Kickstart Number Sense	Zaner Bloser	Teacher Choice
Math	9-12	IXL	iXL	Teacher Choice

Subject	Course	Grade Level	Title	Author(s)	Classroom Use
Executive Functioning	Study Skills Emotional Support/ Executive Skills Development Learning Support	9-12+	Cerebrate	Candance Heiken	Teacher Choice
Executive Functioning		6-8	Cerebrate	Candance Heiken	Teacher Choice
Executive Functioning		4 & 5	Cerebrate	Candance Heiken	Teacher Choice
Written Language	English Lab	11 & 12	Step Up to Writing	Maureen Aumam	Teacher Choice
Replacment Math	Learning Support	9-12+	Math By Topic	Caryl Kelly Pierson	Teacher Choice
Replacment Math	Learning Support	6-8	Math By Topic	Caryl Kelly Pierson	Teacher Choice
Replacement ELA, Math, Science, Social Studies	Life Skills Support	9-12+	Unique	n2y	Teacher Choice
Replacment Math	Life Skills Support	6-8	Moving with Math Connections & Connecting Concepts	Siegfried Englemann	Teacher Choice
Replacement ELA	Autistic Support	9-12+	Readtopia	Don Johnston	Teacher Choice
Replacement ELA	Autistic Support & Life Skills Support	6-8	Readtopia	Don Johnston	Teacher Choice
Replacement Science & Social Studies	Life Skills Support	6-8	Explore World History/Explore Life Sciences/Unique	Attainment company/n2Y	Teacher Choice
Written Language	Learning Support	6-8	Step Up to Writing	Maureen Aumam	Teacher Choice
Replacement Math	Autistic Support	K-5	Moving with Math Connections & Connecting Concepts	Siegfried Englemann	Teacher Choice
Replacement Math	Life Skills Support	K-5	Moving with Math Connections	Math Teachers Press, Inc.	Teacher Choice
Replacment ELA	Life Skills Support, Autistic Support, Learning Support	K-5	Readtopia	Don Johnston	Teacher Choice
ES English	ES English D ZEND	9-12	The Hate U Give	Angie Thomas	Required
ES English	ES English D ZEND	9-12	Monster	Walter Dean Myers	Required
ES English	ES English D ZEND	9-12	Infinite In Between	Carol Mackler	Required
ES English	ES English D ZEND	9-12	Illusive	Emily Lloyd Jones	Required

Educational Conferences

Expensed through the general fund unless otherwise noted.

Conference Title & Sponsor:	ELD Networking / CLIU 21
Location:	CLIU 21
Date(s):	October 29, 2026
Attending:	Beth Fair
Position/Building:	ELD Teacher / Jefferson ES
Cost:	$0

Conference Title & Sponsor:	PaPBS & MTSS Implementers' Forum/ PaTTAN
Location:	PaTTAN Central
Date(s):	November 4 - 6, 2026
Attending:	Tara Desiderio
Position/Building:	Principal / Wescosville
Cost:	$0

Conference Title & Sponsor:	PaPBS & MTSS Implementers' Forum/ PaTTAN
Location:	PaTTAN Central
Date(s):	November 4 - 6, 2026
Attending:	Andrea Lerch
Position/Building:	School Psychologist / Wescosville
Cost:	$0

Conference Title & Sponsor:	Mindful Movement Strategies for Calmer Kids/Moravian University
Location:	Moravian University
Date(s):	November 7, 2026
Attending:	Erin Dry
Position/Building:	K-5 Music Teacher / Willow Lane
Cost:	$0

Conference Title & Sponsor:	Secondary ELA Teacher Networking Group / CLIU 21
Location:	CLIU 21
Date(s):	November 7, 2026
Attending:	Lynn Dreisbach
Position/Building:	8th Grade ELA Teacher / Eyer MS
Cost:	$0

Conference Title & Sponsor:	Implementation of DBT STEPS / Project Aware
Location:	Virtual
Date(s):	November 10,16 & 18, 2026
Attending:	Diana Woodard
Position/Building:	ES Counselor / Wescosville ES
Cost:	$0

Conference Title & Sponsor:	Implementation of DBT STEPS / Project Aware
Location:	Virtual
Date(s):	November 10, 16 & 18, 2026
Attending:	Jennifer Csordas
Position/Building:	ES Counselor / Macungie ES
Cost:	$0

Conference Title & Sponsor:	SAP Certification training / Center for Humanistic Change
Location:	Bethlehem, PA
Date(s):	November 10, 2026
Attending:	Krystina Frei
Position/Building:	Teacher / Macungie ES
Cost:	$0

Conference Title & Sponsor:	SAS Institute 2026 / Pennsylvania Department of Education
Location:	Hershey, PA
Date(s):	December 6-9, 2026
Attending:	Michele Fowkes
Position/Building:	ELA Teacher / Lower Macungie MS
Cost:	$317.42

PERSONNEL AGENDA ITEMS EXHIBIT

RESOLVED, That the Board of School Directors of East Penn SD approve the following personnel items, as recommended by the Superintendent:

I. Resignation(s)

Name	Position	Building	Effective Date
Mary Creedon	Academic Support Assistant	Alburtis ES	10/16/2026

II. Compensated Professional Development Leave as per Board Policy 338.1

Name	Position	Building	Effective Date
Brian Pum	Social Studies Teacher	EHS	2027 – 2028 School Year

III. Income Protection Leave(s)

Name	Position	Building	Effective Date
Megan Rolek	Special Education Teacher	Jefferson ES	9/24/2026 – 1/22/2026

IV. Professional Employee Appointment(s)

Name:	Joshua Fick
Education Level:	B. A. Degree; M. ED. Degree
Undergraduate School:	Moravian University
Graduate School:	DeSales University
Assignment:	Math Teacher – Emmaus HS (Resignation of J. McGeary)
Certification:	Instructional II: Math 7-12
Experience:	Math Teacher: Whitehall Coplay SD; 9/2018 – Current Math Teacher: Lehigh Valley Academy Regional Charter School; 5/2016 – 9/2018
Salary:	$85,875; Year 11; M
Effective:	TBD *(Pending the receipt & approval of all necessary documentation)*

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V. Food Service Support Staff Appointment(s)

Name	Position	Salary/Hours	Effective Date
Richa Mehta	Food Service Support Staff LMMS	$18.32/hr 23.75 hrs/wk (Transfer of D. Lujan)	TBD (*pending the receipt & approval of all necessary documentation)*

VI. Support Staff Appointment(s)

Name	Position	Salary/Hours	Effective Date
Rebecca Bunner	Staff Assistant EHS	$20.37/hr 29 hrs/wk (Resignation of K. Taskalos)	*TBD (pending the receipt & approval of all necessary documentation)*
Donna Spedeliare	Staff Assistant EHS	$20.37/hr 29 hrs/wk (Resignation of E. Guaranda)	*TBD (pending the receipt & approval of all necessary documentation)*

VII. Custodial Transfer of Assignment(s)

Name	From	To	Effective Date
Je-Andy Angrand	Custodian – 2nd Shift Lincoln ES $32.60/hr 40 hrs/wk	Night Foreman LMMS $35.01/hr 40 hrs/wk (Transfer of M. Rumfield)	10/26/2026
Micah Roberts	Head Custodian Shoemaker ES $36.26/hr 40 hrs/wk	Custodian – 2nd Shift Lincoln ES $32.60/hr 40 hrs/wk (Transfer of J. Angrand)	10/26/2026

VIII. Food Service Support Staff Transfer of Assignment(s)

Name	From	To	Effective Date
Diane Stubits	Food Service Support Staff Alburtis ES 27.50 hrs/wk	Food Service Leader Eyer MS 32.50 hrs/wk (Resignation L. Orach)	10/27/2026

IX. Awarding of Tenure

In accordance with Section 1121 of the PA School Code, the following temporary professional employees, based upon satisfactory service, are to be awarded tenure (professional employee status):

Name	Assignment	Building
Marissa Aquino	Spanish Teacher	EHS
Madison Bruder	Special Education Teacher	EHS
Christine Cornish	Elementary Teacher	Macungie ES
Robyn DiStefano	Elementary Teacher	Shoemaker ES
Robert Edwards	Special Education Teacher	EHS
Courtney Gross	Elementary Teacher	Macungie ES
John Guignet	Elementary Teacher	Alburtis ES
Trey Hinkle	Social Studies	EHS
Paige Jemmot	Elementary Teacher	Macungie ES
Kira Kern	Math Teacher	EHS

Katie Kingston	Elementary Teacher	Willow Lane ES
Jacob Maskornick	Social Studies Teacher	EHS
Sandy Nguyen	Special Education Teacher	Eyer MS
Melanie Olivieri	Math Teacher	Lower Macungie MS
Amber Plachko	Elementary Teacher	Shoemaker ES
Cassidy Scheirer	Elementary Teacher	Lincoln ES
Rachel Seitz	Special Education Teacher	Shoemaker ES
Annie Squire	Elementary Teacher	Alburtis ES
Amy Wells	Elementary Teacher	Macungie ES

X. 2026-2027 Schedule B Co-Curricular Appointments (Exhibit "A")

XI. Additions to the STA of Pennsylvania, Inc. Transportation Personnel List – 2026-2027 School Year

Name	Role
Jillian Cerezo	Driver
Payton Goodman	Driver
Susan Matthewson	Driver
Elliott Rodriguez	Driver

XII. Additions to the 2026 - 2027 Per Diem Substitute

Mary Creedon	Academic Support Assistant
Andrea Dougherty	Grades PK-4; Special Education PK-8 *(Pending the receipt & approval of all necessary documentation)*
Kristyn Pawlak	Guest Teacher/Academic Support Assistant/Instructional Assistant/Staff Assistant *(Pending the receipt & approval of all necessary documentation)*
Waajida Sameja	Academic Support Assistant/Instructional Assistant/Staff Assistant *(Pending the receipt & approval of all necessary documentation)*
Kendall Zuk	Elementary K-6 *(Pending the receipt & approval of all necessary documentation)*

XIII. Board Approved Personnel – Update to Pending Documentation Start Date

Name	Position	Building	Board Approved	Start Date
Theresa Del Re	Health Room Nurse	Jefferson ES	9/28/2026	10/22/2026
Andreo Ferraina	Per Diem Substitute	n/a	10/12/2026	10/19/2026
Delaney Gottschall	Per Diem Substitute	n/a	9/28/2026	10/16/2026
Boutros Karam	Staff Assistant	EHS	9/28/2026	10/13/2026
Julie Robertson	Health Room Nurse	Eyer MS	9/28/2026	11/3/2026

2026 - 2027 Schedule B
Co-Curricular Appointments

School	Name	Position	Contract/Volunteer	Amount	Notes
EHS	Nero, Anne	Chaperone	Contract	$82/event	
Willow Lane	Serrao, Jennifer	Kid Yoga and Family Mindfulness	Club B	$851.00	New Club for 2026-2027
Willow Lane	Ross, Kelly	Kids-in-Motion	Club B	$851.00	SPRING; Reclassified to Club B (Club A in 2025 - 2026)
EHS	Lewis, Gerald D.	Softball Assistant Coach - 2	Contract	$4,283.00	Non-Employee
Eyer	Haughney, Lucas	Volleyball Volunteer Assistant (Boys)	Volunteer	$0.00	Board approved on 7/13/2026 as paid coach

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Abrams	Jennifer		M+36	16+	$ 106,500.00		
Abruzzi	Dave		M+12	15	$ 99,875.00		
Adams	Kimberly		M+36	16+	$ 106,500.00	$3,914.00	Dept Chair
Aguilar	Annie		M+12	3	$ 74,000.00		
Albright	Stacy		M+36	16+	$ 106,500.00		
Alfano	Stacey		M	16+	$ 99,000.00		
Andre	Jason		M+24	16+	$ 104,000.00		
Annoni	Gregory		M+36	16+	$ 106,500.00		
Anthony	Edward		M+36	16+	$ 106,500.00		
Aquino	Marissa		M	4	$ 73,000.00		
Ardito	Stephanie		M	16+	$ 99,000.00	$1,980.00	Mentor
Argue	Tara		M+36	16+	$ 106,500.00		
Arnold	Connie		M+36	16+	$ 106,500.00		
Arnold	Heather		M+24	16+	$ 104,000.00		
Ashton	Courtney		M	9	$ 81,100.00	$548.00	Team Leader (split)
Assise	Eleni		M+24	16+	$ 104,000.00		
Atkinson	Shannon		M+36	16+	$ 106,500.00		
Atwater	Laura		M+12	16+	$ 50,750.00		CPL FALL 2026
Augustin	Rebecca		M+24	16+	$ 104,000.00		
Babel	Lori		M+36	16+	$ 106,500.00		
Baker	Jason		M+24	13	$ 95,875.00		
Ballein	Jennifer		M+12	6	$ 77,775.00		
Baranek	Laura	Secondary Counsler	M	8	$ 79,325.00		
Barndt	Doug		M	16+	$ 99,000.00		
Barnes	Danielle		PC	4	$ 70,500.00		
Barnes	Kimberly		D	16+	$ 109,000.00		
Barnum	Robert		M	11	$ 85,875.00		
Barry	Megan		M+12	16+	$ 101,500.00		
Bauer	Susan		M+36	16+	$ 106,500.00	$1,020.00	Jr. Natl Honor Soc (split)
Bealer	Heather		M+24	16+	$ 104,000.00	$1,131.00	Team Leader
Bean	Christina	Behavior Analy	M	3	$ 72,000.00		
Becker	Jessica		M	16+	$ 99,000.00	$1,131.00	Team Leader
Bednar	Eric		M+36	16+	$ 106,500.00	$1,980.00	Mentor
Bednarski	Kellie		M+24	13	$ 95,875.00		
Beer-Schaffer	Alicia		M+36	10	$ 88,875.00		
Behr	Megan		M+36	16+	$ 106,500.00		
Behr	Michael		M+36	16+	$ 106,500.00	$991.00	Team Leader
Behrens	Melinda	Nurse	M	8	$ 79,325.00		
Beitler	Jacob		M+24	12	$ 92,875.00	$3,714.00	Dept Chair
Beitler	Rebecca		M+36	16+	$ 106,500.00		
Beky	Gena		M+36	16+	$ 106,500.00		
Bergey	Alan		B	4	$ 68,000.00		
Bergman	Kendra		M+36	16+	$ 106,500.00		
Bernd	Alexa		M+36	16+	$ 106,500.00		
Berndt	Katelyn		M+36	15	$ 104,000.00		
Best	Kimberly		B	4	$ 68,000.00		
Bickel	Katie	Nurse	M	14	$ 94,875.00		
Bigley	Joseph		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Birns	Patrick		M+36	16+	$ 106,500.00		
Bisignani	Kevin		M+36	16+	$ 106,500.00		
Blacker	Laura		M+12	13	$ 93,875.00		
Blose	Brandi		M+36	16+	$ 106,500.00		
Bodnar	Sarah		D	16+	$ 109,000.00		
Bokansky	Bridget		M+36	16+	$ 106,500.00		
Booth	Tyler		B	3	$ 67,500.00		
Borden	Jonathan		M+36	16+	$ 106,500.00	$1,980.00	Mentor
Bosco	Bonne		M+36	16+	$ 106,500.00		
Bosse	David		M+36	16+	$ 106,500.00		
Bosse	Nicole		M+36	16+	$ 106,500.00		
Boulrice	Alice		M+36	16+	$ 106,500.00		
Boyer	Blake	Secondary Counsler	M+36	16+	$ 106,500.00		

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Boyle	Sean		D	16+	$ 109,000.00	$2,257.00	Head Teacher
Braglio	Steven		M+36	16+	$ 106,500.00	$3,214.00	Dept Chair
Brashear	Cynthia		M+36	16+	$ 106,500.00		
Brashear	Naomi		B	1	$ 66,500.00		
Braun	Peyton		M	6	$ 75,775.00		
Breidenbach	Anne		M+36	16+	$ 106,500.00	$3,364.00	Dept Chair
Brion	Karen		M+36	16+	$ 106,500.00		
Brito Aponte	Melissa		B	7	$ 69,500.00		
Brown	Daniel		M+12	16+	$ 101,500.00		
Brown	David		M+36	16+	$ 106,500.00		
Bruckner	Kristen		M	16+	$ 99,000.00		
Bryan	Susan		M+12	15	$ 99,875.00		
Buck	Meghan		M+36	13	$ 97,875.00	$1,096.00	Team Leader
Budinas	David		M+36	16+	$ 106,500.00	$3,914.00	Dept Chair
Budinas	Erin		M+36	11	$ 91,875.00		
Burk-Powell	Sara	Secondary Counsler	M+36	12	$ 94,875.00		
Burt	Heather	Nurse	B	3	$ 67,500.00		
Caccavo	Mark		M+36	16+	$ 106,500.00		
Camellari	Garrett		B	1	$ 66,500.00		
Campbell	Caroline		M+36	16+	$ 106,500.00		
Campbell	Patrick		M+12	16+	$ 101,500.00		
Cannon	Gail		M+36	16+	$ 106,500.00		
Caraballo	Jennifer		M+36	16+	$ 106,500.00		
Carfara	Jennifer	Nurse	M	11	$ 85,875.00	$2,000.00	National Board Cert
Cari	John		M+36	16+	$ 106,500.00	$548.00	Team Leader (split)
Carolla	Michael		M+36	16+	$ 106,500.00		
Carr	Abigail		B	3	$ 67,500.00		
Carwell	Melanie		M	11	$ 85,875.00		
Cedarberg	Lars		B	2	$ 67,000.00		
Chamberlain	Kara		M+36	16+	$ 106,500.00		
Chase	Johnathan		M+36	16+	$ 106,500.00		
Christ	Karen		M+36	16+	$ 106,500.00	$2,000.00	National Board Cert
Clee	Megan		M	7	$ 77,550.00	$2,216.00	Grade Leader
Clendanial	Meredith		M	13	$ 91,875.00		
Clifton	Joy		M	6	$ 75,775.00	$1,980.00	Mentor
Cole	Jenna		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Coleman	Diane		M	16+	$ 99,000.00		
Colletti	Megan	Nurse	PC	9	$ 78,600.00		
Collier	Rachel		M+36	16+	$ 106,500.00		
Comer	Kristy		M+36	10	$ 88,875.00		
Confer-Resch	Stacy		M+36	16+	$ 106,500.00		
Cooke	Lori		M+36	16+	$ 106,500.00		
Cope	Christina		PC	14	$ 92,375.00		
Cornish	Christine		M	6	$ 75,775.00		
Cosme	Ashley	Secondary Counsler	M+12	10	$ 84,875.00	$2,000.00	National Board Cert
Creyer	Casey	Behavior Analy	M	7	$ 77,550.00		
Csordas	Jennifer	Elementary Counsler	M+12	4	$ 75,000.00		
Cunningham	Marlo		M+36	15	$ 104,000.00		
D'Agostino	Vincent		M+24	13	$ 95,875.00		
Dahlquist	Justin		M	11	$ 85,875.00	$1,882.00	Dept Chair (split)
Davis	Brendan		B	4	$ 68,000.00		
Davis	Brooke	Nurse	B	5	$ 68,500.00		
Day Brinker	Jashanae Day	Secondary Counsler	M+24	9	$ 85,100.00		
Deacon-Hartenstine	Natalie		M+36	14	$ 100,875.00		
DeAngelo	Barbara		PC	16+	$ 96,475.00		
DeLillo	Michelle		M+36	15	$ 104,000.00		
DeLise	Christine		M+12	16+	$ 101,500.00		
DeLong	Ruth		M+36	16+	$ 106,500.00		
Demchak	Colleen	Secondary Counsler	M+12	16+	$ 101,500.00		
Diehl	Adrea		M+36	16+	$ 106,500.00		
Dietrick	John		M+36	16+	$ 106,500.00	$3,364.00	Dept Chair

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Dietz	Joshua		D	13	$ 100,375.00	$2,257.00	Head Teacher
DiGiacinto	Rebecca		PC	12	$ 86,375.00		
DiStefano	Robyn		M+36	10	$ 88,875.00		
Doklan	Bridget		M+36	16+	$ 106,500.00		
Dreisbach	Lynn		M+36	16+	$ 106,500.00	$2,057.00	Dept Chair (split)
Dry	Erin		M+36	16+	$ 106,500.00		
Duarte	Michael		M+36	16+	$ 106,500.00		
Duffy	Kelly		M+36	16+	$ 106,500.00		
Dunlap	Mary		M	11	$ 85,875.00	$2,257.00	Subject Leader
Durigan	Karen		PC	16+	$ 96,475.00		
Dzedzy	Jennifer		M+36	16+	$ 106,500.00	$1,980.00	Mentor
Edwards	Robert		M	16+	$ 99,000.00		
Eisenhard	Erin		M+36	16+	$ 106,500.00		
El-Turky	Hebat	Secondary Counsler	M	16+	$ 99,000.00	$2,000.00	National Board Cert
Ellis	Averi		M+36	13	$ 97,875.00		
England	Carrie		M+12	16+	$ 101,500.00	$1,287.00	Subject Leader
Ervin	Kristin		M+24	16+	$ 104,000.00		
Escudero	Laura		M+36	16+	$ 106,500.00		
Eshbach	Brooke		M+24	5	$ 78,000.00	$1,096.00	Team Leader
Espenshade	Jayne		M+36	16+	$ 106,500.00		
Evans	Cozette		M	5	$ 74,000.00		
Everitt	Caitlin		M+36	11	$ 91,875.00		
Exaros	Kimberly		M+36	13	$ 97,875.00		
Fabey	Lauren		M+12	10	$ 84,875.00		
Fainor	Jordan		B	5	$ 68,500.00		
Fair	Beth		M+36	16+	$ 106,500.00		
Fairclough	Harold		M+36	16+	$ 106,500.00		
Faisetty	Kelly		M+36	16+	$ 106,500.00		
Farrell	Kathleen		M	13	$ 91,875.00		
Faust	Brooke		M	5	$ 74,000.00		
Faust	Kim		M+36	16+	$ 106,500.00		
Fehlinger	Paula		M+36	16+	$ 106,500.00		
Fenstermaker	Nicole		M+24	10	$ 86,875.00		
Fenton	Nicole		M+36	16+	$ 106,500.00		
Figueroa	Isidro		M	12	$ 88,875.00		
Finnegan	Anne		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Finnegan	Sean		M+36	16+	$ 106,500.00		
Fisher	Allison		M+24	7	$ 81,550.00		
Fisher	Philip		M+24	16+	$ 104,000.00	$1,980.00	Mentor
Fix	Lori		M+36	16+	$ 106,500.00		
Flannery	David		M+36	16+	$ 106,500.00	$1,831.00	Grade Leader
						$2,257.00	Head Teacher
Foltz	Bradley		M	8	$ 79,325.00		
Force	Brittney		PC	12	$ 86,375.00		
Ford	Tracy		M+36	16+	$ 106,500.00		CPL Spring 2027
Foster	Megan		M	6	$ 75,775.00		
Foster	Shawn		M	13	$ 91,875.00		
Fowkes	Michele		D	16+	$ 109,000.00	$548.00	Team Leader (split)
Frank	Casey		M	3	$ 72,000.00		
Frantzen	Justine		M+36	16+	$ 106,500.00	$3,914.00	Dept Chair
Fraser	Shannon		M+36	16+	$ 106,500.00	$3,614.00	Dept Chair
Freeman	Megan		M+36	13	$ 97,875.00	$2,814.00	Bldg Schoology
Frei	Krystina		M+12	10	$ 84,875.00		
Frey	Deborah		M+36	16+	$ 106,500.00		
Fritz	Lisa		PC	16+	$ 96,475.00		
Fritz	Marsha		M+24	16+	$ 104,000.00		
Fritz	Sara		M+36	16+	$ 106,500.00		
Fuller	Susan	Elementary Counsler	D	16+	$ 109,000.00	$3,464.00	Dept Chair
Furry	Laurie		M+36	16+	$ 106,500.00		
Gavin	Aaron		M+36	16+	$ 106,500.00		
Gee	Kevin	Secondary Counsler	M	10	$ 82,875.00	$2,814.00	Bldg Schoology

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Geiger	Erin		M+36	16+	$ 106,500.00		
Geist	Jason		M+36	16+	$ 106,500.00		
Getchius	Taylor		B	4	$ 68,000.00		
Gibson	Laura		M	16+	$ 99,000.00		
Gillen	Nicole		M+36	10	$ 88,875.00	$1,980.00	Mentor
Gitski	Linda		M	11	$ 85,875.00		
Glenn	Kaitlyn		M+24	9	$ 85,100.00		
Glick	Krista		M+36	16+	$ 106,500.00		
Grabfelder	Derek		M+36	16+	$ 106,500.00		
Graham	Taylor		B	2	$ 67,000.00		
Green	Emily		M+36	9	$ 87,100.00		
Greenawald	Keri		M	11	$ 85,875.00		
Greene	Heather	Secondary Counsler	M+24	16+	$ 104,000.00		
Grice	Kara		M+24	16+	$ 104,000.00		
Grim	Kyle		PC	12	$ 86,375.00		
Gross	Courtney		M	5	$ 74,000.00		
Guignet	John		M+36	8	$ 85,325.00		
Gurnari	Robyn		M+12	6	$ 77,775.00		
Haas	Allison		M	8	$ 79,325.00	$548.00	Team Leader (split)
Haas	Marissa		M+36	10	$ 88,875.00		
Hacker	Tanya		M+36	16+	$ 106,500.00		
Haddad	Omar		M+12	5	$ 76,000.00		
Haja	Nicholas		M+36	13	$ 97,875.00		
Hallowell	Nicole		M	16+	$ 99,000.00		
Hanlon	Jason		M+36	16+	$ 106,500.00		
Hanna	Virginia		M+36	12	$ 94,875.00		
Hanssen	Jennifer		M	15	$ 97,875.00		
Harkcom	Kelly		M+12	16+	$ 101,500.00		
Harm	Michael		M+36	16+	$ 106,500.00		
Harned	Michelle		M+36	16+	$ 106,500.00		
Harstine	Alexia		M	11	$ 85,875.00		
Harvey	Clare		M+36	16+	$ 106,500.00		
Hassler	Chantal		M+36	12	$ 94,875.00		
Hastie	Kristin		M	14	$ 94,875.00		
Hauge	Kimberly		M	4	$ 73,000.00		
Hausman	Carol		M	16+	$ 99,000.00		
Healy	Robyn		M+12	16+	$ 101,500.00		
Heibeck	Thomas		M	3	$ 72,000.00		
Heller	Amanda		M+36	16+	$ 106,500.00		
Hemberger	Amanda	Elementary Counsler	M+36	15	$ 53,000.00	$2,000.00	National Board Cert
							CPL 26-27
Henry	Kim		M	16+	$ 99,000.00		
Herman	Heather		D	16+	$ 109,000.00	$2,057.00	Dept Chair (split)
Hess	Alyssa		M	5	$ 74,000.00		
Hildebrand	Jacob		M+36	12	$ 94,875.00		
Hildebrand	Rachel	Elementary Counsler	M+12	5	$ 76,000.00		
Hildebrand	Terri	Nurse	M	16+	$ 99,000.00	$3,314.00	Dept Chair
						$2,000.00	National Board Cert
Hinkel	Drew		M+24	16+	$ 104,000.00		
Hinkle	Trey		M+24	4	$ 77,000.00		
Hockenberry	Gabrielle		M+36	5	$ 80,000.00		
Hoderewski	Ara		M	16+	$ 99,000.00		
Hoffman	Anjanette		M+24	16+	$ 104,000.00	$1,796.00	Grade Leader
Hoffman	Michelle		M+36	16+	$ 106,500.00	$956.00	Team Leader
Hogan	Alon		M+36	6	$ 81,775.00	$3,214.00	Dept Chair
Holveck	Amanda		M+36	14	$ 100,875.00		
Hoosier	Abigail		M+36	16+	$ 106,500.00		
Horn	Jamie		M+36	16+	$ 106,500.00		
Horner	Alison		M+36	16+	$ 106,500.00		
Houck	Emily		M	10	$ 82,875.00	$1,131.00	Team Leader
Housten	Stephanie		M+36	16+	$ 106,500.00		

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Howard	Jeanne		M	4	$ 73,000.00		
Hoysan	Brianna		B	3	$ 67,500.00		
Hubbs	Michael		M+36	16+	$ 106,500.00		
Hudak	Jamie		M+36	16+	$ 106,500.00		
Huebner	Amanda		M+36	16+	$ 106,500.00		
Hughes	Aaryanna		B	2	$ 67,000.00		
Hulmes	Ashleigh		M+36	16+	$ 106,500.00		
Hummell	Julie		M+36	16+	$ 106,500.00	$1,882.00	Dept Chair (split)
Hunter	Pamela		M+36	16+	$ 53,250.00		CPL 2026-27 SY
Husser	Crystal		M+24	16+	$ 104,000.00		
Hydro	Lynne		M	16+	$ 99,000.00		
Hydro	Randy		M	16+	$ 99,000.00		
Isaksson	Jaime		M	16+	$ 99,000.00		
Issa	Sierra		B	2	$ 67,000.00		
James	Caitlin		M+24	8	$ 83,325.00		
Jemmott	Paige		M	5	$ 74,000.00		
Kahl	Julianne		M+36	11	$ 91,875.00	$643.50	Team Leader (split)
Kannenberg	Kimberly		M+12	16+	$ 101,500.00		
Kao	Karin		M+24	16+	$ 104,000.00		
Karo	Christine		M+12	16+	$ 101,500.00		
Kaunitz	Amy		M+36	16+	$ 106,500.00	$3,059.00	National Honor Soc.
Keeley	Mark		M+36	16+	$ 53,250.00		
Keller	Jillian		M	7	$ 77,550.00		
Keller	Lauren		M	14	$ 94,875.00		
Keretz	Oksana		M+36	8	$ 85,325.00		
Kern	Alexandra		M	9	$ 81,100.00		
Kern	Kira		M	4	$ 73,000.00		
Kern	Lori	Nurse	M	16+	$ 99,000.00		
Ketcham	Scott		M+36	13	$ 97,875.00		
Kimball	Amy		M	12	$ 88,875.00		
Kingston	Katie		M	4	$ 73,000.00		
Kinney	Heather		M+36	16+	$ 106,500.00		
Kinzel	Sarah		M+36	16+	$ 106,500.00	$1,980.00	Mentor
Kirk	Ross		PC	13	$ 89,375.00		
Kistler Brown	Kimberly		B	2	$ 67,000.00		
Kistler	Jacob		B	5	$ 68,500.00		
Klepeis	Colleen		M+36	16+	$ 106,500.00		
Kline	Laura		M+36	16+	$ 106,500.00		
Kline	Wesley		M+36	10	$ 88,875.00		
Knecht	Erin		M+24	16+	$ 104,000.00		
Knecht	Stacey		M+36	16+	$ 106,500.00		
Kneller	Kimberly		D	16+	$ 109,000.00		
Knight	Jennifer		M+36	16+	$ 106,500.00		
Kollar	Christopher		M+36	16+	$ 106,500.00		
Konjoian	Julie		M+36	16+	$ 106,500.00		
Koppenol	Spencer		M	6	$ 75,775.00	$1,582.00	Dept Chair (split)
Kowalick	Madisyn		M+36	2	$ 77,000.00	$2,000.00	National Board Cert
Kramer	Rachel		M+36	16+	$ 106,500.00		
Krause	Lauren		M+36	16+	$ 106,500.00		
Kreiger	Nichole		M	9	$ 81,100.00		
Krempasky	Matthew		M+36	14	$ 100,875.00		
Kuebler	Jill		M+36	16+	$ 106,500.00		
Kukitz	Anne		M+36	16+	$ 106,500.00		
Kukitz	Daniel		M+24	16+	$ 104,000.00		
Kuklis	Laura		M+24	16+	$ 104,000.00		
Kulnis	Kaitlyn		B	2	$ 67,000.00		
Kuntz	Angela		M	16+	$ 99,000.00		
Kushma	Nikol		M	16+	$ 99,000.00		
LaBar	Jessica	Secondary Counsler	M+36	14	$ 100,875.00		
LaBar	Zachary		M+36	13	$ 97,875.00		
Laird	Geoffrey		PC	16+	$ 96,475.00		

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Lamparella	Rosemary		M	14	$ 94,875.00		
Landrum	Brent		M+24	16+	$ 104,000.00		
Langdon	Brian		M+24	16+	$ 104,000.00		
Larkin	Stephanie		M+36	16+	$ 106,500.00		
Laub	Marissa		M+36	16+	$ 106,500.00		
Laub	Matthew		M+36	16+	$ 106,500.00	$3,564.00	Dept Chair
Laubner	Dawn		D	16+	$ 109,000.00		
Lauchnor	Rosanne		M+36	16+	$ 106,500.00		
Lausch	Jameson		M	16+	$ 99,000.00		
Layton	Jennifer		M+12	16+	$ 101,500.00		
LeBourgeois	David	Librarian	M	16+	$ 99,000.00		
Lechner	Sara		M	6	$ 75,775.00		
Leiby	Laura		D	16+	$ 109,000.00	$2,000.00	National Board Cert
Lerch	Andrea		M+36	12	$ 94,875.00	$3,364.00	Dept Chair
						$1,980.00	Mentor
Lerch	Caitlin		M	13	$ 91,875.00		
Leschinsky	Dennine		M+36	16+	$ 106,500.00		
Lewis	Allison		M+36	15	$ 104,000.00	$2,000.00	National Board Cert
Limoges	Thomas		M	4	$ 73,000.00	$1,980.00	Mentor
Lindaberry	Chelsey		M	7	$ 77,550.00		
Lingold	Judith		M+12	16+	$ 101,500.00		
Linn	Britt		M	9	$ 81,100.00		
Long	Conor		B	5	$ 68,500.00		
Lower	Brad		M+36	16+	$ 106,500.00		
Luancing	Briana		M+36	12	$ 94,875.00		
Luckenbill	Eric		M+36	16+	$ 106,500.00		
Machado	Alyssa		M	5	$ 74,000.00		
Mackey	Kaelee		M+24	1	$ 74,000.00		
Magro	Molly	Librarian	M	14	$ 94,875.00	$2,964.00	Dept Chair
Malischewski	Ronald		M	5	$ 74,000.00	$548.00	Team Leader (split)
Mang	Megan	Librarian	M	16+	$ 99,000.00		
Mark	Tara		M+36	16+	$ 106,500.00		
Martin	Ellen		M+36	16+	$ 106,500.00		
Mascari	Larissa		PC	16+	$ 96,475.00		
Maskornick	Jacob		B	4	$ 68,000.00		
Mast	Katie		M+36	12	$ 94,875.00		
Matrisch	August		M+36	12	$ 94,875.00		
Maurer	Jennifer		M+36	16+	$ 106,500.00		
Mauro	Jessica		M+36	12	$ 94,875.00		
Mauro	Michael		M+12	15	$ 99,875.00		CPL SPRING 2027
Maybray	Megan		M+24	15	$ 101,875.00		
McCartney	Kelly		M	16+	$ 99,000.00		
McComsey	Lily		M	1	$ 70,000.00		
McConville	Andrew		M+36	16+	$ 106,500.00		
McCorristin	Christine		M+36	16+	$ 106,500.00		
McDonald	Sarah		M+36	16+	$ 106,500.00		
McFadden	Jamie		M+36	16+	$ 106,500.00		
McFadden	Tierney		M	10	$ 82,875.00		
McFarland	Samantha		PC	14	$ 92,375.00	$2,814.00	Bldg Schoology
						$1,980.00	Mentor
McFetridge	Robert		M	16+	$ 99,000.00		
McInerney	Michael	Secondary Counsler	M+36	16+	$ 106,500.00	$2,000.00	National Board Cert
McKinney	Dian		M	9	$ 81,100.00		
McLaughlin	Jennifer		M+12	6	$ 77,775.00		
Meehl	James		M+12	16+	$ 101,500.00		
Meinhardt	Jessica		M+36	12	$ 94,875.00		
Melcher	Hannah		M	8	$ 79,325.00		
Meyers	Frank		M+36	16+	$ 106,500.00		
Miller	Brian		M	16+	$ 99,000.00	$1,131.00	Team Leader
Miller	Justin		M	7	$ 77,550.00		
Miller	Lori		M+36	16+	$ 53,250.00		CPL 26-27 SY

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Miller	Tracey	Nurse	M+36	16+	$ 106,500.00		
Milliron	Rachel		M+24	7	$ 81,550.00		
Mish	Carrie		M	16+	$ 99,000.00		
Molnarko	Heather		M	16+	$ 99,000.00		
Monfredi	Christine		M+36	16+	$ 106,500.00		
Montepeque	Williams		M+36	16+	$ 106,500.00		
Montero	Melissa		M+36	16+	$ 106,500.00	$1,980.00	Mentor
Morales Cruz	Jennifer		B	1	$ 66,500.00		
Morales	Jessica		M+12	10	$ 84,875.00		
Morro	Scott		M	16+	$ 99,000.00		
Moseman	Jessie		M+36	16+	$ 106,500.00		
Moser	Heather		M+36	16+	$ 106,500.00		
Mosquera	Fanny		M	8	$ 79,325.00		
Moxley	Melissa		D	16+	$ 109,000.00	$3,814.00	Dept Chair
Moye	Laura		M+24	14	$ 59,325.00		.6 POSITION @ $98,875
Moyer	Samantha		M+12	16+	$ 101,500.00		
Mueller	Julie		M	10	$ 82,875.00		
Murphy	Timothy		M+36	11	$ 91,875.00		
Murray	Kathryn		PC	12	$ 86,375.00		
Mushrush	AmyJo		M+36	16+	$ 106,500.00		
Musselman	Kelly		M+36	16+	$ 106,500.00	$2,007.00	Dept Chair (split)
						$1,980.00	Mentor
Najarian	Jennifer		M+36	15	$ 104,000.00		
Nappo	Nicole		M+12	10	$ 84,875.00		
Nassry	Tammy		M+36	16+	$ 106,500.00		
Nawarynski	Carrie		M+36	16+	$ 106,500.00	$1,831.00	Grade Leader
Neikam	Kristin		M+12	12	$ 90,875.00		
Nero	Anne		M+36	16+	$ 106,500.00		
Newcomer	Melissa		M+12	8	$ 81,325.00		
Nguyen	Sandy		M	5	$ 74,000.00		
Nolan	Sean		M+36	16+	$ 106,500.00		
Nolan	Tyler		M	8	$ 79,325.00		
Nugent	Gunther		PC	13	$ 89,375.00		
O'Brien	Taylor		B	3	$ 67,500.00		
O'Connor	Timothy		M+36	16+	$ 106,500.00		
Ohl	Brent		M+36	16+	$ 106,500.00	$2,007.00	Dept Chair (split)
Olivieri	Melanie		M	4	$ 73,000.00		
Olshefski	Kelly		M+12	16+	$ 101,500.00		
Olver	Rebecca		M+36	16+	$ 106,500.00		
Opfer-Grim	Kristen	Secondary Counsler	M+36	16+	$ 106,500.00	$3,264.00	Dept Chair
Ortega	Sarah		M	7	$ 77,550.00		
Pagliaro	James		B	2	$ 67,000.00		
Palazzo	Regan		M+36	16+	$ 106,500.00		
Parish	Brian		M+24	16+	$ 104,000.00		
Parker	Jessica		M	16+	$ 99,000.00		
Parsell	Monica		M+36	16+	$ 106,500.00		
Passen	Amy		M	6	$ 75,775.00		
Patchcoski	Alison		M+36	16+	$ 106,500.00		
Patriarco	Kaitlyn		M	9	$ 81,100.00		
Paukovits	Carlene		M+36	16+	$ 106,500.00		
Perreca	Brianna		PC	10	$ 80,375.00		
Petcavage	Kate	Elementary Counsler	M+24	14	$ 98,875.00		
Peters	Dylan		M+24	16+	$ 104,000.00	$2,257.00	Subject Leader
Peters	Ryan		M+36	16+	$ 106,500.00		
Pethick	Holly		M	16+	$ 99,000.00	$2,257.00	Subject Leader
Petrunak	Shannon		M+36	16+	$ 106,500.00		
Pfenninger	Katie		M+12	13	$ 93,875.00	$3,214.00	Dept Chair
Phillips	Justin		M+36	14	$ 100,875.00		
Pissarra	Celine		M+36	15	$ 104,000.00		
Plachko	Amber		M	6	$ 75,775.00		
Plantier	Nicole		M	6	$ 75,775.00	$548.00	Team Leader (split)

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Poling	Alyssa		PC	7	$ 75,050.00		
Pomerhn	Sarah		M+36	16+	$ 106,500.00		
Prudente	Mary		M	16+	$ 99,000.00	$1,980.00	Mentor
Pszczolkowski	Brandi		M	16+	$ 99,000.00		
Pugliese	Lauren		M+12	9	$ 83,100.00		
Pum	Brian		M+36	16+	$ 106,500.00		
Racek	Susan		M+36	9	$ 87,100.00		
Raineri	Samuel		B	2	$ 67,000.00		
Rainford	Katrina		M+36	16+	$ 106,500.00		
Ramirez	Shelby		M+36	11	$ 91,875.00		
Ream	Julieanne		M	16+	$ 99,000.00		
Reed	Emily		M+24	4	$ 77,000.00		
Reidy-Toth	Jamie		M+36	16+	$ 106,500.00	$1,096.00	Team Leader
Reightler	Matthew		M	16+	$ 99,000.00	$4,264.00	Dept Chair
Reinert	Jennifer		M	16+	$ 99,000.00		
Reiss	Justen		M+36	16+	$ 106,500.00		
Reitano	Kristen	Psychologist	M+24	1	$ 74,000.00		
Remaly	Kevin		M+12	16+	$ 101,500.00		
Rhodes	Kevin		M	9	$ 81,100.00		
Richards Kohutka	Madeline		B	4	$ 68,000.00	$1,131.00	Team Leader
Richwine	Rachel		M+24	15	$ 101,875.00		
Ridley	Courtney		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Rinker	Stephanie		M	6	$ 75,775.00		
Ritter	Alma		M+36	16+	$ 106,500.00		
Ritter	Christopher		M+36	16+	$ 106,500.00		
Rivera	Jennifer		M+36	16+	$ 106,500.00		
Rivera-Woolard	Luesita		M	12	$ 88,875.00		
Robilotto	Susan		M+36	16+	$ 106,500.00		
Rohrbach	Caitlin		M+36	16+	$ 106,500.00		
Rolek	Megan		B	7	$ 69,500.00		
Romano	Michael		B	3	$ 67,500.00		
Rose	Julia		PC	6	$ 73,775.00		
Ross	Jeannine		M+36	16+	$ 106,500.00		
Ruppert	Kevin		M+36	7	$ 83,550.00		
Sabo	Heather		M+36	16+	$ 106,500.00		
Sabol	Zachary		B	3	$ 67,500.00		
Sakelarides	Jennifer		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Sarro	Jennifer		M+36	16+	$ 106,500.00		
Sauerwine	Patricia		M+36	16+	$ 106,500.00		
Saylor	Melissa		M	16+	$ 99,000.00	$1,831.00	Grade Leader
Schaeffer	Lori		M+36	16+	$ 106,500.00	$1,131.00	Team Leader
						$1,020.00	Jr. Natl Honor Soc (split)
Schael	Lisa		M+36	16+	$ 106,500.00		
Scheirer	Cassidy		M	6	$ 75,775.00		
Scherer	Jonathan		M+12	16+	$ 101,500.00		
Scheuer	Ashley		M+36	14	$ 100,875.00		
Schleicher	Haley		M+36	13	$ 97,875.00	$3,414.00	Dept Chair
Schmoyer	Matthew		M+24	8	$ 83,325.00		
Schneck	Amanda		M+36	16+	$ 106,500.00		
Scholl	Gregory		M+36	16+	$ 106,500.00		
Schrack	Heather		M+36	16+	$ 106,500.00		
Schrader	Jill		M+36	11	$ 91,875.00		
Schuler	Courtney		PC	12	$ 86,375.00		
Schwartz	Emily		M+24	15	$ 101,875.00		
Scisly	Mark		M+36	16+	$ 106,500.00	$643.50	Team Leader (split)
Scisly	Tanya		M+36	16+	$ 106,500.00	$1,096.00	Team Leader
Scozzafava	Nicole		B	3	$ 67,500.00		
Seitz	Rachel		M	5	$ 74,000.00		
Serrao	Jennifer		M+24	16+	$ 104,000.00		
Shaw	Matthew		M	16+	$ 99,000.00		
Shehab	Maria		M	1	$ 70,000.00		

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Sherman	Erin		M+24	11	$ 89,875.00		
Shimmel	Tiffany		D	16+	$ 109,000.00		
Shirvinski	Jonathan		M+36	16+	$ 106,500.00		
Shortall	Alyssa		M+36	12	$ 94,875.00	$2,257.00	Subject Leader
						$2,257.00	Head Teacher
						$1,980.00	Mentor
Shreck	Jeffrey		M+36	16+	$ 106,500.00		
Shriver	Kristen		B	7	$ 69,500.00		
Shutte	Caitlin		M+36	16+	$ 106,500.00		
Sicher	Kimberly		PC	11	$ 83,375.00		
Sickler	Ryan		M+36	10	$ 88,875.00		
Simoes	Jennifer		M	16+	$ 99,000.00		
Simpkins	Christina		M+36	16+	$ 106,500.00		
Sledz	Julia		B	3	$ 67,500.00		
Slivka	Amy		M+12	16+	$ 101,500.00		
Sly-Schueck	Megan	Librarian	M+36	16+	$ 106,500.00		
Smith	Allyson		M+36	16+	$ 106,500.00		
Smith	Anne		M+36	11	$ 91,875.00		
Smith	Eric		M+36	16+	$ 106,500.00		
Smith	Kadie		M+36	16+	$ 106,500.00		
Smith	Nicole		M	16+	$ 99,000.00		
Smith	Thad		M+36	16+	$ 106,500.00		
Smurda	Collette		M+12	11	$ 87,875.00		
Snellman	Brett		M+36	16+	$ 53,250.00		CPL 2026-27 SY
Snellman	Jamie		M+36	14	$ 50,437.50		CPL 2026-27 SY
Snow	Cindy		M+36	16+	$ 106,500.00	$1,131.00	Team Leader
Snow	Kelly	Secondary Counsler	M+24	9	$ 85,100.00		
Snyder	Katherine		M+36	8	$ 85,325.00		
Soboleski	Alexis		M+12	14	$ 96,875.00		
Solano	Jacob	Librarian	M+12	3	$ 74,000.00		
Sollenberger	Mary		M+36	14	$ 100,875.00		
Solt	Justin		M	5	$ 74,000.00	$548.00	Team Leader (split)
Sopko	Tina		PC	16+	$ 96,475.00	$1,726.00	Grade Leader
Sosnovik	Jennifer		M	16+	$ 99,000.00		
Spadt	Douglas		M+36	16+	$ 106,500.00		
Speicher	Stuart		M+36	16+	$ 106,500.00		
Spengler	Mark		M+24	16+	$ 104,000.00		
Spengler	Tanya		M+12	16+	$ 101,500.00		
Spotts	Heather	Secondary Counsler	M+36	16+	$ 106,500.00	$1,980.00	Mentor
Squire	Annie		M	5	$ 74,000.00		
Stangil	Savina		M+36	16+	$ 106,500.00		
Stauffer	Laura		M	16+	$ 99,000.00		
Stellato	Kelly		M+36	16+	$ 106,500.00	$1,020.00	Jr. Natl Honor Soc (split)
Stuchko	Christopher		M+36	16+	$ 106,500.00		
Susens	Kristen		M+36	16+	$ 106,500.00		
Svencer	Bryan		M+36	16+	$ 106,500.00		
Svencer	Kristina		M+36	16+	$ 106,500.00		
Swauger	Jacqueline		M	16+	$ 99,000.00		
Swavely	Jade		M	5	$ 74,000.00		
Szarka	Nicole		M+36	13	$ 97,875.00		
Szewczuk	Alexa		B	3	$ 67,500.00		
Terplan	Katelyn		B	2	$ 67,000.00		
Thomas	Jennifer L.		M+12	16+	$ 101,500.00		
Thomas	Jennifer M.		M+36	16+	$ 106,500.00		
Tietz	Ann Marie		M	16+	$ 99,000.00		
Tomasello	Kristen		M+12	15	$ 99,875.00		
Torpey	Kelsey		M+36	16+	$ 106,500.00		
Torres	Victoria	Elementary Counsler	M+36	10	$ 88,875.00		
Toto	Anthony		M+36	16+	$ 106,500.00	$548.00	Team Leader (split)
						$3,614.00	Dept Chair
Trexler	Gregory		M+36	16+	$ 106,500.00		

TEACHERS

LAST NAME	FIRST NAME	POSITION	DEGREE	YEARS	26/27 SALARY	SALARY+	NOTES
Trujillo	Cheryl		M	16+	$ 99,000.00		
Tucker	Megan		M+36	16+	$ 106,500.00	$1,020.00	Jr. Natl Honor Soc (split)
Ulicny	Adriane		M+24	16+	$ 104,000.00	$1,980.00	Mentor
Ulicny	Brigid		M	16+	$ 99,000.00		
Urbassik	June		M+36	16+	$ 106,500.00		
Valentine	Sharawn		M+24	16+	$ 104,000.00		
VanOrmer	Lisa		PC	16+	$ 96,475.00		
Velez Camacho	Michelle		M	2	$ 71,000.00		
Venanzi	Jenna	Nurse	M	11	$ 85,875.00		
Vergamini	Barbie		M+12	12	$ 90,875.00		
Verile	Peter		M+36	16+	$ 106,500.00		
Vernon	Emily		M+12	16+	$ 101,500.00		
Vitale	Phillip		M+36	9	$ 87,100.00		
Walsh	Danielle		M+36	16+	$ 106,500.00		
Ward	Amanda		M+12	9	$ 83,100.00		
Wasilewski	Shannon		M+12	10	$ 84,875.00		
Watson	Lauren		M+24	16+	$ 104,000.00		
Webb	Maureen		M+36	16+	$ 106,500.00		
Weiderhold	Julie		M+36	16+	$ 106,500.00		
Weikel	David		M	16+	$ 99,000.00		
Weimann	Matthew		M+36	15	$ 104,000.00		
Welhaf	Christine		M	15	$ 97,875.00		
Weller	Loni		M+36	14	$ 100,875.00		
Wells	Amy		M	8	$ 79,325.00		
Welsko	Joann		M+36	15	$ 104,000.00		
Wenner	Jonathan		M+12	16+	$ 101,500.00		
Werst	Sirena		M	8	$ 79,325.00		
West	Heather		M+36	16+	$ 106,500.00		
Wetherhold	Julia		D	15	$ 106,500.00		
Wetherhold	Logan		M	8	$ 79,325.00		
Whiteman	Madison		B	2	$ 67,000.00		
Wiik	Kristen		M	5	$ 74,000.00		
Wikert	Amy		M+36	16+	$ 106,500.00		
Willett	David		M+36	16+	$ 106,500.00		
Williams	Alexis		M+12	16+	$ 101,500.00	$2,257.00	Head Teacher
Williams	Denine		M+36	16+	$ 106,500.00		
Williams	Julie		M+36	16+	$ 106,500.00		
Williams	Ryan		M+36	16+	$ 106,500.00		
Williams	Scott		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Wilson	Heather		M+36	16+	$ 106,500.00	$2,257.00	Head Teacher
Wilson-Rodrigues	Kati		M+36	15	$ 104,000.00		
Wiltrout	Julie		M	12	$ 88,875.00		
Wood	Paul	Secondary Counsler	M+36	16+	$ 106,500.00		
Woodard	Diana	Elementary Counsler	M+12	10	$ 84,875.00		
Woolf	Nicole		M	13	$ 91,875.00		
Wukitch	Nicole		M+12	16+	$ 101,500.00		
Yahr	Catherine		B	2	$ 67,000.00		
Yanovich	Elisa		M	8	$ 79,325.00		
Yeakel	Janet		M+12	16+	$ 101,500.00		
Yergey	Melissa		M+24	9	$ 85,100.00		
Zappile	Julie		M	16+	$ 99,000.00		
Zayaitz-Ruhf	Margaret		M+36	14	$ 100,875.00		
Ziegler	Ashley		M+24	16+	$ 104,000.00		
Ziegler	Jillian		M+36	16+	$ 106,500.00		
Ziegler	Marisa		M	16+	$ 99,000.00	$1,761.00	Grade Leader
Ziemba	Heather		M+12	14	$ 96,875.00		
Zimmer	Julia		B	9	$ 69,500.00	$1,582.00	Dept Chair (split)
Zolomij	Jonathan		M+36	12	$ 94,875.00		

FULL TIME SUBSTITUTES

LAST NAME	FIRST NAME		DEGREE	YEARS	26/27 SALARY		NOTES
Cwynar	Kristen		M	3	$72,000.00		
Ervin	Emily		B	1	$66,500.00		Jan-Jun 2027
Feichtl	Alyvia		B	1	$66,500.00		
Jones	Addison		B	1	$66,500.00		
Kite	Danielle		B	3	$67,500.00		
Lopez	Sasha		B	1	$66,500.00		
McLaughlin	Stacia		B	1	$66,500.00		
Middlecamp	Edward		B	5	$66,500.00		Jan 2027-end of SY
Miller	Christopher		B	1	$66,500.00		
Richardson	Leah		B	1	$66,500.00		Dec 2026-Jun 2027
Rodinov	Anna		B	1	$66,500.00		
St. Pierre	Zachary		B	1	$66,500.00		
Tran	Katie		B	1	$66,500.00		Dec 2026-Jun 2027
Traupman	Alexis		M	1	$70,000.00		

ADMINISTRATIVE ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Ahne	Jill	ADMIN			$21.93		
Arnold	Rebecca	JEFFERSON			$22.22		
Batz	Donna	Eyer			$22.13		
Bennicoff	Courtney	EHS			$21.93		
Boland	Lisa	ADMIN			$22.32		
Chalmers	Julie	ADMIN			$21.93		
Christman-Scherer	Shelley	ADMIN			$21.93		
Crawford	Keri	EHS			$21.93		
DeJohn	Suzanne	EHS			$21.93		
Durnin	Jessica	EHS			$21.93		
Evans	Nina	SHOEMAKER			$23.31		
Featenby	Rebecca	MACUNGIE			$25.57		
Fenstermaker	Tami	ADMIN			$24.56		
Frey	Deborah	LMMS			$22.03		
Gaines	Christina	EYER			$22.03		
Gehman	Christina	WILLOW			$21.93		
Henseler	Karine	EHS			$21.93		
Holmes	Kimberly	ADMIN			$21.93		
Howard	Joanne	WESC			$22.13		
Jones	Gina	EHS			$21.93		
Kern	Megan	ADMIN			$21.93		
Killo	Jill	EHS			$21.93		
Kosalko	Tiffany	SHOEMAKER			$22.23		
Lawson	Nicole	EHS			$21.93		
Lechmanik	Lisa	LINCOLN			$28.15		
Miller	Jessica	ADMIN			$21.93		
Mohlenhoff	Amanda	ADMIN			$21.93		
Roberts	Nancy	ALBURTIS			$22.32		
Roberts	Rudith	Eyer			$21.93		
Ross	Kelly	WILLOW			$21.93		
Rutch	Julia	LMMS			$21.93		
Santaniello	Jessica	Eyer			$21.93		
Schoenly	Lora	WESC			$22.91		
Serensits	Robin	LMMS			$23.31		
Slimm	Linda	MACUNGIE			$22.03		
Smith	Teri	SHOEMAKER			$21.93		
Sparango	Laurie	EHS			$21.93		
St.Pierre	Denise	LMMS			$21.93		
Taskalos	Kimberly	EHS			$21.93		
Vrabel	Jaclyn	ADMIN			$21.93		
Walls	Kelly	EHS			$21.93		
Weidner	Macy	ADMIN			$21.93		
Wetherhold	Gail	EHS			$21.93		
Yartymyk	Heather	LMMS			$21.93		

CAFETERIA

LAST NAME	FIRST NAME	LOCATION	POSITION		26/27 SALARY		NOTES
Agans	Christina	Eyer			$20.36		
Allen	Kelly	JEFFERSON			$20.36		
Anderson	Fawn	Eyer	Leader		$21.14		
Arndt	Tanya	Eyer			$20.36		
Bollinger	Michelle	LMMS			$20.36		
Bower	Amy	EHS	Coordinator		$21.91		
Brinker	Yvette	LMMS			$20.36		
Brouse	Madisen	Eyer			$20.36		
Busher	Anne Marie	LINCOLN			$20.36		
Calise	Kristina	MACUNGIE			$20.36		
Cassium	Alison	LMMS			$20.36		
Costa	Michelle	MACUNGIE			$20.36		
Coyle	Becky	LINCOLN			$20.36		
Deysher	Patricia	EYER			$20.36		
Erney	Amy	ALBURTIS			$20.36		
Falcone	Rosemarie	WESC			$20.36		
Fegely	Louise	EHS			$20.36		
Fegley	Nicole	JEFFERSON			$20.36		
Foraker	Laura	EHS	Leader		$21.14		
Fuerst	Marguerite	EHS			$20.36		
Gambler	Michele	WILLOW			$20.36		
George	Donna	LMMS	Coordinator		$21.91		
Gilbert	Kimberly	LMMS	Leader		$21.14		
Golderer	Kelly	EHS			$20.36		
Gross	Gretchen	WILLOW			$20.36		
Haldeman	Karen	WILLOW	Leader		$21.14		
Hammel	Diann	WILLOW	Leader		$21.14		
Hayes	Erica	LMMS			$18.32		
Holmes	Renee	EHS			$20.36		
Horlacher	Renee	LMMS			$20.36		
Hudak	Mara	LMMS			$18.32		
Kassis	Lisa	EHS			$20.36		
Kern-Wagner	Ashley	LMMS			$20.36		
Kidd	Dawn	MACUNGIE			$20.36		
Kilareski	Nicole	EHS			$20.36		
Krasnansky	Lori	SHOEMAKER			$20.36		
Lion	Rebecca	LMMS	Leader		$21.14		
Lujan	Diana	MACUNGIE			$18.32		
Masiado	Tessa	EHS			$20.36		
Mason	Danielle	EHS	Leader		$21.14		
McGrath	Tami	SHOEMAKER	Coordinator		$21.91		
Mercer	Kristina	LMMS			$20.36		
Miller	Kimberly	EHS			$20.36		
Moyer	Kimberly	SHOEMAKER	Leader		$21.14		
Nau	Faith	LMMS			$20.36		
Newhard	Alice	EHS			$20.36		
Ofray	Madeline	LINCOLN			$18.32		
Pavlacka	Melody	EHS			$20.36		
Pennell	Robin	WESC			$20.36		
Peters	Katie	WESC			$18.32		
Petropoulos	Georgia	WESC			$20.36		
Randazzo	Michelle	WESC			$20.36		
Reinbold	Sherri	Eyer			$20.36		
Reinhart	Brenda	LINCOLN			$20.36		
Rinker	Darlene	EYER	Coordinator		$21.91		
Semet	Karen	EHS			$20.36		
Serrano	Elya	ALBURTIS			$20.36		
Skriletz	Samantha	EHS			$20.36		
Snyder	Debra	LMMS			$20.36		
Stenroos	Lisa	EHS			$20.36		
Stubits	Diane	ALBURTIS			$20.36		

CAFETERIA

LAST NAME	FIRST NAME	LOCATION	POSITION		26/27 SALARY		NOTES
Swafford	Alyssa	EHS			$18.32		
Vargas	Aria	SHOEMAKER			$20.36		
Vargas	Kayla	SHOEMAKER			$18.32		
Young	Tara	EHS			$18.32		

CUSTODIAL

LAST NAME	FIRST NAME	LOCATION	POSITION		26/27 SALARY		NOTES
Althouse	Carrie	EHS	Custodian 2nd Shift		$31.17		
Amato	Nathan	WESCOSVILLE	Head Custodian		$36.26		
Angrand	Jeandy	LINCOLN	Custodian-2nd Shift		$31.17		
Arrington	Shawn	EHS	Custodian-3rd Shift		$28.06		
Bachert	Danny	WILLOW	Head Custodian		$36.26		
Batz	Warren	JEFFERSON	Night Foreman		$33.46		
Benner	Thomas	WILLOW	Custodian		$32.60		
Bennicoff	Allan	ALBURTIS	Head Custodian		$35.01		
Bennicoff	Cody	DIST. GARAGE	Utility		$36.22		
Brown	Matthew	SHOEMAKER	Head Custodian		$36.26		
Buchman	William	JEFFERSON	Head Custodian		$35.01		
Cabrera	Jose	EHS	Custodian - 2nd Shift		$32.80		
Christman	Larry	EHS	Custodian		$32.60		
Diehl	Kurt	MACUNGIE	Custodian-2nd Shift (T-S)		$31.17		
Dugan	Bryan	DIST. GARAGE	Utility		$36.22		
Fegely	Randy	SHOEMAKER	Custodian Cafeteria		$32.60		
Flexer	Todd	EYER	Head Custodian		$36.26		
Fritz	David	MACUNGIE	Head Custodian		$36.26		
Garis	Harry III	EHS	Custodian-2nd Shift (T-S)		$27.91		
Gaugler	Joel	DIST. GARAGE	Maintenance A-Carpenter		$38.49		
Genovese	Anthony	LMMS	Custodian-2nd Shift (T-S)		$27.91		
Greene	Shawn	DIST. GARAGE	Utility		$36.22		
Greer	Gary	EHS	Custodian-2nd Shift		$32.80		
Haja	John	EHS	Custodian-2nd Shift		$31.17		
Hensinger	Derek	EHS	Custodian		$32.60		
Hodge	Nigel	DIST. GARAGE	Utility		$36.22		
Jodubar	Shawn	DIST. GARAGE	Maintenance A - HVAC		$38.49		
Jones	Brett	DIST. GARAGE	Maintenance A - Building Tech		$38.69	Retiring 12/2/26	
Ketner	Jeffrey	DIST. GARAGE	Maintenance B		$36.26		
Klotz	Michael	DIST. GARAGE	Maintenance A		$38.49		
Knauss	Sheryl	WESCOSVILLE	Night Foreman-2nd Shift		$35.21		
Kobal	Thomas	LMMS	Custodian-2nd Shift		$31.17		
Kropf	John	ALBURTIS	Night Foreman-2nd Shift		$35.21		
Leonard	Terry	WILLOW	Custodian-2nd Shift		$32.80		
Leverington	Michael	LMMS	Custodian-2nd Shift		$32.80	Retiring 1/9/27	
Lewis	Scott	DIST. GARAGE	Utility		$36.22		
Lingold	Ryan	EHS	Custodian-3rd Shift		$28.06		
Madzarac	Brian	LINCOLN	Night Foreman-2nd Shift		$35.21		
Malesky	Todd	LMMS	Custodian		$32.60		
Malloy	Thomas	DIST. GARAGE	Utility		$36.22		
Marsteller	Adam	EYER	Custodian		$32.60		
Marsteller	Andrew	EHS	Maintenance B - 2nd Shift		$36.46		
Marsteller	Daniel	EHS	Head Custodian A		$38.49		
Mashraky	Micah	DIST. GARAGE	Electrician		$34.64		
Mayer	Timothy	EHS	Custodian 2nd (T-S)		$31.17		
McCartney	Andrew	MACUNGIE	Night Foreman-2nd Shift		$35.21		
McGinniss	James	EHS	Custodian-2nd Shift		$32.80		
Mertz	Todd	DIST. GARAGE	Maintenance B		$36.26		
Miller	Andrew	DIST. GARAGE	Maintenance A - HVAC		$32.72		
Mondovich	Joseph	MACUNGIE	Custodian		$32.60		
Mondovich	Michael	WESCOSVILLE	Custodian Cafeteria		$32.60		
Morgan	Dennis	SHOEMAKER	Custodian 2nd Shift		$32.80		
Mory	Matthew	SHOEMAKER	Custodian-2nd Shift		$32.80		
Moyer	Andrew	EHS	Night Foreman-2nd Shift		$35.21		
Ohl	Jack	LMMS	Custodian 2nd Shift		$29.54		

CUSTODIAL

LAST NAME	FIRST NAME	LOCATION	POSITION		26/27 SALARY		NOTES
Oswald	Joseph	ALBURTIS	Custodian 2nd Shift		$32.80		
Palmer	Justin	EYER	Custodian 2nd Shift (T-S)		$27.91		
Rau	Adam	EYER	Custodian 2nd Shift		$32.80		
Rau	Grace	WESCOSVILLE	Custodian Part-Time		$27.91		
Roberts	Micah	DIST. GARAGE	Utility		$36.22		
Roberts	Shawn	LMMS	Head Custodian		$36.26		
Rohrbach	Jonathan	EHS	Custodian 2nd Shift		$31.17		
Rumfield	Matthew	EYER	Maintenance B - 2nd Shift		$36.46		
Sachedina	Aslam	WILLOW	Custodian-2nd Shift		$32.80		
Sampson	Jacob	Eyer	Custodian-2nd Shift		$31.17		
Schmeltzle	Cody	EHS	Custodian-2nd Shift (T-S)		$31.17		
Schmick	Andrew	DIST. GARAGE	Maintenance A-Plumber		$38.49		
Schoenly	Scott	EHS	Maintenance B		$36.26		
Sechler	Keenan	EYER	Night Foreman-2nd Shift		$35.21		
Siekonic	Joseph	DIST. GARAGE	Maintenance A-Grounds Keeper		$38.49		
Smith	Justin	WESCOSVILLE	Custodian 2nd Shift		$32.80		
Stamberger	Michael	LMMS	Custodian 2nd Shift		$29.54		
Tarafas	Aidan	Eyer	Custodian 2nd Shift		$32.80		
Torres	Jonathan	EHS	Custodian 2nd Shift		$32.80		
Vicari	Thomas, Jr.	EHS	Custodian 2nd Shift		$32.80		
Vicari	Tyler	EHS	Custodian 2nd Shift		$32.80		
Waite	Alex	SHOEMAKER	Night Foreman-2nd Shift		$35.21		
Walp	Kurtis	LMMS	Maintenance B		$36.46		
Wentz	Stephen	WILLOW	Night Foreman - 2nd Shift		$35.21		
Wetzel	Ronald	LINCOLN	Head Elem Custodian		$35.01		
Yoder	Austin	EHS	Custodian 2nd Shift		$31.17		
Yoder	Nathan	DIST. GARAGE	Maintenance A - Building Tech		$38.49		

INSTRUCTIONAL ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Agnoli	Victoria	Eyer			$21.50		
Ammirati	Dawn	Wescosville			$21.50		
Archer	Donna	Eyer			$23.73		**35 hr/week position**
Arndt	Melody	EHS			$23.73		**35 hr/week position**
Baez	Veronica	EHS			$21.50		
Beers	Jillian	Shoemaker			$21.50		
Benedick	Sarah	Macungie			$21.50		
Bigler	Rebecca	Eyer			$21.50		
Bonser	Margery	Wescosville			$23.73		
Brito	Ana	Shoemaker			$21.50		
Butler	Julia	EHS			$21.50		**35 hr/week position**
Butt	Ferva	Willow			$21.50		
Byrd	Veronica	EHS			$21.50		
Call	Angela	Macungie			$21.50		
Cavalieri	Heather	Eyer			$21.76		**35 hr/week position**
Celis	Paola	Willow			$21.50		
Celone	Jessica	Macungie			$21.50		
Chen	Michele	Eyer			$21.50		
Cooperman	Zachary	Wescosville			$21.50		
Cruz	Julissa	Willow			$21.50		
Curran	Irma	EHS			$23.73		
Damascus	Karra	Eyer			$21.50		**35 hr/week position**
DeJesus	Mabel	Wescosville			$21.50		
Delong	Lisa	EHS			$23.73		**35 hr/week position**
Deppe	Garrett	Alburtis			$21.50		
DePue	Debra	Shoemaker			$21.50		
Detrick	Sharon	EHS			$23.73		
Dickinson	Laura	Willow			$21.50		
Diefenderfer	Ashley	LMMS			$21.50		
Diehl	Sarah	Eyer			$21.50		
Dorn	Lisa	Eyer			$21.50		
Dwyer	Denise	Willow			$21.50		

INSTRUCTIONAL ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Eckert	Erin	Wescosville			$21.50		**35 hr/week position**
Everleth	Christopher	Eyer			$21.50		
Ewing	Sharon	Lincoln			$23.73		
Farner	Marcia	Willow			$21.50		
Fitzmaurice	Cynthia	Jefferson			$23.11		
Forster	Olivia	Macungie			$21.50		**35 hr/week position**
Frankenfield	Kaela	Wescosville			$21.50		
Fuller	Diane	Jefferson			$21.50		
Gehman	Michelle	Macungie			$21.50		
Geiger	Dyanne	Macungie			$21.62		
Geiger	Korinne	Macungie			$21.50		
Gery	Sara	Willow			$21.50		
Giannaris	Penny	Shoemaker			$21.50		
Hafeez	Nadera	LMMS			$21.50		
Harnett	Wendy	Willow			$23.73		
Heckman	Mary	Eyer			$21.50		
Hernandez	Jennifer	Wescosville			$21.50		
Horwath	Shannon	LMMS			$21.50		
Hriczko	Kimberly	Eyer			$21.50		
Hughes	Tammy	EHS			$23.73		
Jacobs	Jessica	Lincoln			$21.50		
Jacobs	Stephanie	Wescosville			$23.73		**35 hr/week position**
Jarrah	Ehana	Shoemaker			$21.50		
Johnson	Diane	Lincoln			$21.50		
Johnson	Theresa	Eyer			$21.50		
Jones	Lydia	LMMS			$21.50		
Kauffman	Christine	Lincoln			$23.73		
Kemmerer	Allison	Shoemaker			$21.50		
Kennedy	Karen	EHS			$23.11		
Kermitz	Lisa	Macungie			$23.73		
Kilka	Melissa	Macungie			$21.50		
Kleckner	Kristine	Shoemaker			$23.73		
Knerr-Rambo	Connie	Lincoln			$23.73		
Kotch	Kim	Lincoln			$23.73		
Krahulik-Knapp	Chad	Wescosville			$21.50		**35 hr/week position**
Kramer	Kathy	EHS			$23.73		
Lenig	Alicia	Wescosville			$21.50		
Liberatore	Lauren	Wescosville			$21.50		
Liedlich	Cara	Wescosville			$21.50		
Litzenberger	Joann	EHS			$23.73		
MacArthur	Cora	Macungie			$21.50		
Mackaravitz	Melissa	Jefferson			$21.50		
Maldonato	Blanca	EHS			$21.50		**35 hr/week position**
Malloy	Julie	Eyer			$21.62		
Maranki	Nicole	Eyer			$21.50		
Maslonka	Meredith	Macungie			$21.50		
Matsuba	Maria	Eyer			$23.73		
McConnell	Deborah	EHS			$23.04		
McNeely	Robin	EHS			$21.50		
McPherson	Izaiah	EHS			$21.50		
Mendenhall	Elizabeth	Wescosville			$21.50		**35 hr/week position**
Mendez	Marcia	Eyer			$21.50		
Mientus	Emily	Macungie			$21.50		
Miller	Jeanine	Wescosville			$23.73		
Moore	Eileen	Wescosville			$21.76		**35 hr/week position**
Moser	Catherine	Willow			$21.50		**35 hr/week position**
Moser	Jennifer	Jefferson			$21.62		
Moyer	Cynthia A	Wescosville			$23.73		
Moyer	Kelly	Shoemaker			$21.50		
Muedin	Arzu	Shoemaker			$21.50		**35 hr/week position**
Nonnemacher	Dianne	LMMS			$23.73		

INSTRUCTIONAL ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Norton	Kathy	Lincoln			$23.73		
Pallotta	Elizabeth	Wescosville			$21.50		
Peluso	Lori	EHS			$23.73		**35 hr/week position**
Penkauskas	Melanie	Alburtis			$21.50		
Phillip	Melissa	Wescosville			$21.50		**35 hr/week position**
Pierog	Susan	EHS			$23.73		
Ponte	Mariana	Shoemaker			$21.50		
Price	Mary	EHS			$21.88		
Przybylska	Emilia	Macungie			$21.50		
Quatrocchi	Alicia	Wescosville			$21.50		
Quinn	Marissa	Wescosville			$21.50		**35 hr/week position**
Rainford	Kathleen	EHS			$21.50		
Ray	Kaitlyn	Macungie			$21.50		
Reichenbach	Eleanor	Willow			$21.50		
Reidenour	Deann	EHS			$23.73		**35 hr/week position**
Reigle	Ashley	Willow			$21.50		**35 hr/week position**
Renna	Jennifer	Lincoln			$21.50		
Rice	Carolyn	Willow			$21.50		
Rife	Katherine	Eyer			$21.50		
Riley	Amy	Shoemaker			$23.11		
Rivera	Jennifer	Shoemaker			$21.50		
Rodriguez	Frances	Willow			$21.50		
Rollo	Tara	LMMS			$21.50		
Schaeffer	Dave	LMMS			$23.73		
Schneck	Trevor	LMMS			$21.50		
Shankweiler	Kimberlee	Willow			$21.50		**35 hr/week position**
Shoemaker	Sharon	Shoemaker			$23.73		
Shook	Julie	EHS			$21.62		
Sinkovits	Jessalyn	Willow			$21.50		
Smicker	Daron	Willow			$21.50		
Smith	Sarah	Wescosville			$21.50		
Smith	Tami	Willow			$21.50		**35 hr/week position**
Speraw	Briana	Macungie			$21.50		
Stamberger	Faith	LMMS			$21.50		
Stek	Nancy	EHS			$21.50		
Stuchko	Jennifer	Wescosville			$21.62		
Szep	Lisa	Eyer			$21.50		
Tesar	Patti	Willow			$21.50		
Thomas	Jessica	Wescosville			$21.50		
Traub	Corinne	Alburtis			$21.50		
Tresolaski	Rebecca	Alburtis			$21.50		
Trexler	Ashley	Alburtis			$21.50		
Trinkle	Kathleen	LMMS			$21.50		
Trumbull	Doreen	Willow			$21.76		
Urbanowicz	Danielle	Alburtis			$21.50		
Urick	Noelle	Macungie			$21.50		
Vega	Yolanda	EHS			$21.50		**35 hr/week position**
Wagstaff	Sarah	Eyer			$21.50		**35 hr/week position**
Ward	Rebecca	EHS			$21.50		
Watson	Michele	Willow			$21.50		
Wiley	Mary	Shoemaker			$21.50		
Wimble	Catherine	Macungie			$21.50		
Winkler	Kristen	Shoemaker			$21.50		
Wukitch	Brian	Willow			$23.73		**35 hr/week position**
Yeager	Lisa	EHS			$23.73		**35 hr/week position**
Zaytoun	Diane	Wescosville			$21.50		
Zimmer	Melissa	Willow			$21.50		**35 hr/week position**
Zinni	Sarah	Shoemaker			$21.50		

STAFF ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Aikey	Michelle	Willow			$20.37		
Allender	Terri	Jefferson			$20.37		
Amey	Jenna	EHS			$20.37		
Ashelman	Wendy	Shoemaker			$20.63		
Blewett	Katherine	Jefferson			$20.37		
Brouse	Sarah	EHS			$22.61		
Buss	Anna	Macungie			$20.75		
Butts	Sarah	Alburtis			$20.37		
Cabrey	Adrianna	Alburtis			$20.37		
Campbell	Melanie	EHS			$20.37		
Casse	Kari	LMMS			$20.37		
Delong	Karen	Macungie			$22.61		
Diaz	Eliana	Willow			$20.37		
Ditty	Isabella	Shoemaker			$20.37		
Dooley	Paula	Jefferson			$22.61		
Drogowski	Kelly	EHS			$20.37		
Durante	Kathleen	EHS			$20.75		
Edwards	Jenna	EHS			$20.37		
Engleman	Amber	Lincoln			$20.37		
Farina	Paul	Macungie			$20.37		
Flynn	Jessica	Willow			$20.37		
Freeman	Joanne	EHS			$22.61		
Frye	Wendy	EHS			$21.79		
George	Mariann	Lincoln			$20.37		
Gonya	Mary	Willow			$20.75		
Grochowski	Melissa	EHS			$20.37		
Gross	Teri	Lincoln			$20.37		
Halcisak	Jennifer	Lincoln			$22.61		
Haussmann	Juliane	EHS			$20.37		
Hinkel	Eriin	Wescosville			$20.37		
Hittinger	Bree	Eyer			$20.37		
Hoch	Susan	EHS			$20.37		
Huff	Daniel	EHS			$20.37		
Janjua	Rabia	EHS			$20.37		
Karam	Boutros	EHS			$20.37		
Karam	Clautilde	EHS			$20.37		
Keenan	Katherine	Lincoln			$20.37		
Kehm	Diane	Shoemaker			$22.61		
Kerchner	Barbara	Shoemaker			$20.37		
Kline	Nicole	EHS			$20.37		
Kosalko	Alexandria	Shoemaker			$20.37		
Lessard	Jamie	Alburtis			$20.37		
Longenbach	Alicia	EHS			$20.37		
Luhman	Nancy	Shoemaker			$22.61		
MacGeorge	Megan	Wescosville			$20.37		
Magargal	Michelle	EHS			$22.61		
Mariner	Allison	EHS			$20.37		
McCartney	Michelle	EHS			$20.37		
Messler	MaryKate	Willow			$20.37		
Morgan	Tahreek	Eyer			$20.37		
Murden	Tyler	Willow			$20.37		
Nonnemacher	Diann	EHS			$20.37		
Nunez-Roma	Elisabeth	Eyer			$20.37		
Ortiz	Hector	EHS			$20.37		
Park	Elizabeth	Alburtis			$22.61		
Pellegrino	Olimpia	EHS			$22.61		
Pena	Lourdes	LMMS			$20.37		
Peters	Ellen	Macungie			$20.37		
Peterson	Amy	EHS			$20.37		
Petroski	Melissa	Shoemaker			$20.37		
Preston	Nicole	Wescosville			$20.37		

STAFF ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Reilman	Tammy	EHS			$20.37		
Replogle	Audra	EHS			$20.37		
Schwab	Michael	EHS			$22.61		
Sechler	Karen	EHS			$20.37		
Shubzda	Jennifer	LMMS			$22.61		
Slifer	Larissa	Jefferson			$20.37		
Tavernier	Deborah	Willow			$20.37		
Taylor	Leah	EHS			$20.37		
Walker	Florydalia	EHS			$20.37		
Weintraub	Alan	Wescosville			$20.37		
Wessner	Martha	Jefferson			$20.37		
Wessner	Nicole	Macungie			$20.37		
Williams	Christina	LMMS			$20.37		
Wulzer-McClain	Gretchen	Wescosville			$20.37		
Zazo	Amy	EHS			$20.75		

HEALTH ROOM NURSES

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Allwein	Kathy	LMMS			$29.95		
Breidinger	Susan	Alburtis			$32.43		
Del Re	Theresa	Jefferson			$29.95		
Dondero	Lisa	Eyer			$29.95		
Fenstemaker	Valerie	Shoemaker			$29.95		
Johnson	Melisa	Willow			$29.95		
Josulevicz	Erika	Wescosville			$29.95		
Martinez	Rachel	Shoemaker			$29.95		
Novak	Amy	EHS			$29.95		
Posch	Michelle	EHS			$29.95		
Valerio	Ashley	EHS			$29.95		
Voght	Sherri	Lincoln			$32.43		
Yard	Jennifer	Macungie			$32.43		

ACADEMIC SUPPORT ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Baillie	Genevieve	WESCOSVILLE			$25.13		
Berger	Susan	JEFFERSON			$25.13		
Berndt	Irina	WILLOW			$25.13		
Boty	Christine	JEFFERSON			$25.13		
Caicedo-Tintle	Zenddy	WESCOSVILLE			$25.13		
Creedon	Mary	ALBURTIS			$25.13		
Delong	Jamie	WILLOW			$25.13		
Dormann	Paige	LMMS			$25.13		
Evans	Allison	MACUNGIE			$25.13		
Evans	Jennifer	LINCOLN			$25.13		
Farner	David	WILLOW			$25.13		
Ferrel	Suzanne	ALBURTIS			$25.13		
Fluck	Mark	LINCOLN			$25.13		
Gallagher	Tracy	EHS			$25.13		
Gautier	Nathalie	WILLOW			$25.13		
Geschel	Lynn	SHOEMAKER			$25.13		
Glowacki	Anne	EYER			$25.13		
Gruber	Jennifer	LMMS			$25.13		
Haughney	Lucas	EYER			$25.13		
Hodge	Keri	SHOEMAKER			$25.13		
Kreiner	Sandra	MACUNGIE			$25.13		
Lienhard	Catherine	SHOEMAKER			$25.13		
Lind	Allison	MACUNGIE			$25.13		
Lockwood	Brielle	LINCOLN			$25.13		
Lombardy	Renee	ALBURTIS			$25.13		
Lysek	Kathleen	WESCOSVILLE			$25.13		
Mastrorilli	Felicia	LINCOLN			$25.13		
Mauser	Stephanie	LINCOLN			$25.13		
Mechler	Sarah	WILLOW			$25.13		

ACADEMIC SUPPORT ASSISTANTS

LAST NAME	FIRST NAME	LOCATION			26/27 SALARY		NOTES
Meyer	Sheena	SHOEMAKER			$25.13		
Murante	Lacey	LINCOLN			$25.13		
Naylor	Shannon	WESCOSVILLE			$25.13		
Nguyen	Megan	WESCOSVILLE			$25.13		
Riffel	Amy	MACUNGIE			$25.13		
Rohrer	Jill	MACUNGIE			$25.13		
Romig	Jenna	LMMS			$25.13		
Taylor	Yanitza	JEFFERSON			$25.13		
Valois	Madeline	SHOEMAKER			$25.13		
Ward	Janine	ALBURTIS			$25.13		
Weidner	Britney	JEFFERSON			$25.13		
Woloshyn	Brianna	LMMS			$25.13		
Yanniello	Christine	WESCOSVILLE			$25.13		

AGREEMENT

This AGREEMENT made this 1st day of October, 2026 between Unami Fish & Game Protective Association, Inc. (hereinafter Lessor) of 76 Chestnut Hill Road, Emmaus, Pennsylvania and the East Penn School District (hereinafter Lessee) with principal offices located at 800 Pine Street, Emmaus, Pennsylvania is as follows:

The Lessor maintains shooting ranges including an indoor range suitable for small bore rifle and pistol caliber firearms at 76 Chestnut Hill Road, Emmaus, Pennsylvania.

The Lessee desires to field a rifle team for the 2026-2027 season and the parties are desirous of entering into an AGREEMENT pursuant to which the Lessee will use a proscribed portion of the premises of the Lessor so that the Lessee can practice, compete and hold matches in an interscholastic rifle league.

Therefore the parties do hereby agree to the following:

1. The above recitals are part of this AGREEMENT.

2. Lessor agrees to provide 8 lanes of a rifle shooting range commencing 1 November 2026 and concluding 21 February 2027 from 3:00 PM to 6:00 PM Mondays through Fridays so that the Lessee can practice, compete and hold matches in an interscholastic rifle league. Lessee agrees to open premises no sooner than 2:30 PM, and vacate the range no later than 6:30 PM. Away matches will require access and return of equipment at times other than specified above. These respective dates and times will apply for subsequent years for the life of the AGREEMENT. These times will be scheduled for exclusive use of Lessee for team and/or intramural teams' usage. Any additional range usage may be negotiated as agreed by both parties and by amendment to this AGREEMENT. Lessor agrees to maintain a suitable indoor range environment and Lessee agrees to clean up and remove any materials except for material inside the steel backstop trap area that result from practices and matches.

3. Lessor agrees to maintain its range in accordance with National Rifle Association (hereinafter NRA) standards and Lessee agrees that the coach of the rifle team shall be a NRA certified Rifle Coach. The responsibility of selecting the coach is entirely up to the Lessee and the Lessor will have no control over that appointment. The coach will supervise all team members and any other staff until they all have left the premises.

4. Lessor does further agree that all rifles, ammunition, and accoutrements of the Lessee shall be stored in an alarmed building at the premises of the Lessor. Said items may be utilized only by Lessee's team and coach. Said items will remain the sole property of Lessee (EPSD), and may be utilized only by Lessee's (EPSD) students and coaches. The Lessee's designated coach shall have key and alarm access to range area. A safe will be provided, delivered, and removed at the termination of this AGREEMENT by Lessee.

5. All practice and match shooting shall be conducted in accordance with NRA and Lessor's safety practices. The Lessor does not assume for any liability for any losses that may occur due to the conduct of the Lessee or persons solely within the control of the Lessee, it being understood that the Lessee maintains its own liability coverage which does cover its teams, agents, servants, and employees. Lessee hereby warrants that it will indemnify and defend Lessor in case of any loss or liability that may arise out of Lessor's performance under, and in accordance with, this AGREEMENT, but not to the extent that any such loss or liability results directly or indirectly from the gross negligence or willful misconduct of Lessor.

6. All of Lessee's coaches, teams, volunteers, agents, servants, and employees using Lessor's facilities must sign a release form prior their first practice session of each contract year. See Exhibit A. Team members and their match opponents may attend coach supervised practices and matches only as specified in this AGREEMENT and need not become members. Lessee's staff that may attend and assist under the main coach supervising practice and matches need not obtain guest passes, but as stated above must sign a release form.

7. In event of a default by the Lessor, the Lessee, at its option may immediately declare this AGREEMENT null and void, and all money paid, due or owing from the Lessee shall be pro-rated.

8. In consideration of the above, the Lessee agrees to pay an annual seasonal rental fee of $2500.00 by 1 November.

9. This AGREEMENT will continue for a period of 12 months. Lessor may request reasonable rent increase with Lessee's agreement in subsequent years. Either party may cancel this lease for any reason with prior notice with no penalty or cancelation fee. Notice of termination of this AGREEMENT must be made by either party on or before 28 February of each contract year.

10. This AGREEMENT constitutes the entire AGREEMENT. Any changes shall be in writing and signed by both parties. This AGREEMENT shall be construed and interpreted under the laws of the State of Pennsylvania.

11. FORCE MAJEURE Neither party will be liable for any failure or delay in performing an obligation under this AGREEMENT that is due to any of the following causes: acts of God, accident, riots, war, terrorist act, epidemic, pandemic, quarantine, civil commotion, breakdown of communication facilities, natural catastrophes, government acts or omissions, changes in law or regulations, natural strikes, fire, explosion, or generalized lack of accountability of raw materials or energy.

LESSOR:	LESSEE:
UNAMI FISH & GAME PROTECTIVE ASSOCIATION, INC.	EAST PENN SCHOOL DISTRICT Board of School Directors
Authorized Signature	Authorized Signature
Print Name/Title	Print Name/Title
Date	Date

2026-2027 REGULAR SCHOOL YEAR
BASE TUITION AGREEMENT

Between: George Crothers Memorial School (GCMS) ("APPROVED PRIVATE SCHOOL")
401 Rutgers Avenue
Swarthmore, PA 19081

and: East Penn School District ("SENDING DISTRICT")
800 Pine St.
Emmaus, PA 18049

Terms of this AGREEMENT (the "AGREEMENT") are as follows:

1. Nature of the Services to be Performed. Self-contained special education program in accordance with the Individualized Education Program ("IEP") of the Student named in paragraph 3.

2. Date(s) and Frequency of Services to be Performed. 5 days a week, beginning August 31, 2026 or first school entry date through June 11, 2027 (or last day of school) or until eligible for an available 4010 slot and tuition is provided to APPROVED PRIVATE SCHOOL by the PA Department of Education (PDE) through the PDE-4010 process.

3. Student. The individual who will receive direct benefits from the services to be performed is [redacted] ("Student").

4. Necessity of the Service. School-aged children are entitled to a free and appropriate education including, as in the case of the Student, in accordance with an approved IEP.

5. Payment Terms. The fee will be **$80,490.60** per year (180 school days) per student. This fee is inclusive of speech, occupational and physical therapy services. APPROVED PRIVATE SCHOOL will submit monthly bills to SENDING DISTRICT indicating number of education days provided and total fee due. Payment for services will be rendered within thirty (30) days after receipt of a properly detailed invoice.

6. Termination. (1) By mutual written agreement of the parties to this AGREEMENT; or (2) by either party to the AGREEMENT upon 30 days prior written notice to the other party to this AGREEMENT; or (3) granting of tuition reimbursement from the PDE (i.e. PDE 4010 process slot becomes available per paragraph 2). "Termination shall not take effect and Student shall not be disenrolled until Student's parent or legal guardian has consented in writing or, in the absence of such consent, until the change of placement is approved by final order of a hearing officer, appeals panel, or court. Notwithstanding the foregoing, the Approved Private School agrees to comply with the stay-put procedural safeguard provisions of 20 U.S.C.'1415."
If the APPROVED PRIVATE SCHOOL determines that it can no longer appropriately serve the Student, the SENDING DISTRICT shall take all available steps to obtain an appropriate alternative program and to effectuate a transfer to that program. This responsibility on the part of the SENDING DISTRICT does not negate or reduce the right of the APPROVED PRIVATE SCHOOL to discharge the student in a manner consistent with applicable law under such circumstances.

7. Equal Opportunity and Non-Discrimination. APPROVED PRIVATE SCHOOL shall serve students referred to the APPROVED PRIVATE SCHOOL without regard to sex, color, religion, race, national origin, non- disqualifying disability or due to membership in any other class protected by law or by any Policy adopted by the Board of Directors of the SENDING DISTRICT.

8. Attendance Records. The APPROVED PRIVATE SCHOOL shall keep attendance records that shall be submitted with the monthly bill. The Student's absence from the APPROVED PRIVATE SCHOOL shall not constitute a termination of the Student's enrollment nor reduce any amount that the SENDING DISTRICT is obligated to pay hereunder without the APPROVED PRIVATE SCHOOL'S prior written consent. The SENDING DISTRICT shall receive notice of the Student's absence in excess of 5 consecutive days for the purposes of convening an IEP Team Meeting.

9. Privacy. The parties to this AGREEMENT shall protect the privacy and provide for the security of the Student's Protected Health Information that may be disclosed pursuant to the execution and performance of this AGREEMENT in compliance with the Health Insurance Portability and Accountability Act of 1996, Public Law 104-191 ("HIPPA") and regulations promulgated there under by the U.S. Department of Health and Human Services (the "HIPPA Regulations") and other applicable laws.

   "Protected Health Information" of "PHI" means any information, whether oral or recorded in any form or medium: (i) that relates to the past, present or future physical or mental health or condition of an individual; the provision of health care to an individual; or past, present or future payment for the provision of health care to an individual , and (ii) that identifies the individual or with respect to which there is a reasonable basis to believe the information can be used to identify the individual, and shall have the meaning given to such term under HIPPA and the HIPPA Regulations including, but not limited to, 45 CFR Section 164.501.

   The APPROVED PRIVATE SCHOOL shall also protect personally identifiable information about the Student that is prohibited from disclosure pursuant to state or federal law, including FERPA, IDEA, the Protection of Pupil Rights Amendment (PPRA), the National School Lunch Act, and 22 Pa. Code 12.31-12.32

10. Insurance. APPROVED PRIVATE SCHOOL agrees to maintain for itself and for its agents, employees, and any other personnel rendering Services under this AGREEMENT provided hereunder, (a) general liability insurance (including coverage for acts of molestation, neglect and/or abuse); and (b) professional liability insurance, as it may be needed, and all other insurance required by law to provide Services under this AGREEMENT. All insurance policies shall be maintained with companies licensed and authorized to do business in the Commonwealth of Pennsylvania and certificates of coverage shall be furnished to the SENDING DISTRICT upon request.

11. Indemnification. APPROVED PRIVATE SCHOOL shall defend, indemnify and save the SENDING DISTRICT, and its board of directors, officers, agents, employees, in their official or individual capacities, harmless from any and all claims, damages, demands, liabilities, costs and expenses, including court costs and attorney's fees, from third parties which arise out of or are related to APPROVED PRIVATE SCHOOL'S acts, omissions, or performance of its obligations under this AGREEMENT. This obligation for indemnification by APPROVED PRIVATE SCHOOL shall not apply with respect to any claim, damage, demand, liability, cost or expense allegedly arising from the SENDING DISTRICT'S negligence or willful misconduct or reckless disregard or bad faith. APPROVED PRIVATE SCHOOL shall retain counsel and provide a defense, and the SENDING DISTRICT agrees to cooperate fully in all respects with such defense.

12. Integration/Amendment. This AGREEMENTS constitutes the entire agreement between the parties hereto respecting the subject matter hereof and supersedes any prior understanding or written, or oral or implied-in-fact or implied-in-law agreements between parties respecting the subject matter contained herein. This AGREEMENT may be amended only in writing signed by both parties hereto.

13. Governing Law. This AGREMENT shall be governed by the laws of the Commonwealth of Pennsylvania and venued in the Court of Common Pleas of Delaware County, Pennsylvania or, if subject matter jurisdiction exists, the United Stated District Court for the Eastern District of Pennsylvania over any suit, action or proceeding arising out of or relating to this agreement, and each party agrees that such Court has personal jurisdiction over it.

14. Compliance with Federal, State and Local Law. APPROVED PRIVATE SCHOOL agrees and warrants that it will comply with all federal, state, and local law relating to APPROVED PRIVATE SCHOOL's actions or performance of its obligations under this AGREEMENT, including but not limited to the Individuals with Disabilities Act (IDEA); 34 C.F.R. 300 and 301; Family Educational Rights and Privacy Act (FERPA); 22 Pa. Code Chapters 14 and 15; and any requirements regarding employment history and/or child abuse clearances/certifications and background checks.

15. Severability. In the event any provision of this AGREEMENT is held to be unenforceable for any reason, the unenforceable portion thereof shall not affect the remainder of this AGREEMENT, which shall remain in full force and effect and be enforceable in accordance with its terms.

16. Modification. This AGREEMENT shall not be changed, modified or amended nor shall a waiver of is terms or conditions be deemed effective expect by a writing signed by the parties hereto. Modifications to this AGREEMENT shall be in writing, signed by the parties.

17. Assignment/Subcontracting. No assignment of this AGREEMENT or the rights and obligations hereunder shall be valid without the specific written consent of both parties hereto. None of the work or services covered by this AGREEMENT may be subcontracted without the prior written approval of the SENDING DISTRICT.

18. Right to Know Law. APPROVED PRIVATE SCHOOL agrees that, when requested by the SENDING DISTRICT, it will cooperate with the SENDING DISTRICT in complying with the Pennsylvania Right-to-Know Law, 65 P.S. '67.101 et seq., and any other similar laws, in complying with requests for public records made under such laws. This provision does not obligate the APPROVED PRIVATE SCHOOL to create any record other that the written report to the SENDING DISTRICT.

19. Use of SENDING DISTRICT'S Name/Logo. APPROVED PRIVATE SCHOOL shall not use the SENDING DISTRICT'S name or logo without the express written authorization of the SENDING DISTRICT.

20. Training. APPROVED PRIVATE SCHOOL represents that all employees, agents, or representatives performing services under this AGREEMENT have received mandatory child abuse training in compliance with 24 P.S '12-1205.6, or, in the alternative, APPROVED PRIVATE SCHOOL agrees to ensure that all such individuals receive such training prior to performing services under this AGREEMENT.

21. Independent Contractor Status. APPROVED PRIVATE SCHOOL, including employees, officers, and agents of APPROVED PRIVATE SCHOOL, shall at all times be an independent contractor and not an employee, agent or representative of the SENDING DISTRICT.

22. Notice. Any notice, request, demand or other communication required or permitted to be given under this Agreement shall be sufficient if in writing and if delivered personally, or sent by certified or registered mail as follows (or to other addressee as shall be set forth in a notice given in the same manner):

    If to the APPROVED PRIVATE SCHOOL:

    George Crothers Memorial School
    401 Rutgers Ave.
    Swarthmore, PA 19081
    Attention: Alena Subacus

    If to the SENDING DISTRICT
    East Penn School District
    800 Pine St.
    Emmaus, PA 18049
    Attention:

23. Return Date. This AGREEMENT shall be signed and returned no later than 30 days after its receipt. After 30 days and three documented attempts made to acquire a signature for this AGREEMENT from the SENDING DISTRICT, the STUDENT'S signed NOREP and/or IEP will act as the agreed upon educational document between the SENDING DISTRICT and APPROVED PRIVATE SCHOOL.

IN WITNESS WHEREOF, the parties have caused this AGREEMENT to be duly executed on this 31st day of August, 2026

GEORGE CROTHERS MEMORIAL SCHOOL, a division of CADES.

Alena Subacus _____ Date: 8/31/2026

Alena Subacus, Chief Administrative Officer, CADES

_____ Date: _____

East Penn School District

INTERDISTRICT STUDENT TRANSPORTATION AGREEMENT

This Interdistrict Student Transportation Agreement ("Agreement") is made this 21st day of October, 2026 (the "Effective Date"), by and between the East Penn School District ("EPSD") and the Northwestern Lehigh School District ("NWLSD") (each a "District" and collectively the "Districts").

WHEREAS, EPSD is a school district located in the Commonwealth of Pennsylvania, the geographic area of which includes Lehigh County, Pennsylvania; and

WHEREAS, NWLSD is a school district located in the Commonwealth of Pennsylvania, the geographic area of which includes Lehigh County, Pennsylvania; and

WHEREAS, a student enrolled in NWLSD (the "Student") attends morning programming at Emmaus High School, a school building within EPSD, and afternoon programming at the Lehigh Career and Technical Institute (LCTI); and

WHEREAS, NWLSD has requested that EPSD transport the Student on its existing midday bus route between the two facilities rather than by separate transportation; and

WHEREAS, EPSD has agreed to provide said transportation; and

WHEREAS, the Districts wish to document their agreement regarding the provision of transportation to Student for the 2026-2027 school year.

NOW THEREFORE, in consideration of the mutual covenants and agreements hereinafter set forth and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Districts hereto agree as follows:

1. Term

This Agreement is effective as of the Effective Date and shall continue through the end of the 2026-2027 school year (the "Term").

2. Transportation Arrangement

EPSD shall, through its contracted transportation provider, transport the Student on its existing midday bus route from Emmaus High School to LCTI on days when both Emmaus High School and LCTI are in session for the Student. NWLSD remains solely responsible for the Student's transportation to Emmaus High School each morning and for the Student's transportation home from LCTI or any other transportation not expressly addressed in this Agreement. The Districts acknowledge and agree that this Agreement is exclusive to Student and shall not be construed to pertain to or relate in any way to any other NWLSD student.

3. Responsibility for the Student

NWLSD retains educational and disciplinary responsibility for the Student at all times, including while the Student is aboard the EPSD bus. EPSD's responsibility under this Agreement is limited to the safe transportation of the Student during the period the Student is aboard the EPSD bus between Emmaus High School and LCTI. EPSD shall immediately notify NWLSD of any concerns or incidents involving Student while aboard the EPSD bus.

NWLSD shall be responsible for promptly notifying EPSD of any change in the Student's enrollment, schedule, or transportation needs that would affect this Agreement.

4. Insurance

Prior to the commencement of transportation under this Agreement, NWLSD shall provide EPSD with a certificate of insurance evidencing NWLSD's general liability, automobile liability, and workers' compensation coverage, and shall name EPSD as an additional insured on its general liability and automobile liability policies. NWLSD shall provide EPSD with a current certificate of insurance meeting these requirements.

EPSD shall confirm that its contracted transportation provider maintains active driver clearances and an acceptable motor vehicle record for the driver assigned to the route, consistent with EPSD's standard practice for all student transportation.

5. Indemnification

Each District shall, to the extent permitted by law, indemnify and hold harmless the other District, and its board members, officers, and employees, from and against any and all claims, damages, losses, and expenses, including reasonable attorneys' fees, arising out of the negligent acts or omissions of the indemnifying District or its employees, agents, or contractors in connection with this Agreement. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist. In no event will either District be required to indemnify or hold harmless the other for the other's negligence, gross negligence, or willful misconduct. Notwithstanding the foregoing, (a) each District shall advise the other District in writing of any claims, notices, or other information received by it or of which it becomes aware for which such District will seek indemnification hereunder, in such time and manner as not to impair or prejudice the ability of the indemnifying District to defend such claims or investigate such notice, (b) each District shall provide the indemnifying District with the cooperation and assistance necessary to defend such claim requested by the indemnifying District; and (c) neither District shall settle or compromise any claim admitting the fault, liability or negligence of the other District without the other District's prior written consent, which shall not be unreasonably withheld or delayed. Nothing in this Agreement shall be construed as a waiver of either District's rights, immunities, or defenses under the Pennsylvania Political Subdivision Tort Claims Act or other applicable law.

6. Termination

In the event Student disenrolls from NWLSD, no longer participates at LCTI, or upon the conclusion of the 2026-2027 school year, this Agreement shall automatically terminate. Either District may at any time terminate this Agreement upon five (5) days' written notice to the other District. Either District may terminate this Agreement immediately upon written notice if it reasonably determines that continuing the arrangement presents a safety concern. The obligations under Section 4 (Insurance) and Section 5 (Indemnification) shall survive termination of this Agreement.

7. No Additional Compensation

Except as the Districts may otherwise agree in writing, neither District shall be required to pay any fee to the other District in connection with the transportation arrangement described in this Agreement.

8. Notices

All notices required or permitted under this Agreement shall be in writing and deemed to have been made if (i) delivered personally, (ii) sent by certified or registered mail, postage prepaid, or (iii) sent by nationally recognized overnight courier, addressed as set forth below:

East Penn School District
Attn: Superintendent
800 Pine Street, Emmaus, PA 18049-0000

Northwestern Lehigh School District
Attn: Superintendent
6493 Route 309, New Tripoli, PA 18066-2038

Either District may at any time, in the manner set forth for giving notices to the other District, designate a different name and/or address to which notices to it shall be sent.

9. Board Approval

This Agreement is subject to, and shall not become effective until, approval by the Board of School Directors of each District, as evidenced by the signatures below.

10. Governing Law

This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Pennsylvania. The Districts agree to submit to the exclusive jurisdiction of the Lehigh County Court of Common Pleas or the District Court for the Eastern District of Pennsylvania for any action in law or equity to interpret, enforce, or defend a breach thereof or action seeking a declaratory judgment or injunction.

11. Entire Agreement

This Agreement constitutes the entire understanding between the Districts regarding the transportation arrangement described herein and may be amended only by a writing signed by authorized representatives of both Districts.

12. Counterparts

This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument. A signature delivered by electronic means shall be treated as an original signature for all purposes.

13. No Discrimination

Each of the Districts hereto covenant and agree that where applicable respectively, they shall not discriminate against any person by reason of gender, gender identity or expression, sex, race, creed, religion, color, sexual preference or orientation, national or ethnic origin, genetic information, disability, ancestry, marital or familial status, veteran status or age.

14. No Waiver

No failure to assert any rights or remedies available to a District under this Agreement, or a waiver of same by course of dealing or otherwise shall be deemed to waive any right or remedy, unless such waiver

of such right or remedy is contained in a writing signed by the District alleged to have waived its right or remedy. Any waiver of any provision of this Agreement or any right by any District hereto at any time shall not be construed as a waiver or bar for any such right or provision at any other time by such District, unless expressly so stated in writing, and such waiver shall not be effective unless in writing and signed by the District to be charged.

15. Assignment

The Districts agree that a material condition of this Agreement is that it cannot be assigned.

16. Force Majeure

Neither District shall be deemed in default or otherwise liable under this Agreement due to its inability to perform its obligations by reason of any fire, earthquake, flood, hurricane, tornado, snowstorm, epidemic, pandemic, accident, explosion, casualty, virus or other malicious software, strike, lockout, labor controversy, riot, civil disturbance, act of public enemy, embargo, war, act of God, act of terrorism, or any municipal, county, state or national ordinance or law, or any executive, administrative or judicial order (which order is not the result of any act or omission which would constitute a default hereunder), or any failure or delay or any transportation, power, or communications system or any other or similar cause beyond that District's reasonable control.

17. Severability

All agreements and covenants contained in this Agreement are severable and in the event any of them are held to be invalid by any competent court, this Agreement will be interpreted as if invalid agreements or covenants were not contained in this Agreement. The Districts further agree that if any clause of this Agreement is held unconscionable, the remaining clauses of this Agreement shall remain in full force and effect.

IN WITNESS WHEREOF, the Districts have caused this Agreement to be executed by their duly authorized representatives.

ATTEST:
By: _____
Name/Title: _____
Date: _____

EAST PENN SCHOOL DISTRICT
By: _____
Name/Title: _____
Date: _____

ATTEST:
By: Stacy Eisenhard
Name/Title: Stacy Eisenhard, Executive Asst.
Date: 10.22.2026

NORTHWESTERN LEHIGH SCHOOL DISTRICT
By: _____
Name/Title: Troy Sosnovik, Asst. Superintendent
Date: 10.22.2026

Board Policy Updates | **Third Reading & Adoption**

Policy #	Existing Title	Title	Status	Original Adoption	Reviewers	1st Reading	2nd Reading	3rd Reading and Adoption
102	Academic Standards	Academic Standards	Existing	2/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
105	Curriculum	Curriculum	Existing	2/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
105.2	Exemption From Instruction	Exemption From Instruction	Existing	2/8/2016	AI, AS, S	9/28/2026	10/12/2026	10/26/2026
204.1		Virtual Attendance and Wellness Checks	New		AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
209	Health Examinations/Screenings	Health Examinations/Screenings	Existing	6/3/2016	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
246	School Wellness	School Wellness	Existing	8/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
249	Bullying/Cyberbullying	Bullying/Cyberbullying	Existing	8/8/2016	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
704	Maintenance	Maintenance	Existing	5/22/2017	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
803	School Calendar	School Calendar	Existing	7/10/2017	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
805.2	School Security Personnel	School Security Personnel	Existing	12/9/2019	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026
822	Automated External Defibrillator (AED) / Cardiopulmonary Resuscitation (CPR)	Automated External Defibrillator (AED) / Cardiopulmonary Resuscitation (CPR)	Existing	9/7/2017	AI, AS, S, BS	9/28/2026	10/12/2026	10/26/2026

Key:
S= Superintendent
AS= Assistant Superintendent
BS= Board Solicitor
AI= Administrative Input

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

102 Academic Standards - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
102	2/8/2016	3/9/2026	v1.4
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes the importance of developing, assessing and expanding academic standards to challenge students to achieve at their highest level possible. To this end, the district shall establish rigorous academic standards in accordance with, and may expand upon, those adopted by the State Board of Education.[1][2]

DEFINITION

Academic standards - what a student should know and be able to do at a specified grade level. Academic standards encompasses Pennsylvania Core Standards, Pennsylvania Integrated Standards, state academic standards and local academic standards.[2][3]

AUTHORITY

The Board shall approve academic standards for district students to attain, in the following content areas:[2]

1. English Language Arts - PA Core Standards.
2. Mathematics - PA Core Standards.
3. Science, Technology, Engineering, Environmental Literacy and Sustainability (K-12) - PA Integrated Standards.
4. Social Studies – to include reading and writing - PA Core Standards.
5. Arts and Humanities.
6. Career Education and Work.
7. Health, Safety and Physical Education.
8. Family and Consumer Sciences.
9. World Languages.
10. Computer and Business Applications.
11. Library.
12. Counseling.

13. English Language Development.
14. Personal Finance.

GUIDELINES

The district's curriculum shall be designed to provide students with the planned instruction needed to attain established academic standards. Such standards require the incorporation of education on social media literacy.[2] [4] [5]

The district shall address social media literacy by providing instruction to students on the potential health and academic impacts, and safety and security concerns associated with social media use.[9]

The district shall assess individual student attainment of established academic standards and provide assistance for students having difficulty attaining academic standards.[2] [6] [7]

Students with disabilities may attain academic standards by completion of their Individualized Education Programs in accordance with law, regulations and Board policy.[2] [8]

Legal Footnotes

[1] 22 PA Code 4.11
LEGAL REFERENCE

[2] 22 PA Code 4.12
LEGAL REFERENCE

[3] 22 PA Code 4.3
LEGAL REFERENCE

[4] Pol. 105 — Curriculum
POLICY REFERENCE

[5] Pol. 107 — Provision for Planned Instruction
POLICY REFERENCE

[6] Pol. 127 — Assessment System
POLICY REFERENCE

[7] Pol. 213
POLICY REFERENCE
Referenced policy is not available in this policy book.

[8] Pol. 113 — Special Education
POLICY REFERENCE

[9] 24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

105 Curriculum - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
105	2/8/2016	3/9/2026	v1.3
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes its responsibility for the development, assessment and improvement of the educational program of the schools. To this end, the curriculum shall be evaluated, developed and modified on a continuing basis and in accordance with a plan for curriculum improvement.[1]

DEFINITION

Curriculum - a series of planned instruction aligned with established academic standards in each subject that is coordinated, articulated and implemented in a manner designed to result in the achievement of academic standards at the proficient level by all students.[2][3] **[4]**

AUTHORITY

The Board shall be responsible for the curriculum of the district's schools. The curriculum shall be designed to provide students the opportunity to achieve the academic standards established by the Board. Attaining the academic standards requires students to demonstrate the acquisition and application of knowledge.[1][2] **[4]**

In order to provide a quality educational program for district students, the Board shall adopt a curriculum plan that includes the requirements for courses to be taught; subjects to be taught in the English language; courses adapted to the age, development and needs of students; and strategies for assisting those students having difficulty attaining the academic standards.[1][2][5][6] **[7]** **[8]**

Special Instruction/Observances

The district's curriculum plan must also include provisions for special instruction and observances to comply with state and federal law including, but not limited to, Constitution Day and Citizenship Day, and the Bill of Rights Week.[9][10][11]

GUIDELINES

The district's curriculum shall provide the following:

1. Continuous learning through effective collaboration among the schools of this district.
2. Continuous access for all students to sufficient programs and services of a library/media facility and classroom collection to support the educational program. [12]
3. Guidance and counseling services for all students to assist in career and academic planning. [13]
4. A continuum of educational programs and services for all students with disabilities, pursuant to law and regulation. [14]
5. Language Instruction Educational Program for Multilingual Learner students, pursuant to law and regulation. [15] [16]
6. Compensatory education programs for students, pursuant to law and regulation.
7. Equal educational opportunity for all students, pursuant to law and regulation. [17] [18]
8. Career awareness and vocational education, pursuant to law and regulation. [19]
9. Educational opportunities for identified gifted students, pursuant to law and regulation. [20]
10. Regular and continuous instruction in required safety procedures. [21]

DELEGATION OF RESPONSIBILITY

As the educational leader of the district, the Superintendent shall be responsible to the Board for the district's curriculum. The Superintendent shall establish procedures for curriculum development, evaluation and modification, which ensure the utilization of available resources, and effective participation of teaching staff, students, and Board members, as appropriate. [1]

A listing of all curriculum materials shall be made available for the information of parents/guardians, students, staff and Board members. [1] [22]

With Board notification, the Superintendent may conduct pilot programs as deemed necessary to the continuing improvement of the instructional program. The Superintendent shall report periodically to the Board on the status of each pilot program, along with its objectives, evaluative criteria, and costs.

The Board encourages, where it is feasible and in the best interest of district students, participation in state-initiated pilot programs of educational research.

The Board directs the Superintendent to pursue actively state and federal aid in support of research activities.

Legal Footnotes

[1] **22 PA Code 4.4**
LEGAL REFERENCE

[2] **22 PA Code 4.12**
LEGAL REFERENCE

[3] 22 PA Code 4.3
LEGAL REFERENCE

[4] Pol. 102 — Academic Standards
POLICY REFERENCE

[5] 24 P.S. 1511
LEGAL REFERENCE

[6] 24 P.S. 1512
LEGAL REFERENCE

[7] Pol. 107 — Provision for Planned Instruction
POLICY REFERENCE

[8] Pol. 127 — Assessment System
POLICY REFERENCE

[9] 36 U.S.C. 106
LEGAL REFERENCE

[10] P.L. 108-447
LEGAL REFERENCE

[11] 24 P.S. 1541-1555
LEGAL REFERENCE

[12] Pol. 109 — Resource Materials
POLICY REFERENCE

[13] Pol. 112 — Guidance Counseling
POLICY REFERENCE

[14] Pol. 113 — Special Education
POLICY REFERENCE

[15] 22 PA Code 4.26
LEGAL REFERENCE

[16] Pol. 138 — Language Instruction Educational Program for English Learners
POLICY REFERENCE

[17] Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students
POLICY REFERENCE

[18] Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities
POLICY REFERENCE

[19] Pol. 115 — Career and Technical Education
POLICY REFERENCE

[20] Pol. 114 — Gifted Education
POLICY REFERENCE

[21] Pol. 805 — Emergency Preparedness and Response
POLICY REFERENCE

[22] Pol. 105.1
POLICY REFERENCE
Referenced policy is not available in this policy book.

Legal References

Additional References

24 P.S. 1512.1
LEGAL REFERENCE

24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

105.2 Exemption From Instruction - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
105.2	2/8/2016	3/9/2026	v1.2
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

The Board adopts this policy to ensure that parents/guardians have the right to have their children excused from specific instruction that conflicts with their sincerely held religious and/or moral beliefs.[1][2]

The right to be exempt from instruction which conflicts with sincerely held religious beliefs extends to parents/guardians of students enrolled in this district when the students are under the age of eighteen (18), and to the students themselves when the student is eighteen (18) or older.

The right to be exempt from instruction which conflicts with moral beliefs extends to the parents/guardians of students enrolled in this district.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall notify parents/guardians of this policy at least annually, at the beginning of each school year, and within a reasonable time after any substantive changes regarding the contents of this policy.

GUIDELINES

The district shall excuse any student from specific instruction, subject to the following conditions:

1. To assist the school district in ensuring that the student is excused from the correct specific instruction, the request must be made in writing and must detail the specific instruction from which the student is to be excused, including the reason(s) for the request.

2. The written request to be excused shall be sent by the parent/guardian or student who is eighteen (18) or older to the building principal. One (1) copy of the request shall be retained in the student's permanent school records, one (1) copy kept by the school principal, and one (1) copy submitted to the teacher from whose instruction the student is to be excused.
3. The written request must contain a statement that the specific instruction described conflicts with the sincerely held religious and/or moral beliefs of the student or of the parents/guardians.
4. The parent/guardian and/or student may request suggested replacement educational activities. The only permissible educational activity for this purpose shall be substantially similar instruction that is consistent with the learning objectives set for the course.
5. The building principal shall determine where the student shall report during the time the student is excused.
6. All students excused from specific instruction shall be required to achieve the academic standards established by the district as necessary for graduation. [3] [4]

Exemption from Dissection Activities

Students have the right to decline participation in an education project involving dissection, vivisection, incubation, capture or other harm or destruction of an animal or any part of an animal.[5]

The district must notify students and parents/guardians of their right to decline participation in such activities at least three (3) weeks prior to the start of the education project. Students who do not participate in such activities will be assigned an alternative education project.[5]

Legal Footnotes

[1] 22 PA Code 4.4
LEGAL REFERENCE

[2] 22 PA Code 11.7
LEGAL REFERENCE

[3] Pol. 102 — Academic Standards
POLICY REFERENCE

[4] Pol. 217 — Graduation
POLICY REFERENCE

[5] 24 P.S. 1523
LEGAL REFERENCE

Exemption From Specific Instruction Under Board Policy 105.2

Eligible Student Request Form

Please use this form to identify the exact instruction from which an exemption is requested. Please send this completed request to the student's building principal. Submit it as soon as the instruction is known so the school can coordinate the student's learning and supervision.

Student Information

Student name	School
Grade	Course or class
Teacher	Anticipated date or unit

Type of Request per policy 105.2

☐ Religious belief

☐ Moral belief

☐ Animal dissection

Specific Instruction

Identify the lesson, activity, text, media, discussion, assignment, project, or assessment component. Include dates, titles, pages, unit names, or other details that will help the school excuse the student from the correct instruction. Attach another page if needed.

Instruction from which exemption is requested

_____

_____

_____

_____

Reason and Required Statement

Briefly explain the reason for the request. The district does not require proof of religious affiliation or agreement with the belief, but it needs enough information to identify and implement the requested exemption.

Reason for the request

_____

_____

_____

Replacement Learning

Any replacement assigned under Policy 105.2 will be substantially similar instruction consistent with the course learning objectives.

Animal Dissection and Related Activities

Complete this section only if the student is declining participation in or observation of an activity involving dissection, vivisection, incubation, capture, or other harm or destruction of an animal or animal part. A religious or moral objection is not required.

☐ The student declines participation in the activity.

☐ The student declines observation of the activity.

☐ The student requests an alternative project or test that does not involve harmful use of an animal or animal parts.

Activity, course, teacher, and anticipated date, if known

_____
_____

Requester Information and Signature

I certify that I am authorized to make this request and that the information provided is accurate to the best of my knowledge. I understand that the student remains responsible for district academic standards and applicable course-credit and graduation requirements.

Requester printed name	Relationship to student
Email address	Telephone
Signature	Date

For School Use

Date received	Received by
☐**complete ☐ clarification requested**	Date clarification received
Instruction and dates covered	Student reporting location
Replacement activity or assessment	Teacher or staff responsible
Principal signature	Date family notified

Required distribution: one copy to the student's permanent school record, one copy retained by the building principal, and one copy to the teacher whose instruction is affected.

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

204.1 Virtual Attendance and Wellness Checks - NEW POLICY

POLICY NUMBER	VERSION	DOCUMENT STATUS	PRINTED
204.1	v2.3	DRAFT	10/8/2026

PURPOSE

This policy establishes standards for wellness checks for students who receive academic instruction exclusively through the district's virtual instruction program for the full school year. Wellness checks are conducted to verify attendance and to facilitate the safety and well-being of students.

AUTHORITY

The Board directs the maintenance of a wellness check process that complies with state law. [1]

This policy shall be posted on the district's publicly accessible website.[1]

DEFINITION

District employee/representative – a district teacher, administrator or other district representative who is subject to mandated reporter requirements for child abuse under the Child Protective Services Law.[2][3]

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall be responsible for implementing this policy.

It shall be the responsibility of the designated district employee/representative to administer wellness check procedures in accordance with applicable law and this policy.

GUIDELINES

Weekly Wellness Checks

Weekly wellness checks must be conducted for each student enrolled in the district's virtual instruction program who receives academic instruction exclusively through virtual means for the full school year.[1]

At least once during any week consisting of three (3) or more full or partial academic instructional days, a district employee/representative shall ensure that each student is visibly seen and communicated with in real time either, in person or through electronic means.[1]

Wellness Check Methods

Acceptable methods of conducting wellness checks include:[1]

1. A student turning on a webcam and the district employee/representative visibly seeing and communicating with the student during synchronous online instruction.
2. Virtual or face-to-face participation by the student in any of the following activities:
   a. Health screenings.
   b. Standardized testing.
   c. Advising sessions.
   d. Tutoring sessions.
   e. In person, school-sponsored activities chaperoned by a district employee/representative.

Excused Absence Exemptions

A student may be exempt from a wellness check on the day a check is attempted if the student has an excused absence pursuant to applicable attendance requirements.[1] [4][5]

If this occurs, the district shall conduct the wellness check on the next school day or another school day during the same week. If a student has an excused absence for all school days during the same week, the student shall be exempt from the wellness check requirement for that week.[1] [4][5]

Internet or Power Outage Exemptions

A student may be exempt from a wellness check when the student's household experiences a documented Internet or power outage during the day and time of the attempted wellness check.[1]

If this occurs, the district shall conduct the wellness check on the next school day or another school day during the same week following resolution of the outage.[1]

The student’s parent/guardian shall provide documentation of the outage to the district as soon as possible.[1]

Failure to Complete a Required Wellness Check

Within one (1) school day after a student fails to complete a required wellness check, the district shall:[1]

1. Make documented and ongoing efforts to complete the required wellness check and contact the student's parent/guardian using at least two (2) different methods of communication; and

2. Provide written notice to the parent/guardian, in the parent's/guardian's preferred language, stating that the required wellness check has not been completed.

Wellness Review Conference

If the required wellness check is not completed within three (3) school days following the issuance of written notice, the district shall immediately schedule a wellness review conference to occur within one (1) school day. The wellness review conference may be conducted in person or through electronic means.[1]

The wellness review conference will be conducted to:[1]

1. Complete the required wellness check through real-time visual interaction with the student;
2. Reestablish communication with the student and the student’s parent/guardian; and
3. Identify interventions to facilitate future participation in wellness checks.

The wellness review conference shall convene as scheduled regardless of whether the student or the student’s parent/guardian participates.[1]

In-Person Wellness Check

If a student does not participate in the wellness review conference, the district must conduct an in-person wellness check within twenty-four (24) hours of the scheduled conference, even if this time period falls on a weekend or holiday.[1]

When the district is unable to establish contact with or obtain a response from the student, the Superintendent or designee shall determine appropriate next steps based on the circumstances. Such action may include requesting a welfare check from local law enforcement and/or making a referral to Children and Youth Services.

Wellness Check Records

The district shall maintain accurate records of all wellness checks, including the date, time, method, and outcome of each check.[1]

District administrators are prohibited from altering attendance records for wellness checks after a wellness check has been performed, except to correct an identified error.[1]

Reporting Requirements

Any district employee/representative who observes an indications of abuse, neglect or harm to a child during a wellness check, wellness review conference, or related contact, the district employee/representative is required to report the concerns in accordance with law and Board policy.[1][2][3]

The district shall maintain documentation sufficient to demonstrate compliance with this policy and applicable law.[1]

Such documentation shall be provided to the Pennsylvania Department of Education (PDE) upon request. Failure to comply with the with such requests may result in:[1]

1. A requirement to report to PDE the date, time and method of each wellness check for each student enrolled exclusively in the district's virtual instruction program.
2. Mandating district educators, administrators and staff to complete child abuse recognition, prevention and reporting training annually.
3. Requiring the district to meet in person with each student enrolled in a virtual instruction program at least once during the school year following the school year in which the district was found to be out of compliance.
4. Prohibiting the district from being awarded a competitive state grant by PDE until the district demonstrates compliance.

Legal Footnotes

[1] **24 P.S. 1327.4**
LEGAL REFERENCE

[2] **23 Pa. C.S.A. 6301 et seq**
LEGAL REFERENCE

[3] **Pol. 806 — Child Abuse**
POLICY REFERENCE

[4] **24 P.S. 1329**
LEGAL REFERENCE

[5] **Pol. 204 — Attendance**
POLICY REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

209 Health Examinations/Screenings - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
209	6/13/2016	10/14/2019	v1.5
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

In compliance with applicable law and regulations, and Board-approved health and safety plans, the Board shall require that district students submit to health and dental examinations, screenings and health monitoring in order to protect the school community from the spread of communicable disease and to ensure that the student's participation in health, safety and physical education courses meets the student's individual needs and that the learning potential of each student is not lessened by a remediable physical disability.[1][2][3][4]

GUIDELINES

Each student shall receive a comprehensive health examination either conducted by the school physician or a private licensed medical provider upon original entry, in sixth grade, and in eleventh grade.[2][4][5]

Each student shall receive a comprehensive dental examination conducted by the school dentist or a private dental provider upon original entry, in third grade, and in seventh grade.[3][4][5]

A private health and/or dental examination conducted at the parents'/guardians' request and expense shall be accepted in lieu of the school examination. The district shall accept reports of privately conducted physical and dental examinations completed within one (1) year prior to a student’s entry into the grade where an exam is required.[5]

The school nurse or medical technician shall administer to each student vision tests, hearing tests, tuberculosis tests and other tests deemed advisable at intervals established by the district. Height and weight measurements shall be used to calculate the student’s weight-for-height ratio.[2][4][6]

The school nurse or other health care practitioner shall conduct measurements of height and weight for each student for the purpose of tracking growth patterns. Height and weight measurements will be conducted at intervals established by the district and in a manner that protects student confidentiality. Parents/Guardians have the right to request an exemption from height and weight measurements for their child, and the district must provide notification of the exemption request procedure.[2][22]

Parents/Guardians of students who are to receive physical and dental examinations or screenings shall be notified. The notice shall include the date and location of the examination or screening and notice that the parents/guardians may attend. The notice shall encourage the parent/guardian to have the examination or screening conducted by the student's private physician or dentist at the parent's/guardian's expense to promote continuity of care. Such statement may also include notification that the student may be exempted from such examination or screening if it is contrary to the parent's/guardian's religious beliefs.[10][11][12]

A student who presents a statement signed by the parent/guardian that a health examination is contrary to the student's or parent's/guardian's religious beliefs shall be examined only when the Secretary of Health determines that facts exist indicating that certain conditions would present a substantial menace to the health of others in contact with the student if the student is not examined for those conditions.[7][8]

Where it appears to school health officials or teachers that a student deviates from normal growth and development, or where school examinations reveal conditions requiring health or dental care, the parent/guardian shall be notified of the apparent need for a special examination by the student's private physician or dentist. The parent/guardian shall report to the school whether a special examination occurred. If the parent/guardian fails to report whether the examination occurred within a reasonable time after being notified of the apparent need and the abnormal condition persists, appropriate school health personnel shall arrange a special health examination for the student.[2][4][9]

The first notice to comply with the policy of health or dental examinations will be mailed on or about October 1. The second notice to comply with the policy of health or dental examinations will be mailed on or about December 1. If the health or dental examination, as requested through the Department of Health and/or the East Penn School District, is not completed and proof submitted to the appropriate school nurse by the last day of the second marking period of the school year in question, the student will be excluded from school.

In the event that the parent/guardian objects to or refuses to obtain a regular or special health or dental examination or refuses to permit the child to be examined as arranged by the school nurse or school physician, the school nurse, in consultation with the school physician, shall determine whether the student appears to have unaddressed health conditions such that under the circumstances the refusal should be reported to the Pennsylvania Department of Health or other appropriate authorities.

Where school health officials or staff have reasonable cause to suspect that a student may be the victim of child abuse, the school employee shall immediately make a report of suspected child abuse in accordance with law and Board policy.[16] **[17]**

Health Monitoring

The Board directs district staff to monitor student health in accordance with applicable Board policy and the Board-approved health and safety plan.[23]

A student may request an alternative method of monitoring as a religious accommodation, and designated district staff shall assess and respond to such request in accordance with applicable law, regulations and Board policy. A request for an accommodation that would unreasonably impair safety or cause undue hardship will not be granted.[24]

A student with a health condition that may render a monitoring method ineffective should notify designated staff so that alternative or supplemental methods may be considered.[24] [25]

Students who may be exhibiting symptoms that indicate health concerns shall be referred to the school nurse or designated staff for further assessment and response, in accordance with Board policy.[23]

Health Records

The district shall maintain for each student a comprehensive health record which includes a record of immunizations and the result of tests, measurements, regularly scheduled examinations and special examinations.[2]

All health records shall be confidential and shall be disclosed only when necessary for the health of the student or when requested by the parent/guardian, in accordance with law and Board policy.[13] **[14]** **[18]**

The district may disclose information from health records to appropriate parties in connection with an emergency when necessary to protect the health or safety of the student or other individuals, in accordance with applicable law and Board policy.[13] **[14]** **[18]** [19][20] **[21]**

Designated district staff shall request from the transferring school the health records of students transferring into district schools. Staff shall respond to such requests for the health records of students transferring from district schools to other schools.[13]

If no health record of a student transferring into district schools is received or the health record indicates that a mandated screening or examination has not been completed at the appropriate level, the student shall be examined as soon as possible after the transfer by a school physician or school dentist, unless a private examination meeting the requirements of this policy has been furnished.

The district shall destroy student health records only after the student has not been enrolled in district schools for at least two (2) years.[13] **[15]**

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall instruct all staff members to continually observe students for conditions that indicate health problems or disability and to promptly report such conditions to the school nurse.[2]

The Superintendent or designee shall ensure that educational information and materials regarding eating disorder awareness and education are made available to students in grades six through twelve. Eating disorder awareness and educational materials must also be posted on the district's website.[26][27]

The Superintendent or designee shall ensure that notice is provided to all parents/guardians regarding the existence of and eligibility for the Children's Health Insurance Program (CHIP).[9]

Legal Footnotes

[1] 24 P.S. 1401
LEGAL REFERENCE

[2] 24 P.S. 1402
LEGAL REFERENCE

[3] 24 P.S. 1403
LEGAL REFERENCE

[4] 22 PA Code 12.41
LEGAL REFERENCE

[5] 24 P.S. 1407
LEGAL REFERENCE

[6] 28 PA Code 23.1 et seq
LEGAL REFERENCE

[7] 24 P.S. 1419
LEGAL REFERENCE

[8] 28 PA Code 23.45
LEGAL REFERENCE

[9] 24 P.S. 1406
LEGAL REFERENCE

[10] 24 P.S. 1405
LEGAL REFERENCE

[11] 28 PA Code 23.2
LEGAL REFERENCE

[12] 20 U.S.C. 1232h
LEGAL REFERENCE

[13] 24 P.S. 1409
LEGAL REFERENCE

[14] Pol. 216 — Student Records
POLICY REFERENCE

[15] Pol. 800 — Records Management
POLICY REFERENCE

[16] 23 Pa. C.S.A. 6311
LEGAL REFERENCE

[17] Pol. 806 — Child Abuse
POLICY REFERENCE

[18] Pol. 113.4 — Confidentiality of Special Education Student Information
POLICY REFERENCE

[19] 20 U.S.C. 1232g
LEGAL REFERENCE

[20] 34 CFR Part 99
LEGAL REFERENCE

[21] **Pol. 805 — Emergency Preparedness and Response**
POLICY REFERENCE

[22] **28 PA Code 23.7**
LEGAL REFERENCE

[23] **Pol. 203 — Immunizations and Communicable Diseases**
POLICY REFERENCE

[24] **Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students**
POLICY REFERENCE

[25] **Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities**
POLICY REFERENCE

[26] **24 P.S. 1408**
LEGAL REFERENCE

[27] **24 P.S. 1426 — 24-P-S-1426**
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

246 School Wellness - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
246	8/8/2016	1/24/2022	v1.6
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

East Penn School District recognizes that student wellness and proper nutrition are related to students' physical well-being, growth, development and readiness to learn. The Board is committed to providing a school environment that promotes student wellness, proper nutrition, nutrition education and promotion, and regular physical activity as part of the total learning experience. In a healthy school environment, students will learn about and participate in positive dietary and lifestyle practices that can improve student achievement.

AUTHORITY

The Board adopts this policy based on the recommendations of the Wellness Committee and in accordance with federal and state laws and regulations.[1][2][3]

To ensure the health and well-being of all students, the Board establishes that the district shall provide to students:

1. A comprehensive nutrition program consistent with federal and state requirements.
2. Access at reasonable cost to foods and beverages that meet established nutrition guidelines.
3. Physical education courses and opportunities for developmentally appropriate physical activity during the school day.
4. Curriculum and programs for grades K-12 that are designed to educate students about proper nutrition and lifelong physical activity, in accordance with State Board of Education curriculum regulations and academic standards.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall be responsible for the implementation and oversight of this policy to ensure each of the district's schools, programs and curriculum is compliant with this policy, related policies and established guidelines or administrative regulations.[2][3]

Each building principal or designee shall annually report to the Superintendent or designee regarding compliance in their school.[3]

Staff members responsible for programs related to school wellness shall report to the Superintendent or designee regarding the status of such programs.

The Superintendent or designee shall annually report to the Board on the district's compliance with law and policies related to school wellness. The report may include:

1. Assessment of school environment regarding school wellness issues.
2. Evaluation of food services program.
3. Review of all foods and beverages sold in schools for compliance with established nutrition guidelines.
4. Listing of activities and programs conducted to promote nutrition and physical activity.
5. Recommendations for policy and/or program revisions.
6. Suggestions for improvement in specific areas.
7. Feedback received from district staff, students, parents/guardians, community members and the Wellness Committee.

The Superintendent or designee and the established Wellness Committee shall conduct an assessment at least once every three (3) years on the contents and implementation of this policy as part of a continuous improvement process to strengthen the policy and ensure implementation. This triennial assessment shall be made available to the public in an accessible and easily understood manner and include:[2][3]

1. The extent to which each district school is in compliance with law and policies related to school wellness.
2. The extent to which this policy compares to model wellness policies.
3. A description of the progress made by the district in attaining the goals of this policy.

At least once every three (3) years, the district shall update or modify this policy as needed, based on the results of the most recent triennial assessment and/or as district and community needs and priorities change; wellness goals are met; new health science, information and technologies emerge; and new federal or state guidance or standards are issued.[3]

The district shall annually inform and update the public, including parents/guardians, students, and others in the community, about the contents, updates and implementation of this policy via the district website, student handbooks, newsletters, posted notices and/or other efficient communication methods. This annual notification shall include information on how to access the School Wellness policy; information about the most recent triennial assessment; information on how to participate in the development, implementation and periodic review and update of the School Wellness policy; and a means of contacting Wellness Committee leadership.[2][3]

GUIDELINES

Recordkeeping

The district shall retain records documenting compliance with the requirements of the School Wellness policy, which shall include:[3][4]

1. The written School Wellness policy.
2. Documentation demonstrating that the district has informed the public, on an annual basis, about the contents of the School Wellness policy and any updates to the policy.
3. Documentation of efforts to review and update the School Wellness policy, including who is involved in the review and methods used by the district to inform the public of their ability to participate in the review.
4. Documentation demonstrating the most recent assessment on the implementation of the School Wellness policy and notification of the assessment results to the public.

Wellness Committee

The district shall establish a Wellness Committee comprised of, but not necessarily limited to, at least one (1) of each of the following: School Board member, district administrator, district food service representative, student, parent/guardian, school health professional, physical education teacher and member of the public. It shall be the goal that committee membership will include representatives from each school building and reflect the diversity of the community.[2]

The Wellness Committee shall serve as an advisory committee regarding student health issues and shall be responsible for developing, implementing and periodically reviewing and updating a School Wellness policy that complies with law to recommend to the Board for adoption.

The Wellness Committee shall review and consider evidence-based strategies and techniques in establishing goals for nutrition education and promotion, physical activity and other school based activities that promote student wellness as part of the policy development and revision process.[3]

Advisory Health Council

An Advisory Health Council may be established by the Superintendent to study student health issues and to assist in organizing follow-up programs.[5]

The Advisory Health Council may examine related research, assess student needs and the current school environment, review existing Board policies and administrative regulations, and raise awareness about student health issues.

The Advisory Health Council may survey parents/guardians and/or students; conduct community forums or focus groups; collaborate with appropriate community agencies and organizations; and engage in similar activities, within the budget established for these purposes.

The Advisory Health Council shall provide periodic reports to the Superintendent or designee regarding the status of its work, as required.

Individuals who conduct student medical and dental examinations shall submit to the Advisory Health Council annual reports and later reports on the remedial work accomplished during the year, as required by law.[5]

Nutrition Education

Nutrition education will be provided within the sequential, comprehensive health education program in accordance with curriculum regulations and the academic standards for Health, Safety and Physical Education, and Family and Consumer Sciences.[6] **[7]** **[8]**

Nutrition education in the district shall teach, model, encourage and support healthy eating by students. Promoting student health and nutrition enhances readiness for learning and increases student achievement.

Nutrition education lessons and activities shall be age-appropriate.

School food service and nutrition education classes shall cooperate to create a learning laboratory.

Lifelong lifestyle balance shall be reinforced by linking nutrition education and physical activity.

Nutrition education shall extend beyond the school environment by making resources available for families and the community.

Nutrition Promotion

Nutrition promotion and education positively influence lifelong eating behaviors by using evidence-based techniques and nutrition messages, and by creating food environments that encourage healthy nutrition choices and encourage participation in school meal programs.

District schools shall promote nutrition through the implementation of Farm to School activities, where possible. Activities may include, but not be limited to, the initiation/maintenance of school gardens, taste-testing of local products in the cafeteria and classroom, classroom education about local agriculture and nutrition, field trips to local farms and incorporation of local foods into school meal programs.

District food service personnel shall review and implement research-based, behavioral economics techniques in the cafeteria to encourage consumption of more whole grains, fruits, vegetables and legumes, and to decrease plate waste.

Consistent nutrition messages shall be disseminated and displayed throughout the district, schools, classrooms, cafeterias, homes, community and media.

District schools shall offer resources about health and nutrition to encourage parents/guardians to provide healthy meals for their children.

Physical Activity

District schools shall strive to provide opportunities for developmentally appropriate physical activity during the school day for all students.

District schools shall contribute to the effort to provide students opportunities to accumulate at least sixty (60) minutes of age-appropriate physical activity daily, as recommended by the Centers for Disease Control and Prevention. Opportunities offered at school will augment physical activity outside the school environment, such as outdoor play at home, sports, etc.

Age-appropriate physical activity opportunities, such as outdoor and indoor recess, before and after school programs, during lunch, clubs, intramurals and interscholastic athletics, shall be provided to meet the needs and interests of all students, in addition to planned physical education.

A physical and social environment that encourages safe and enjoyable activity for all students shall be maintained.

Before and/or after-school programs shall provide developmentally appropriate physical activity for participating children.

District schools shall promote physical activity through encouragement of walking and biking as a means of transportation to and from school.

Students and their families shall be encouraged to utilize district-owned physical activity facilities, such as playgrounds and fields, outside school hours in accordance with established district rules.

Extended periods of student inactivity, two (2) hours or more, shall be discouraged.

Physical activity shall not be used or withheld as a form of punishment.

Physical Education

A sequential physical education program consistent with curriculum regulations and Health, Safety and Physical Education academic standards shall be developed and implemented. All district students must participate in physical education. **[7]** **[8]** [9]

Instruction involving the collection of a student's height and weight measurements must be conducted in a manner that protects student confidentiality. The calculation of body mass index (BMI) is prohibited.[9]

Quality physical education instruction that promotes lifelong physical activity and provides instruction in the skills and knowledge necessary for lifelong participation shall be provided.

Physical education classes shall be the means through which all students learn, practice and are assessed on developmentally appropriate skills and knowledge necessary for lifelong, health-enhancing physical activity.

A comprehensive physical education course of study that focuses on providing students the skills, knowledge and confidence to participate in lifelong, health-enhancing physical activity shall be implemented.

Students shall be moderately to vigorously active as much time as possible during a physical education class. Documented medical conditions and disabilities shall be accommodated during class.

Safe and adequate equipment, facilities and resources shall be provided for physical education courses.

Physical education shall be taught by certified health and physical education teachers.

Physical education classes shall have a teacher-student ratio comparable to those of other courses for safe and effective instruction.

A varied and comprehensive curriculum that promotes both team and individual activities and leads to students becoming and remaining physically active for a lifetime shall be provided in the physical education program.

Appropriate professional development shall be provided for physical education staff.

Social Media

A social media literacy program consistent with curriculum regulations and academic standards shall be developed and implemented to address the following: **[7]** **[8]** [23]

1. Mental, psychological and physical effects of social media and mobile device use.
2. Potential impacts of social media and mobile device use on academic growth and learning.
3. Safe use of social media, including how to recognize suspicious online behavior including, but not limited to:
   a. Cyberbullying.
   b. Predatory behavior.
   c. Potential human trafficking.
4. Personal security and privacy on mobile devices.

Other School Based Activities

Safe drinking water shall be available and accessible to students, without restriction and at no cost to the student, at all meal periods and throughout the school day.[10][11][21][24]

Nutrition professionals who meet hiring criteria established by the district and in compliance with federal regulations shall administer the school meals program. Professional development and continuing education shall be provided for district nutrition staff, as required by federal regulations. **[12]** [13][14][15]

District schools shall provide adequate space, as defined by the district, for eating and serving school meals.

Students shall be provided a clean and safe meal environment.

Meal periods shall be scheduled at appropriate hours, as required by federal regulations and as defined by the district.[10]

Students shall have access to hand washing or sanitizing before meals and snacks.

Nutrition content of school meals shall be available to students and parents/guardians.

Fundraising projects submitted for approval shall be supportive of healthy eating and student wellness.

The district shall maintain a healthy school environment to optimize conditions for learning and minimize potential health risks to students, in accordance with the district's school environmental health program and applicable laws and regulations

District schools may implement alternative service models to increase school breakfast participation where possible, such as breakfast served in the classroom, "grab and go breakfast" and breakfast after first period to reinforce the positive educational behavioral and health impacts of a healthy breakfast.

Access to the food service operation shall be limited to authorized staff.

Students and parents/guardians may be involved in menu selections through various means, such as taste testing and surveys.

The district shall provide awareness to staff on the components of the School Wellness policy.

Nutrition Guidelines for All Foods/Beverages at School

All foods and beverages available in district schools during the school day shall be offered to students with consideration for promoting student health and reducing obesity.

Foods and beverages provided through the National School Lunch or School Breakfast Programs shall comply with established federal nutrition standards.[10][11][13][14]

Foods and beverages offered or sold at school-sponsored events outside the school day, such as athletic events and dances, shall offer healthy alternatives in addition to more traditional fare.

Competitive Foods -

Competitive foods available for sale shall meet or exceed the established federal nutrition standards (USDA Smart Snacks in School). These standards shall apply in all locations and through all services where foods and beverages are sold to students, which may include, but are not limited to: a la carte options in cafeterias, vending machines, school stores, snack carts and fundraisers.[3][16][17]

Competitive foods - foods and beverages offered or sold to students on school campus during the school day, which are not part of the reimbursable school breakfast or lunch.

School campus - any area of property under the jurisdiction of the school that students may access during the school day.[3][16]

School day - the period from midnight before school begins until thirty (30) minutes after the end of the official school day.[3][16]

The district may impose additional restrictions on competitive foods, provided that the restrictions are not inconsistent with federal requirements.[16]

Fundraiser Exemptions -

Fundraising activities held during the school day involving the sale of competitive foods shall be limited to foods that meet the Smart Snacks in School nutrition standards, unless an exemption is approved in accordance with applicable Board policy and administrative regulations. **[18]**

The district may allow a limited number of exempt fundraisers as permitted by the Pennsylvania Department of Education each school year: up to five (5) exempt fundraisers in elementary and middle school buildings, and up to ten (10) exempt fundraisers in high school buildings. Exempt fundraisers are fundraisers in which competitive foods are available for sale to students that do not meet the Smart Snacks in School nutrition standards.[16]

The district shall establish administrative regulations to implement fundraising activities in district schools, including procedures for requesting a fundraiser exemption.

Non-Sold Competitive Foods -

Non-sold competitive foods available to students, which may include but are not limited to foods and beverages offered as rewards and incentives, at classroom parties and celebrations, or as shared classroom snacks, shall meet or exceed the standards established by the district.

If the offered competitive foods do not meet or exceed the Smart Snacks in School nutrition standards, the following standards shall apply:

1. Rewards and Incentives:
    a. Foods and beverages shall not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (e.g., guest chef, field trip to a farm or farmers market, etc.).
2. Classroom Parties and Celebrations:
    a. Parents/Guardians shall be informed through newsletters or other efficient communication methods that foods/beverages should only be brought in when requested for scheduled parties.
    b. Classroom parties shall offer a minimal amount of foods (maximum 2-3 items) containing added sugar as the primary ingredient (e.g., cupcakes, cookies) and will provide the following:
        i. Fresh fruits/vegetables; and
        ii. Water, 100 percent juice, 100 percent juice diluted with water, low-fat milk or nonfat milk.
    c. When possible, foods/beverages for parties and celebrations shall be provided by the food service department to help prevent food safety and allergy concerns.

3. Shared Classroom Snacks:
    a. Ingredients of shared classroom snacks will be reviewed by the classroom teacher to ensure that no ingredients are contained which have been identified as allergens outlined in the individual student 504 plans or contained in the Allergy List provided by the school nurse.

The district shall provide a list of suggested nonfood ideas and healthy food and beverage alternatives to parents/guardians and staff, which may be posted via the district website, student handbooks, newsletters, posted notices and/or other efficient communication methods.

Marketing/Contracting -

Any foods and beverages marketed or promoted to students on the school campus during the school day shall meet or exceed the established federal nutrition standards (USDA Smart Snacks in School) and comply with established Board policy and administrative regulations. [3][16]

Exclusive competitive food and/or beverage contracts shall be approved by the Board, in accordance with provisions of law. Existing contracts shall be reviewed and modified to the extent feasible to ensure compliance with established federal nutrition standards, including applicable marketing restrictions.[19]

Management of Food Allergies in District Schools

The district shall establish Board policy and administrative regulations to address food allergy management in district schools in order to: **[20]**

1. Reduce or eliminate the likelihood of severe or potentially life-threatening allergic reactions.
2. Ensure a rapid and effective response in case of a severe or potentially life-threatening allergic reaction.
3. Protect the rights of students by providing them, through necessary accommodations when required, the opportunity to participate fully in all school programs and activities.

Safe Routes to School

The district shall assess and, to the extent possible, implement improvements to make walking and biking to school safer and easier for students.

Legal Footnotes

[1] **24 P.S. 1422.1**
LEGAL REFERENCE

[2] **42 U.S.C. 1758b**
LEGAL REFERENCE

[3] **7 CFR 210.31**
LEGAL REFERENCE

[4] **7 CFR 210.15**
LEGAL REFERENCE

[5] 24 P.S. 1422
LEGAL REFERENCE

[6] 24 P.S. 1513
LEGAL REFERENCE

[7] Pol. 102 — Academic Standards
POLICY REFERENCE

[8] Pol. 105 — Curriculum
POLICY REFERENCE

[9] 24 P.S. 1512.1
LEGAL REFERENCE

[10] 7 CFR 210.10
LEGAL REFERENCE

[11] 7 CFR 220.8
LEGAL REFERENCE

[12] Pol. 808 — Food Services
POLICY REFERENCE

[13] 42 U.S.C. 1751 et seq
LEGAL REFERENCE

[14] 42 U.S.C. 1773
LEGAL REFERENCE

[15] 7 CFR 210.30
LEGAL REFERENCE

[16] 7 CFR 210.11
LEGAL REFERENCE

[17] 7 CFR 220.12
LEGAL REFERENCE

[18] Pol. 229 — Student Fundraising
POLICY REFERENCE

[19] 24 P.S. 504.1
LEGAL REFERENCE

[20] Pol. 209.1 — Food Allergy Management and Dietary Needs
POLICY REFERENCE

[21] 24 P.S. 701
LEGAL REFERENCE

[23] 24 P.S. 1556 — 24-P-S-1556
LEGAL REFERENCE

[24] 24 P.S. 742.1
LEGAL REFERENCE

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Ala Carte-Food/Snacks *Foods offered through the National School Lunch or School Breakfast Programs may qualify towards meeting this requirement if the item is also offered for sale as an ala carte item. ** Includes any item served as a competitive food whether it is part of a reimbursable school meal or solely a competitive food.	The following standards apply to <u>all</u> foods offered as ala carte. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • A selection/variety of whole grains will be available on a daily basis. * (Table 1) • A minimum of 1 fresh fruit and vegetable will be offered daily. A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 4 times per week.** • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be	The following standards apply to <u>all</u> foods offered as ala carte. • Except for entrees, items will provide <200 calories per serving. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • At least 50% of grains offered will be whole grains.* (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh/raw). A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 3 times per week.** These 3 items are exempt from the total fat and	The following standards apply to <u>all</u> foods offered as ala carte. • Items will provide <200 calories per serving. • Portion sizes will not exceed the serving size of food served in the National School Lunch or School Breakfast Program and/or items will be packaged in single serving sizes. • At least 50% of grains offered will be whole grain.* (Table 1) • A minimum of 3 fruits and 3 vegetables will be offered daily (at least 1 of each being fresh/raw). A variety of fruits and vegetables will be offered from day to day.* • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis.* • No foods will be on-site deep fat fried. This does not include stir-fried or sautéed foods. Pre-fried or flash fried foods will not be offered more than 2 times per week.** These 2 items are exempt from the total fat and saturated fat restrictions listed below. • Foods of Minimal Nutritional

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Ala Carte-Food/Snacks – cont. *Foods offered through the National School Lunch or School Breakfast Programs may qualify towards meeting this requirement if the item is also offered for sale as an ala carte item. ** Includes any item served as a competitive food whether it is part of a reimbursable school meal or solely a competitive food.	available anytime during the school day. In addition, the majority of items offered will: • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage selection of the healthier foods. K-5 will not offer more than 5 ala carte food items in total.	saturated fat restrictions listed below. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat (excluding reduced fat cheeses). • <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Minimal to no trans fatty acids. Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. K-5 will not offer more than 5 ala carte food items in total. **Table 5 contains formulas for calculating	Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat (excluding reduced fat cheeses). • <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Minimal to no trans fatty acids. (Table 4) K-5 will not offer more than 5 ala carte food items in total. Ala carte items will supplement the reimbursable meal (limited to 1-2 items); not replace the reimbursable meal. Ala carte items will not be available until the end of each meal period. **Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
		total fat, saturated fat, and sugar by weight.	
Ala carte-Beverages	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • Milk, 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day.	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • Milk, 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Any beverage that does not meet the criteria in the above mentioned standards (not to surpass 25% of items available) will not exceed: • 150 calories • 35 grams of sugar Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day.	All beverages will meet these criteria. • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Food/Snacks	Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, the majority of items offered will: • Not be fried. (Table 2) • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition	• Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters and reduced fat cheeses). • <10% of calories from saturated fat.	Vending will not be available for students in grades K-5, and, at most, should only be available in limited quantities for grades 6-8. Including grades 9-12, the following standards apply to all foods offered through vending machines. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Fruits and vegetables will be available at every vending area. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters and reduced fat cheeses). • <10% of calories from saturated fat. • <35% sugar by weight (excluding

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Food/Snacks-cont.	education strategies will be used to encourage selection of the healthier foods. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	• <35% sugar by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Vending-Beverages	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving, inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Vending will not be available for students in grades K-5. All beverages offered through vending will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar). Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	**A Starting Point** (July 1, 2006)	**Better** (July 1, 2007)	**Best** (July 1, 2008)

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Fundraisers (non-vending)	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Foods will not be fried. (Table 2) • Foods will not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage selection of the healthier foods. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Total fat will be <35% of the total calories (excluding nuts, seeds, nut butters and reduced fat cheeses). • Saturated fat will be <10% of the total calories. • Sugar content will be <35% by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Items will contain minimal to no trans fatty acids. (Table 4) Foods sold as fundraisers that are available for sale outside of the school	All food items sold as fundraisers, available for sale during the school day, will follow the standards listed below. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. • Total fat will be <35% of the total calories (excluding nuts, seeds, nut butters and reduced fat cheeses.) • Saturated fat will be <10% of the total calories. • Sugar content will be <35% by weight (excluding naturally occurring sugars and low fat yogurts) and added sugar will not be listed as the first ingredient. • Items will contain minimal to no trans fatty acids. (Table 4) Food items will be available no earlier than 30 minutes after the last meal period of the day. Alternate revenue generating sources will be developed. Following are resources:

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Fundraisers (non-vending)		day will support healthy eating by limiting foods high in added sugar, fat, sodium or trans fat content. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	www.kidseatwell.org/flyers/twentywaystoraisefunds.pdf.; www.newenglanddairycouncil.org/pdf/creativefinancing.pdf. Foods sold as fundraisers that are available for sale outside of the school day will support healthy eating by limiting foods high in added sugar, fat, sodium or trans fat content. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Classroom Parties/ Holiday Celebrations	Classroom parties will offer minimal amount of foods (maximum 2-3 items) that contain added sugar as the first ingredient (Table 3) and will provide the following: • Fresh fruits and vegetables. • Water, 100% fruit juice or milk.	Classroom parties will offer minimal amount of foods (maximum 2-3 items) that contain added sugar as the first ingredient (Table 3) and will provide the following: • Fresh fruits and vegetables. • Water, 100% fruit juice or milk.	In addition, Food Service Departments will offer party lists/menus that include food and beverage choices that: • Are moderate in sodium content. • Provide minimal to no trans fatty acids. • Provide items that contain > 2 grams of fiber/serving. • Offer fresh fruits and vegetables • Offer water, 100% fruit juice or milk as the beverage choices. • Do not offer any Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220). Parents and teachers will be encouraged to purchase foods and beverages from this menu of items.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Rewards	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf	Food will not be used as a reward for classroom or school activities unless the reward is an activity that promotes a positive nutrition message (ie., guest chef, field trip to a farm or farmers market, etc.). Alternate ideas can be found at: www.msue.msu.edu/fnh/tn/foodrewards.pdf; www.cspinet.org/nutritionpolicy/constructive_rewards.pdf
Foods from Home		Parents/caregivers will be encouraged to promote their child's participation in the school meals programs. If their child does not participate in the school meals programs, parents/caregivers will be encouraged to provide or encourage the purchase of healthy alternatives. All nutrition standards will be explained to parents/caregivers. They will continuously be provided with nutrition education and encouraged to comply with the nutrition policies to the best of their ability and knowledge. Examples of nutrition education outreach include newsletters, open houses, back to school nights, family nights, etc.	Parents/caregivers will be encouraged to promote their child's participation in the school meals programs. If their child does not participate in the school meals programs, parents/caregivers will be encouraged to provide a healthy alternative. All nutrition standards will be explained to parents/caregivers. They will continuously be provided with nutrition education and encouraged to comply with the nutrition policies to the best of their ability and knowledge. Examples of nutrition education outreach include newsletters, open houses, back to school nights, family nights, etc.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Foods/Snacks	The following standards apply to all foods sold in school stores. • Packages will be in single serving sizes. • A minimum of 1 fresh fruit and vegetable will be offered daily. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • No foods will be on-site deep fat fried. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, the majority of items offered will: • Not be fried. (Table 2) • Not contain added sugar as the first ingredient. (Table 3) • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to	The following standards apply to all foods sold in school stores. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • At least 50% of grains offered will be whole grain. (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh or raw). A variety of fruits and vegetables will be offered. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, a minimum of 75% of items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat.	The following standards apply to all foods sold in school stores. • Items will provide <200 calories per serving. • Packages will be in single serving sizes. • At least 50% of grains offered will be whole grain. (Table 1) • A minimum of 2 fruits and 2 vegetables will be offered daily (including fresh or raw). A variety of fruits and vegetables will be offered. • A variety of items that provide >2 grams of fiber per serving will be available on a daily basis. • Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. In addition, all food items available will contain: • <35% of calories from total fat (excluding nuts, seeds, nut butters, and reduced fat cheeses). • <10% of calories from saturated fat. • <35% sugar by weight (excluding

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Foods/Snacks-cont.	encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	• <35% sugar by weight (excluding naturally occurring sugars) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) Marketing, pricing and nutrition education strategies will be used to encourage the selection of foods meeting these standards. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**	naturally occurring sugars) and added sugar will not be listed as the first ingredient. • Provide minimal to no trans fatty acids. (Table 4) School stores will not sell food until 30 minutes after the last meal period of the day. The school Food Service Director can provide assistance in identifying foods that meet these criteria. ****Table 5 contains formulas for calculating total fat, saturated fat, and sugar by weight.**
School Stores-Beverages	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 12 oz). • Milk, 1% lowfat or nonfat (not to exceed 16 oz), flavored or unflavored (not to exceed 30 grams of sugar per 8 ounce serving inclusive of naturally	A minimum of 75% of the beverages offered will be: • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • Milk, 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar).	All beverages will meet these criteria. • Water, unflavored (any size). • 100% fruit juice (not to exceed 6 oz). • A minimum of 75% of milk selections will be 1% lowfat or nonfat (not to exceed 8 oz), flavored or unflavored (not to exceed 30 grams of sugar inclusive of naturally occurring sugar).

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
School Stores-Beverages - cont.	occurring sugar). Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Preferably packaged in plastic resealable containers. Marketing, pricing and nutrition education strategies will be used to encourage the selection of the beverages listed above. Any beverage that does not qualify in the above-mentioned standards (not to surpass 25% of items available) will not exceed: • 150 calories • 35 grams of sugar Foods of Minimal Nutritional Value (USDA regulation 7CFR 210 and 220) will not be available anytime during the school day. The school Food Service Director can provide assistance in identifying foods that meet these criteria.	Preferably packaged in plastic resealable containers. The school Food Service Director can provide assistance in identifying foods that meet these criteria.

East Penn School District Guidelines for Competitive Foods

Source of Competitive Food	A Starting Point (July 1, 2006)	Better (July 1, 2007)	Best (July 1, 2008)
Faculty Lounges	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.	Faculty is encouraged to set the example for students. Students are not likely to believe that nutrition policies are beneficial if they see faculty consuming foods and beverages that do not align with the school policy.
Other	Student Input-Students will be an active part of menu planning through regularly scheduled meetings and taste testing.	Vegetarian Options-Students will be surveyed yearly for their interest in vegetarian entrees as part of the reimbursable meal or ala carte. If interest is indicated, efforts should be made to include appealing vegetarian choices. Student Input-Students will be an active part of menu planning through regularly scheduled meetings and taste testing.	Vegetarian Options-Students will be surveyed yearly for their interest in vegetarian entrees as part of the reimbursable meal or ala carte. If interest is indicated, efforts should be made to include appealing vegetarian choices. Student Input-Students will be an active part of menu planning through

East Penn School District Guidelines for Competitive Foods

Table 1- Whole Grains

A whole grain food is one labeled with the whole grain as first ingredient. The Food and Drug Administration requires foods that bear the "whole grain health claim" to contain 51% or more whole grain ingredients by weight per reference amount and be low in fat. Whole grains will usually contain at least 2 grams of fiber per serving. Examples of whole grain terms are: "cracked," "crushed," "whole," "entire," or "groats." Examples of whole grain ingredients are:	
Whole/entire wheat flour	Whole grain barley (hulled or lightly pearled)
Whole oats/oatmeal	Wild rice
Cracked/crushed wheat	Buckwheat
Graham flour	Wheat berries (whole wheat kernels)
Old fashioned oatmeal	Triticale
Quick cooking oats	Bulgur
Cornmeal	Millet
Whole grain corn	Quinoa
Popcorn	Sorghum
Brown rice	Spelt
Whole rye	
Generally, if the first ingredient is "fortified" or "enriched," it is probably not a whole grain. These items are generally not whole grains:	
Unbleached flour	Organic, unbleached flour
Wheat flour	Enriched flour
Semolina	Degerminated (cornmeal)
Durum wheat	Multigrain (may describe several whole grains or several refined grains)

Sources include the USDA Food Buying Guide for Child Nutrition Programs, Dietary Guidelines for Americans 2005, Whole Grains Council.

East Penn School District Guidelines for Competitive Foods

Table 2-Fried Foods

Fried Foods: Foods that are cooked by total immersion into hot oil or other fat, commonly referred to as "deep fat frying." This definition does not include foods that are stir fried or sautéed, but does include foods that have been pre-fried, flash fried, or deep-fat fryed.

Table 3-Added Sugar

Brown Sugar	Invert sugar
Corn sweetener	Lactose*
Corn syrup	Maltose*
Dextrose	Malt syrup
Fructose*	Molasses
Fruit juice concentrate	Raw sugar
Glucose*	Sucrose
High fructose corn syrup	Sugar
Honey	Syrup
*Naturally occurring. Will not show up on food ingredient list unless added. Will be included as "sugars" listed on the food label.	

Table 4-Trans Fatty Acids (Trans Fats)

Trans fats: Occurs in food when manufacturers use hydrogenation, a process in which hydrogen is added to vegetable oil to turn the oil into a more solid (saturated) fat. Sources of trans fatty acids include hydrogenated/partially hydrogenated vegetable oils that are used to make shortening and commercially prepared baked goods, snack foods, fried foods, and margarine. Trans fatty acids are present in foods that come from ruminant animals (e.g., cattle and sheep). Such foods include dairy products, beef and lamb. Federal labeling of trans fats on all food products is required by January 1, 2006.

East Penn School District Guidelines for Competitive Foods

Table 5-Formulas

% Total fat:	1. Multiply grams of total fat per serving times 9 2. Divide by calories per serving 3. Multiply times 100
% Saturated fat:	1. Multiply grams of saturated fat per serving times 9 2. Divide by calories per serving 3. Multiply times 100
% Sugar by weight:	1. Divide grams of sugar per serving by gram weight for the serving size 2. Multiply times 100

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

249 Bullying/Cyberbullying - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
249	8/8/2016	3/24/2025	v1.8
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes that bullying and cyberbullying creates an atmosphere of fear and intimidation, detracts from the safe environment necessary for student learning, and may lead to more serious violence. The Board is committed to providing a safe, positive learning environment for district students that is free from bullying and cyberbullying.

DEFINITIONS

Artificial Intelligence-Generated or Modified Media - text, code, images, audio or video data that has been created or modified from its original source data through the use of artificial intelligence technology, programs or platforms.[1]

Bullying - an intentional electronic, written, verbal or physical act or series of acts directed at another student or students, which occurs in a school setting and/or outside a school setting, that is severe, persistent or pervasive and has the effect of doing any of the following:[1]

1. Substantially interfering with a student's education; or
2. Creating a threatening environment; or
3. Substantially disrupting the orderly operation of the school setting.

Cyberbullying - bullying through the use of electronic technology or communication, including data, computer software or online platforms regardless of their origin, using a device, system network, internet service, email, social media or other digital means, including artificial intelligence–generated or modified media. Cyberbullying includes bullying conduct which occurs in a school setting and/or outside a school setting.[1]

School setting - in the school, on school grounds, in school vehicles, at a designated bus stop or at any activity sponsored, supervised or sanctioned by the school.[1]

AUTHORITY

The Board prohibits all forms of bullying and cyberbullying by district students and requires that this policy be accessible in every classroom. The policy shall be posted in a prominent location within each school building and on the district website.[1]

The Board encourages students who believe they or others have been bullied to promptly report such incidents to the building principal or designee.

The Board directs that complaints of bullying and cyberbullying be investigated promptly, and appropriate corrective or preventative action be taken when allegations are substantiated. The Board directs that any complaint of bullying or cyberbullying brought pursuant to this policy also be reviewed for conduct which may not be proven to be bullying or cyberbullying under this policy but merits review and possible action under other Board policies.

Confidentiality

Confidentiality of all parties, witnesses, the allegations, the filing of a complaint and the investigation shall be handled in accordance with applicable law, regulations, this policy and the district's legal and investigative obligations.

Retaliation

Reprisal or retaliation relating to reports of bullying or cyberbullying or participation in an investigation of allegations of bullying or cyberbullying is prohibited and shall be subject to disciplinary action.

DELEGATION OF RESPONSIBILITY

Each student shall be responsible to respect the rights of others and to ensure an atmosphere free from bullying and cyberbullying.

The Superintendent or designee shall develop administrative regulations to support this policy.

The Superintendent or designee shall ensure that this policy and administrative regulations are reviewed annually with students.[1]

The Superintendent or designee, in cooperation with other appropriate administrators, shall review this policy every three (3) years and recommend necessary revisions to the Board.[1]

District administration shall annually provide the following information with the school safety and security incident report:[1] **[6]**

1. Board's Bullying/Cyberbullying Policy.
2. Report of bullying and cyberbullying incidents.
3. Information on the development and implementation of any bullying and cyberbullying prevention, intervention or education programs.

GUIDELINES

Reports of bullying or cyberbullying may be made orally or in writing and may be anonymous, except where made by district staff. Students are encouraged to use the district's reporting form attached to this policy, or to submit a written complaint; however, oral complaints will be accepted, documented and investigated.

Any individual receiving a complaint shall handle the report objectively, neutrally and professionally, setting aside personal biases that might favor or disfavor any person involved.

District staff who observe bullying/cyberbullying or receive a report of bullying/cyberbullying shall not conduct an independent investigation but shall take appropriate action to protect the safety of involved students and promptly provide a summary of the observed or reported conduct to the building principal or designee.

For purposes of this policy, a reporter is an individual, other than district staff, who reports alleged bullying/cyberbullying directed at one or more students. A complainant is the alleged victim or target of the conduct. In some circumstances, the same individual may serve as both reporter and complainant.

The building principal or designee shall encourage the complainant or reporter to complete the district's designated report form. If, due to age, disability or other incapacity, the complainant or reporter is unable to complete the form, the building principal or designee shall document the report and complete the form on the individual's behalf. If the report is made by someone other than the complainant, the complainant shall be notified promptly, informed of the report, and encouraged to complete the district reporting form.

As soon as practicable after the receipt of a report of bullying or cyberbullying, the district shall notify the parent(s)/guardian(s) of any student involved in the incident.

If the complainant, district staff, or other professionals with knowledge of the complainant's health and well-being indicate that notifying a parent/guardian could place the complainant or another person at risk of abuse, neglect or other imminent harm, the building principal, in consultation with the Superintendent and legal counsel, and as appropriate, law enforcement, child welfare authorities and other qualified professionals, may determine whether parental notification should be delayed as permitted by law. The basis for the delay must be documented, and parent/guardian notification shall occur as soon as legally and safely practicable.[14][15]

Every report of bullying/cyberbullying shall be reviewed and investigated promptly and sufficiently to address the alleged misconduct, even if the report is anonymous or the complainant requests that no action be taken.

Threat Assessment

When a student's behavior indicates a threat to the safety of the student, other students, school employees, school facilities, the community, or others, district staff shall make a referral to the district's threat assessment team in accordance with applicable law and Board policy.[2] **[3]**

Discrimination/Harassment

If, at the time of the report or at any time during the investigation of the alleged bullying/cyberbullying, there is reason to believe that the conduct may fall within the provisions of the district's discrimination/harassment policies, the Title IX Coordinator must be promptly notified. Upon notification, the Title IX Coordinator will immediately initiate steps to comply with appropriate policies and procedures. The investigation will be handled as a joint and concurrent investigation to address all applicable allegations and legal requirements. [4] [5]

Investigation Procedures

After determining that the matter does not require handling under Policy 103, the building principal shall determine whether the investigation may be conducted by the principal or designee or whether the matter must be referred to the Superintendent or another appropriate administrator.

If law enforcement has been notified, a law enforcement report has been filed, or substantiated allegations could result in expulsion, the building principal shall consult with the Superintendent or appropriate administrator, who may seek advice from legal counsel.

Investigations shall be timely, impartial, thorough and comprehensive. The investigation may include:

1. Interviewing the complainant.
2. Interviewing the individual(s) accused of the conduct.
3. Interviewing witnesses.
4. Reviewing physical, electronic or documentary evidence.
5. Reviewing any other relevant information provided during the investigation.
6. Conducting any additional inquiry reasonably necessary to determine the facts and address proven misconduct.

Investigative Findings

The investigator shall prepare findings that summarize the investigation, determine whether the allegations have been substantiated, identify any violation of Board policy or applicable law, and recommend appropriate corrective action.

As soon as practicable after determining that an incident of bullying or cyberbullying has occurred, the district shall notify the parent(s)/guardian(s) of any student involved in the incident of the determination of the investigation.

The complainant/reporter and the accused shall be informed of the outcome of the investigation within a reasonable period of time, consistent with the Family Educational Rights and Privacy Act (FERPA) and other applicable laws. The accused shall not be informed of any individual remedies provided to the complainant.[16]

District Response and Corrective Action

If an investigation results in a finding that bullying or cyberbullying or other misconduct occurred, the district shall take prompt and appropriate corrective action designed to stop the conduct, prevent its recurrence, protect affected students, eliminate any hostile or disruptive environment, and prevent retaliation.[1]

The district shall document corrective actions taken and, when permitted by law, inform the complainant or reporter of responsive measures. District administrators shall monitor the effectiveness of corrective actions and take additional measures when necessary.[1]

If an investigation reveals violations of other Board policies or circumstances requiring additional review, referral, discipline or intervention, the district shall address those matters through the appropriate disciplinary, administrative or support processes.

Any disciplinary action imposed shall be consistent with the Code of Student Conduct, Board policies and administrative regulations, applicable collective bargaining agreements, and state and federal law, and may include:[1] **[6]** **[8]** **[11]** **[12]**

1. Counseling within the school.
2. Parental conference.
3. Loss of school privileges.
4. Transfer to another school building, classroom or school bus.
5. Exclusion from school-sponsored activities.
6. Detention.
7. Suspension.
8. Expulsion.
9. Counseling/Therapy outside of school.
10. Referral to law enforcement authorities.

The Student Discipline Code, which shall contain this policy, shall be disseminated annually to students.[1][7] **[8]**

Education

The district shall develop, implement and evaluate bullying and cyberbullying prevention and intervention programs and activities. Programs and activities shall provide district staff and students with appropriate training for effectively responding to, intervening in and reporting incidents of bullying and cyberbullying.[1][9][10]

School Safety and Security Incidents Report

Annually, by July 31, the Superintendent shall report on the designated form, to the PA Department of Education, all new incidents as required by state law. The report must include the total number of bullying and cyberbullying incidents that occurred during the school year, including the number of cyberbullying incidents suspected to involve artificial intelligence-generated or modified media. **[6]** [18]

Legal Footnotes

[1] 24 P.S. 1303.1-A
LEGAL REFERENCE

[2] 24 P.S. 1302-E
LEGAL REFERENCE

[3] Pol. 236.1 — Threat Assessment
POLICY REFERENCE

[4] Pol. 103 — Discrimination/Title IX Sexual Harassment Affecting Students
POLICY REFERENCE

[5] Pol. 103.1 — Nondiscrimination — Qualified Students with Disabilities
POLICY REFERENCE

[6] Pol. 805.1 — Relations With Law Enforcement Agencies
POLICY REFERENCE

[7] 22 PA Code 12.3
LEGAL REFERENCE

[8] Pol. 218 — Student Discipline
POLICY REFERENCE

[9] 20 U.S.C. 7118
LEGAL REFERENCE

[10] 24 P.S. 1302-A
LEGAL REFERENCE

[11] Pol. 236 — Student Assistance Program
POLICY REFERENCE

[12] Pol. 233 — Suspension and Expulsion
POLICY REFERENCE

[14] 23 Pa. C.S.A. 6301 et seq
LEGAL REFERENCE

[15] Pol. 806 — Child Abuse
POLICY REFERENCE

[16] Pol. 216 — Student Records
POLICY REFERENCE

[18] 24 P.S. 1319-B
LEGAL REFERENCE

Legal References

Additional References

Pol. 815.1
LEGAL REFERENCE

DISCRIMINATION/SEXUAL HARASSMENT/BULLYING/
HAZING/DATING VIOLENCE/RETALIATION
REPORT FORM

The Board declares it to be the policy of this district to provide a safe, positive learning and working environment that is free from bullying, hazing, dating violence, sexual harassment and other discrimination, and retaliation. If you have experienced, or if you have knowledge of, any such actions, we encourage you to complete this form. The Title IX Coordinator will be happy to support you by answering any questions about the report form, reviewing the report form for completion and assisting as necessary with completion of the report. The Title IX Coordinator's contact information is:

Position: Head of Human Resources

Address: 800 Pine Street, Emmaus, PA 18049

Email: hr@eastpennsd.org

Phone Number: 610-966-8377

Retaliation Prohibited

The district, its employees and others are prohibited from intimidating, threatening, coercing, or discriminating against you for filing this report. Please contact the Title IX Coordinator immediately if you believe retaliation has occurred.

Confidentiality

Confidentiality of all parties, witnesses, the allegations and the filing of a report shall be handled in accordance with applicable law, regulations, Board policy, procedures, and the district's legal and investigative obligations. The school will take all reasonable steps to investigate and respond to the report, consistent with a request for confidentiality as long as doing so does not preclude the school from responding effectively to the report. If you have any questions regarding how the information contained in this report may be used, please discuss them with the Title IX Coordinator prior to filing the report. Once this report is filed, the district has an obligation to investigate the information provided.

***Note**: For purposes of Title IX sexual harassment, this Report Form serves initially as an informal report, <u>not</u> a formal complaint of Sexual Harassment under Title IX.*

I. Information About the Person Making This Report:

Name: _____

Address: _____

Phone Number: _____

School Building: _____

I am a:

☐ Student ☐ Parent/Guardian ☐ Employee ☐ Volunteer ☐ Visitor

☐ Other _____ (please explain relationship to the district)

If you are not the victim of the reported conduct, please identify the alleged victim:

Name: _____

The alleged victim is: ☐ Your Child ☐ Another Student ☐ A District Employee

☐ Other: _____ (please explain relationship to the alleged victim)

II. Information About the Person(s) You Believe is/are Responsible for the Bullying, Hazing, Harassing or Other Discrimination You are Reporting

What is/are the name(s) of the individual(s) you believe is/are responsible for the conduct you are reporting?

Name(s):

The reported individual(s) is/are:

☐ Student(s) ☐ Employee(s)

☐ Other _____ (please explain relationship to the district)

III. Description of the Conduct You are Reporting

In your own words, please do your best to describe the conduct you are reporting as clearly as possible. Please attach additional pages if necessary:

When did the reported conduct occur? (Please provide the specific date(s) and time(s) if possible):

Where did the reported conduct take place?

Please provide the name(s) of any person(s) who was/were present, even if for only part of the time.

Please provide the name(s) of any other person(s) that may have knowledge or related information surrounding the reported conduct.

Have you reported this conduct to any other individual prior to giving this report?

☐Yes ☐ No

If yes, who did you tell about it?

If you are the victim of the reported conduct, how has this affected you?

I affirm that the information reported above is true to the best of my knowledge, information and belief.

_____	_____
Signature of Person Making the Report	Date
_____	_____
Received By	Date

FOR OFFICIAL USE ONLY

This section is to be completed by the Title IX Coordinator based on reviewing the report with the complainant or other individual making the report.

The purpose of this form is to assist the Title IX Coordinator in gathering information necessary to properly assess the circumstances surrounding the reported conduct to determine if the allegations fall under the definition of Title IX sexual harassment or if the matter merits review and action under the Code of Student Conduct and/or other Board policies. The Title IX Coordinator shall gather as much information as possible in cases of incomplete or anonymous reports (including those that may be received through the Safe2Say Something program) to assess the report.

Upon receipt of the report, The Title IX Coordinator shall promptly contact the complainant regarding the report to gather additional information as necessary, and to discuss the availability of supportive measures as described in Policy 103 and Attachment 3. The Title IX Coordinator shall consider the complainant's wishes with respect to supportive measures.

I. Reporter Information:

Name: _____

Address: _____

Phone Number: _____

School Building: _____

Reporter is a:

☐ Student ☐ Parent/Guardian ☐ Employee ☐ Volunteer ☐ Visitor

☐ Other _____ (please explain relationship to the district)

If the reporter is not the victim of the reported conduct, please identify the alleged victim:

Name: _____

The alleged victim is: ☐ Reporter's Child ☐ Another Student ☐ Another Employee

☐ Other: _____ (please explain relationship to the alleged victim)

II. Respondent Information

Please state the name(s) of the individual(s) believed to have conducted the reported violation:

Name(s):

The reported respondent(s) is/are:

☐ Student(s) ☐ Employee(s)

☐ Other _____ (please explain relationship to the district)

III. Level of Report:

☐ Informal ☐ Formal (see additional information below on Title IX formal complaints)

IV. Type of Report:

☐ Title IX Sexual Harassment ☐ Discrimination ☐ Retaliation ☐ Bullying

☐ Hazing ☐ Dating Violence ☐ Other _____

Nature of the Report (check all that apply):

☐ Race
☐ Color
☐ Religion
☐ Sexual Orientation
☐ National Origin
☐ Marital Status
☐ Handicap/Disability
☐ Hazing
☐ Age
☐ Creed
☐ Sex
☐ Sexual Harassment (Title IX)
☐ Ancestry
☐ Pregnancy
☐ Bullying
☐ Dating Violence

V. Reported Conduct

Describe the reported conduct below, including specific actions, dates, times, locations and any other details necessary to properly assess the reported incident(s).

How often did the conduct occur?

Is it being repeated? ☐ Yes ☐ No

Do the circumstances involve a student identified as a student with a disability under the Individuals with Disabilities Education Act or Section 504 of the Rehabilitation Act?

☐ No.

☐ Yes, please identify the student with a disability and contact the Director of Special Education.

Date Director of Special Education was contacted: _____

How has the conduct affected the alleged victim's ability to fully participate in the school's academic, programs, activities or school employment?

What is the alleged victim's relationship with the alleged respondent?

Insert names, descriptions, and/or contact information of individuals believed to have observed the conduct or who otherwise may have knowledge of the conduct and/or related circumstances.

Additional observations or evidence including pictures, texts, emails, video or other information submitted to the Title IX Coordinator.

VI. Safety Concerns

Are there safety concerns that may require Emergency Removal of or Administrative Leave for a respondent? (This requires an individualized safety and risk analysis as to whether there is an immediate threat to the physical health or safety of a student or other individual.)

☐ No.

☐ Yes, please describe:

VII. Other Reports

Has the conduct been reported to the police or any other agency?

□ No

□ Yes Date reported: _____ Agency: _____

VIII. Identification of Policies Implicated by Reported Conduct

Check all that apply:

□ Policy 103. Discrimination/Title IX Sexual Harassment Affecting Students
□ Policy 104. Discrimination/Title IX Sexual Harassment Affecting Staff
□ Policy 247. Hazing
□ Policy 249. Bullying

□ Other _____

To meet the definition of Title IX sexual harassment, the conduct must have taken place during a district education program or activity involving a person in the United States. An **education program or activity** includes the locations, events or circumstances over which the district exercises substantial control over both the respondent and the context in which the sexual harassment occurs. Title IX applies to all of a district's education programs or activities, whether such programs or activities occur on-campus or off-campus.

Did the incident occur during a during a school program or activity involving a person in the United States?

□ Yes

□ No

To meet the definition of Title IX sexual harassment, the conduct needs to satisfy one or more of the following (please check all that apply):

□ A district employee conditioning the provision of an aid, benefit, or district service on an individual's participation in unwelcome sexual conduct, commonly referred to as quid pro quo sexual harassment.

□ Unwelcome conduct determined by a reasonable person to be so severe, pervasive and objectively offensive that it effectively denies a person equal access to a district education program or activity.

□ Sexual assault, dating violence, domestic violence or stalking.

Dating violence means violence committed by a person who is or has been in a social relationship of a romantic or intimate nature with the victim and where the existence of such a relationship is determined by the following factors:

- Length of relationship.
- Type of relationship.
- Frequency of interaction between the persons involved in the relationship.

Domestic violence includes felony or misdemeanor crimes of violence committed by a current or former spouse or intimate partner of the victim, by a person with whom the victim shares a child in common, by a person who is cohabitating with or has cohabitated with the victim as a spouse or intimate partner, by a person similarly situated to a spouse of the victim under the domestic or family violence laws of the jurisdiction receiving federal funding, or by any other person against an adult or youth victim who is protected from that person's acts under the domestic or family violence laws of the jurisdiction.

Sexual assault means a sexual offense under a state or federal law that is classified as a forcible or nonforcible sex offense under the uniform crime reporting system of the Federal Bureau of Investigation.

Stalking means stalking on the basis of sex, for example when the stalker desires to date a victim. Stalking means to engage in a course of conduct directed at a specific person that would cause a reasonable person to either:

1. Fear for their safety or the safety of others.
2. Suffer substantial emotional distress.

IX. Recommended Course of Action

After consultation with the complainant and consideration of the reported information, the Title IX Coordinator directs the report to proceed under the provisions of (check all that apply):

☐ No further action at this time. Reason:

☐ Policy 247. Hazing
☐ Policy 249. Bullying

☐ Other _____

☐ Policy 103 Discrimination/Title IX Sexual Harassment Affecting Students: Attachment 2 Discrimination Complaint Procedures

□ Policy 104 Discrimination/Title IX Sexual Harassment Affecting Staff: Attachment 2 Discrimination Complaint Procedures

□ Policy 103. Discrimination/Title IX Sexual Harassment Affecting Students: Attachment 3 Title IX Sexual Harassment Procedures and Grievance Process for Formal Complaints
□ Policy 104. Discrimination/Title IX Sexual Harassment Affecting Staff: Attachment 3 Title IX Sexual Harassment Procedures and Grievance Process for Formal Complaints

X. Title IX Information to Complainant

What supportive measures were discussed with the complainant, and what were the complainant's wishes with respect to supportive measures?

Upon designating a course of action under Title IX sexual harassment, the Title IX Coordinator will promptly:

1. Explain to the complainant the process for filing a formal complaint.

2. Inform the complainant of the continued availability of supportive measures with or without the filing of a formal complaint.

3. The Title IX Coordinator shall contact a student complainant's parents/guardians and provide them with information regarding the report and Title IX sexual harassment procedures and grievance process for formal complaints.

   If the complainant/reporter, school staff or others with professional knowledge relating to the complainant's health and well-being indicate that notifying the parents/guardians could cause serious harm to the health or well-being of the complainant or other person(s), the Title IX Coordinator will determine, in consultation with such individuals and upon advice of legal counsel, whether to withhold or delay notification of the report from the complainant's parents/guardians.

4. Determine what supportive measures may be offered to the respondent.

5. Determine whether the complainant wishes this report to be treated as a formal complaint.

XI. Title IX Coordinator Signature

I recommend the above course of action based on my consultation with the complainant and the information available at this time.

Title IX Coordinator: _____

Date: _____

XII. Title IX Formal Complaint Action

The Title IX Coordinator shall have the complainant check the appropriate box and sign and date below to indicate whether or not the complainant wishes to have this form serve as a formal complaint pursuant to Title IX.

I would like my report to be treated as a formal complaint pursuant to Title IX.

☐ Yes ☐ No

Complainant's Signature: _____

Date: _____

If the complainant does not wish this report to be treated as a formal complaint pursuant to Title IX, the Title IX Coordinator must assess whether actions limited to supportive measures are a sufficient response to alleged behavior, or whether a formal complaint process is necessary to investigate and address the situation adequately. For example, if disciplinary action would be warranted if allegations are true, if the respondent is an employee, or if further investigation is needed to assess the extent of the behavior and impact on others, it may be clearly unreasonable not to initiate the formal complaint process. The Title IX Coordinator may consult with the school solicitor and other district officials in making this decision.

As Title IX Coordinator, I have determined that, notwithstanding the complainant's preference, it is necessary to proceed with the Grievance Process for Formal Complaints for the following reasons:

Therefore, I am signing this form for the purpose of serving as the formal complaint initiating that process:

Title IX Coordinator's Signature: _____

Date: _____

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EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

704 Maintenance - DRAFT

POLICY NUMBER	ADOPTED	VERSION	DOCUMENT STATUS
704	5/22/2017	v1.4	DRAFT

PRINTED
10/8/2026

PURPOSE

Adequate maintenance of buildings, property and equipment is essential for the efficient management of district facilities in a fiscally responsible manner.

AUTHORITY

The Board directs that a continuous program of inspection and maintenance of all district buildings, property and equipment be established and implemented. Wherever possible, maintenance shall be preventative.[1][2]

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall develop and supervise a maintenance program which shall include:

1. Regular program of maintenance, repair and improvement of buildings and facilities.
2. Testing lead levels in drinking water.[2]
3. Equipment replacement program.
4. Long-range plans for building modernization and conditioning.

The Facilities Director or designee, in conjunction with each building principal and head custodian, shall conduct a physical inspection of the building on an annual basis.

Building maintenance needs will be prioritized and reviewed by the Superintendent and Business Manager for inclusion in the annual budget.

Legal Footnotes

[1] 24 P.S. 701
LEGAL REFERENCE

[2] 24 P.S. 742.1
LEGAL REFERENCE

Legal References

Additional References

25 PA Code 171.1 et seq
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

803 School Calendar - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
803	7/10/2017	10/28/2024	v1.5
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

PURPOSE

The Board recognizes that preparation of an annual school calendar is necessary for the efficient operation of the district and communication with students, staff, parents/guardians and the school community.

AUTHORITY

The Board shall determine annually the days and the hours when the schools will be in session for instructional purposes, in accordance with state law and regulations. This may include, as appropriate, activities qualifying as instructional days or hours under the direction of certified school employees for fulfilling the minimum required days or hours of instruction under law, regulations and state guidance.[1][2][3][4][5][6][7][8][9]

The school calendar shall normally consist of a minimum of 180 student days or 900 hours of instruction at the elementary level and 990 hours of instruction at the secondary level.[1][2][8][10]

The Board reserves the right to alter the school calendar when it is in the best interests of the district, including in cases of emergency, in accordance with applicable law and regulations. The Board shall take action to establish temporary provisions in cases of emergency, in accordance with law, and shall document such actions with the PA Department of Education when required.[2][5][6][7][9][11][12][13] **[14]**

Temporary provisions established in accordance with law may include but are not limited to: [1][2][5][6][7][8][9][12][13] **[15]**

1. Keeping schools in session such days and hours as the Board deems necessary, which shall include maintaining the requirement for a minimum of 180 student days or 900 hours of instruction at the elementary level and 990 hours of instruction at the secondary level.
2. Reducing the length of time of daily instruction for courses and classes.

3. Implementing remote and other alternative methods of delivering instruction under the direction of certified school employees.

Each year, prior to finalizing the school calendar, the Board must discuss the use or potential use of flexible instructional days and remote or virtual instructional days at a public Board meeting.[7] [14]

DELEGATION OF RESPONSIBILITY

The Superintendent shall annually prepare a school calendar for Board consideration.

The Superintendent or designee shall document alterations to the school calendar and any temporary provisions in accordance with law, regulations, guidance from the PA Department of Education and Board policy. [15]

Legal Footnotes

[1] 24 P.S. 133
LEGAL REFERENCE

[2] 24 P.S. 1501
LEGAL REFERENCE

[3] 24 P.S. 1502
LEGAL REFERENCE

[4] 24 P.S. 1503
LEGAL REFERENCE

[5] 24 P.S. 1504
LEGAL REFERENCE

[6] 24 P.S. 1505
LEGAL REFERENCE

[7] 24 P.S. 1506
LEGAL REFERENCE

[8] 22 PA Code 11.1
LEGAL REFERENCE

[9] 22 PA Code 11.2
LEGAL REFERENCE

[10] 22 PA Code 4.4
LEGAL REFERENCE

[11] 24 P.S. 520
LEGAL REFERENCE

[12] 24 P.S. 520.1
LEGAL REFERENCE

[13] 24 P.S. 1501.3
LEGAL REFERENCE

[14] Pol. 006 — Meetings
POLICY REFERENCE

[15] Pol. 805 — Emergency Preparedness and Response
POLICY REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

805.2 School Security Personnel - DRAFT

POLICY NUMBER	ADOPTED	REVISED	VERSION
805.2	12/9/2019	1/13/2025	v1.4
DOCUMENT STATUS	**PRINTED**		
DRAFT	10/8/2026		

AUTHORITY

The Board shall employ, contract for and/or assign staff to coordinate the safety and security of district students, staff, visitors and facilities.

The district shall employ or contract for at least one (1) full-time school security personnel who has completed the training required by law and this Board policy to be on duty during the school day.[1]

The district shall certify to the state School Safety and Security Committee annually that it has met the requirements for school security personnel or has received a waiver, in accordance with applicable law.[1]

DEFINITIONS

School security personnel - school police officers, school resource officers and school security guards.[2]

School Resource Officer (SRO) - a law enforcement officer commissioned and employed by a law enforcement agency whose duty station is located in the district and whose stationing is established by an agreement between the law enforcement agency and the district. The term includes an active certified sheriff or deputy sheriff whose stationing in the district is established by a written agreement between the county, the sheriff's office and the district.[2]

School day - the hours between the morning opening of a school building and the afternoon dismissal of students on a day which classes are in session.[1]

DELEGATION OF RESPONSIBILITY

The Superintendent shall appoint a school administrator to serve as the School Safety and Security Coordinator, in accordance with law. When a vacancy occurs in the role of the School Safety and Security Coordinator, the Superintendent shall appoint another school

administrator to serve as the School Safety and Security Coordinator within thirty (30) days of the vacancy and shall notify the Board regarding the appointment.[3]

The Superintendent or designee shall submit the name and contact information for the appointed School Safety and Security Coordinator to the state's School Safety and Security Committee within thirty (30) days of the appointment.[3]

The School Safety and Security Coordinator shall report directly to the Superintendent, and shall be responsible for the following:[3]

1. Oversee all School Resource Officers (SROs).
2. Review and provide oversight of all Board policies, administrative regulations and procedures related to school safety and security, and ensure compliance with federal and state laws and regulations regarding school safety and security.
3. Coordinate training and resources for students and staff related to situational awareness, trauma-informed approaches, behavioral health awareness, suicide awareness and prevention and bullying and cyberbullying awareness and prevention, substance use awareness, emergency procedures and training drills, and identification or recognition of student behavior that may indicate a threat to the safety of the student, other students, school employees, other individuals, school facilities or the community, in accordance with the standards established by the state's School Safety and Security Committee and the requirements of applicable law and regulations.[4] **[5] [6] [7] [8] [9] [10] [11] [12] [13]**
4. Coordinate a tour of the district's buildings and grounds biennially, or when a building is first occupied or reconfigured, with law enforcement and first responders responsible for protecting and securing the district to discuss and coordinate school safety and security matters.
5. Serve as the liaison with law enforcement and other state committees and agencies on matters of school safety and security.
6. Serve on the district's threat assessment team(s) and participate in required training and the threat assessment process. **[8]** [14]
7. Coordinate School Safety and Security Assessments, School Safety and Security grant requirements and respond to School Safety and Security surveys, as applicable. **[12]** [15]

The School Safety and Security Coordinator shall, within one (1) year of appointment, complete required training as specified by the state's School Safety and Security Committee for serving in the role of a School Safety and Security Coordinator. This training shall be in addition to other training requirements for school administrators, but shall count toward professional education credit, where applicable.[3][16][17][18]

By June 30 of each year, the School Safety and Security Coordinator shall make a report to the Board at an executive session on the district's current safety and security practices, and identify strategies to improve school safety and security.[3] **[19]**

The Board directs the School Safety and Security Coordinator to include the following information in the annual report:

1. Threat assessment team information, including verification of compliance with law and regulations, the number and composition of the district's threat assessment team(s), the total number of threats assessed in the past year and additional information on threat assessment required by the Superintendent or designee, in accordance with Board policy. **[8]** [14]
2. The number and type(s) of school security personnel contracted or employed by the district, including: [3]
   a. The number of school security personnel that are armed, listed by type(s) of personnel.
   b. The school building at which each school security personnel is assigned, listed by type(s) of personnel.
   c. The training, including the type of training and completion dates, of each school security personnel, listed by type(s) of personnel.
   d. A listing of other individuals utilized by the district for school safety-related duties.
3. Reports of required emergency preparedness, fire, bus evacuation and school security drills. **[12]**
4. Information on required school safety and security training and resources provided to students and staff. **[12]**
5. Safe2Say Something aggregate data, including a breakdown of Life Safety and Non-Life Safety reports received.
6. Behavioral health and school climate information, including aggregate data from surveys and assessments issued in the district, information on referrals and services accessed by students and families, and identification of additional resources needed in the district. **[20]**
7. School safety and security incident reports for the previous year(s) and/or data collected to date for the current year. **[21]**
8. Updates regarding the district's Memorandum of Understanding with law enforcement authorities. **[21]**
9. Updates to laws, regulations and/or Board policies related to school safety and security.
10. Information on grants or funding applied for and/or received in support of school safety and security efforts.

A copy of the report, including the required information on threat assessment and school security personnel, shall be submitted to the state's School Safety and Security Committee. [3]

The Superintendent or designee shall implement job descriptions and procedures to address the responsibilities and requirements of the School Resource Officers (SROs) in carrying out their duties.

School Resource Officers (SROs) shall carry weapons, including firearms, in performance of their duties only if, and to the extent, authorized by the Board.

GUIDELINES

School Resource Officers (SROs)

The district shall establish an agreement with any law enforcement agency that has jurisdiction, in accordance with the provisions of law, for the assignment of a School Resource Officer(s) to specified district schools.[2] **[22]**

The agreement shall address the powers and duties conferred on SROs, which shall include but not be limited to:[23]

1. Assist in identification of physical changes in the environment which may reduce crime in or around a school.
2. Develop and educate students in crime prevention and safety.
3. Address crime and violence issues, gangs and drug activities affecting or occurring in or around a school.
4. Other duties as agreed upon between the district and municipal agency

Prior to assignment in the district, the district shall confirm that law enforcement authorities have completed a law enforcement authority background investigation and received the SRO's separation record, when required, in compliance with applicable law and regulations. The district shall coordinate with law enforcement authorities in making required reports regarding hiring and separation, and maintaining all required records, in accordance with applicable law and regulations.[24][25]

SROs shall successfully complete required training, in accordance with law.[23]

Legal Footnotes

[1] **24 P.S. 1316-C**
LEGAL REFERENCE

[2] **24 P.S. 1301-C**
LEGAL REFERENCE

[3] **24 P.S. 1309-B**
LEGAL REFERENCE

[4] **24 P.S. 1310-B**
LEGAL REFERENCE

[5] **Pol. 146.1 — Trauma-Informed Approach**
POLICY REFERENCE

[6] **Pol. 227 — Controlled Substances/Paraphernalia**
POLICY REFERENCE

[7] **Pol. 236 — Student Assistance Program**
POLICY REFERENCE

[8] **Pol. 236.1 — Threat Assessment**
POLICY REFERENCE

[9] **Pol. 249 — Bullying/Cyberbullying**
POLICY REFERENCE

[10] **Pol. 333 — Professional Development**
POLICY REFERENCE

[11] **Pol. 351 — Controlled Substance Abuse**
POLICY REFERENCE

[12] **Pol. 805 — Emergency Preparedness and Response**
POLICY REFERENCE

[13] **Pol. 819 — Suicide Awareness, Prevention and Response**
POLICY REFERENCE

[14] **24 P.S. 1302-E**
LEGAL REFERENCE

[15] **24 P.S. 1305-B**
LEGAL REFERENCE

[16] **24 P.S. 1316-B**
LEGAL REFERENCE

[17] **24 P.S. 1205.1**
LEGAL REFERENCE

[18] **24 P.S. 1205.5**
LEGAL REFERENCE

[19] **Pol. 006 — Meetings**
POLICY REFERENCE

[20] **Pol. 235.1 — Surveys**
POLICY REFERENCE

[21] **Pol. 805.1 — Relations With Law Enforcement Agencies**
POLICY REFERENCE

[22] **Pol. 909 — Municipal Government Relations**
POLICY REFERENCE

[23] **24 P.S. 1313-C**
LEGAL REFERENCE

[24] **44 Pa. C.S.A. 7301 et seq**
LEGAL REFERENCE

[25] **37 PA Code 241.1 et seq**
LEGAL REFERENCE

EAST PENN SCHOOL DISTRICT

POLICY PORTAL™ PSBA

POLICY

822 Automated External Defibrillator (AED)/Cardiopulmonary Resuscitation (CPR) - DRAFT

POLICY NUMBER	ADOPTED	VERSION	DOCUMENT STATUS
822	9/11/2017	v1.6	DRAFT

PRINTED
10/8/2026

PURPOSE

The Board is committed to providing a safe and healthy environment for the school community.

Maintaining automated external defibrillator (AED) units and staff trained in cardiopulmonary resuscitation (CPR) in the schools enables responders to deliver early defibrillation and resuscitation to victims.

DEFINITION

Automated external defibrillator (AED) - a portable device that uses electric shock to restore a stable heart rhythm to an individual in cardiac arrest.[2]

AUTHORITY

Each school building shall have one (1) person trained and certified in the use of an AED and CPR during the school day when school is in session and students are present.[1][3]

Beginning May 13, 2029, each school nurse or designee, coach of an athletic activity, marching band director, physical education teacher and athletic trainer in the district must participate in instruction in the use of an AED and CPR and maintain their certification.[3]

The AED units are owned by the district and shall be properly maintained and tested, and located in secure and accessible locations.

Beginning May 13, 2029, the district shall have an AED in a readily accessible location for students participating in interscholastic athletics and practices. Individuals trained in the use of an AED and CPR will be present during these times.[4][5]

The AED units shall be used in accordance with approved district procedures.

GUIDELINES

A core team shall be trained in CPR and AED procedures by completing a training program offered by approved providers. Members of the team shall be provided opportunities for annual training and retraining.

The district shall make instruction in the use of an AED available to all its employees and volunteers at least once every two (2) years. The instruction is optional and shall be conducted by an approved provider that may be through the Internet or other electronic means.[3]

The district may make instruction on the principles and techniques of CPR and the use of operating an AED available to students.[3]

Written guidelines for medical emergencies related to the use of AED units shall be provided to all employees instructed in the use of an AED.

Responders' use of AED units shall not replace the care provided by emergency medical services (EMS) providers. Patient care shall be transferred to the EMS providers upon their arrival.

DELEGATION OF RESPONSIBILITY

The Superintendent or designee shall develop and disseminate administrative regulations that support this policy.

The Superintendent or designee shall annually, by June 30, report to the PA Department of Education detailing the number, condition, age, expiration date and placement of AEDs in each school building.[6]

Legal Footnotes

[1] 24 P.S. 1424
LEGAL REFERENCE

[2] 24 P.S. 1401
LEGAL REFERENCE

[3] 24 P.S. 1423.1 — 24-P-S-1423-1
LEGAL REFERENCE

[4] 24 P.S. 1423.3 — 24-P-S-1423-3
LEGAL REFERENCE

[5] Pol. 123 — Interscholastic Athletics
POLICY REFERENCE

[6] 24 P.S. 1423.2 — 24-P-S-1423-2
LEGAL REFERENCE