

## **Science Department Courses**

**Earth Systems:** The Earth Systems course merges Earth and Environmental Science concepts. This course focuses on Earth's spheres, global earth and environmental issues as well as how these issues affect local areas. Each unit focuses on one of Earth's spheres. The goal of each unit is to develop an understanding of the sphere while also exploring interactions between this sphere and other Earth systems as well as how humans' impact and are impacted by the focus sphere. Each unit also incorporates the engineering design process which includes identifying a challenge/issue, synthesizing new learning, and brainstorming and/or evaluating possible solutions. Successful completion of the Human Sustainability Capstone Project, where students develop an action plan that addresses an environmental problem, fulfills the High School Science Student Service-Learning graduation requirement. This course is a graduation requirement.

**Living Systems:** This course redefines the traditional topics in biology, such as cells, biochemistry, genetics, evolution and ecology by adding a modern approach and relevant, real-world applications of phenomena. The NGSS standards addressed by this course include all of the Life Science (LS) Performance Expectations (PEs), as well as a few PEs from the Life Sciences (LS) and Engineering Design (ETS) domains. The units of study within this course are: building the ultimate you, you are what you eat, decoding your future, superbugs, and top predators. The course will end with a capstone project and this course is a graduation requirement.

**IPC:** The new Integrated Physics and Chemistry course merges physical and chemical concepts. The goal of each unit is to develop an understanding of specific phenomena through the lens of physical science processes. Each unit also incorporates the engineering design process which includes identifying a challenge/issue, synthesizing new learning, and brainstorming and/or evaluating possible solutions. The Integrated Physics and Chemistry course concludes with students developing and presenting a proposal for a museum exhibit that portrays how an innovation in technology has changed over time with advancements in scientific understanding as well as the impact it has had on human society.

**Chemistry:** This course redefines the traditional topics in chemistry, such as atomic structure, chemical bonding, writing and naming reactions, stoichiometry, gas laws, and acid/base chemistry by adding a modern career-based approach and relevant, real-world applications of phenomena. The NGSS standards addressed by this course include the Physical Science Performance Expectations (PEs) relating to chemistry as well as the Engineering Design (ETS) domain. The NGSS call for an integration of three dimensions - science content, science and engineering practices, and crosscutting concepts - is seen in each unit.

**Physics:** Our physics curriculum focuses on making sure students get a clear understanding of motion, energy, electricity, magnetism, and the laws that govern the physical universe. Students learn to understand scientific principles and processes, ask questions, present hypotheses, experiment, solve problems, and think abstractly and critically. Here are some concepts and skills you will learn through the high school physics curriculum:

- Understanding of the laws and applications of motion, forces, and gravity.
- Understanding of the processes of work and energy and the laws of thermodynamics.
- Understanding of how light and sound waves function in our environment.
- Understanding of principles of electricity and magnetism and how they are applied.
- Knowledge of current achievements and innovative ideas in nuclear and modern physics.
- Ability to use the scientific method to explore physics questions.
- Ability to think critically and abstractly about physics design elements and real-world applications.

**Paramedical Biology:** This elective focuses on assessing and treating life-threatening medical and trauma emergencies. Students will learn how to assess a scene, triage a patient, perform ongoing assessments, treat and stabilize patients, and transfer care to more highly qualified personnel. Students will learn how to take a patient's vitals, perform rapid and focused assessments, and will ultimately become certified in HeartSaver CPR and First Aid through the American Heart Association should they choose. Other important topics include mass casualty incidents, hazardous materials, basic anatomy, and activities to promote collaboration in a team-based learning environment.

**Honors Anatomy and Physiology:** This elective focuses on the human body and its body systems. Students will learn in depth about each of the body systems, their respective organs and functions, and how they work with the other body systems to help maintain homeostasis. Throughout the course various dissections are performed and students are engaged in lab work. This course is extremely rigorous in order to prepare those wanting to pursue a career in the medical field with the foundation that they will need in order to be successful.

**Forensics:** Forensic Science focuses on the skills and concepts behind physical aspects of crime scene investigation and forensic science. Whether students desire to be a crime scene investigator, forensic pathologist, or some other medical scientist, this course will help them hone their investigative skills and review a wide range of science concepts. Students will review physics, chemistry, anatomy, cell biology, environmental science and computer science in the process of learning about forensic science.

**APES:** 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.

Laboratory requirement: Although there are no specific AP Environmental Science labs or field investigations required for the course, it is required that students can spend a minimum of 25% of instructional time engaged in hands-on, inquiry-based laboratory and/or fieldwork investigations.

Course equivalent: The AP Environmental Science course is designed to be the equivalent of a one-semester, an introductory college course in environmental science.

**AP Chemistry:** AP Chemistry is a course geared toward students with interests in chemical and physical sciences, as well as any of the biological sciences. The course aims to prepare students to take the AP Chemistry exam toward the end of the academic year. AP Chemistry topics include atomic theory, chemical bonding, phases of matter, solutions, types of reactions, chemical equilibrium, reaction kinetics, electrochemistry, and thermodynamics. AP Chemistry is an introductory college-level chemistry course where students cultivate their understanding of chemistry through inquiry-based lab investigations.

**AP Physics C:** Is a calculus-based, college-level **physics** course, especially appropriate for students planning to specialize or major in one of the physical sciences. Students cultivate their understanding of physics through classroom study and activities as well as hands-on laboratory work as they explore concepts like change, force interactions, fields, and conservation.

**PLTW Biomedical Science Program:** Whether discovering new cancer treatments or teaching healthy lifestyle choices to their communities, today's biomedical science professionals are tackling big challenges to make the world a better place.

Through a sequence of courses that includes Human Body Systems and Biomedical Innovation, PLTW Biomedical Science students in grades 9-12 are taking on these same challenges – and they're doing it before they even graduate from high school.

Working with the same tools used by professionals in hospitals and labs, PLTW Biomedical Science students step into the roles of medical investigators, surgeons, microbiologists, geneticists, and biomedical engineers. They explore realistic situations like investigating the death of a fictional person and analyzing prevention, diagnosis, and treatment of disease.

The program's collaborative, hands-on explorations inspire students to discover the diversity of biomedical science careers and empower them to develop the knowledge and skills to make their life-changing ideas a reality.

This is a four year program, below are the four courses:

**Principles of Biomedical Science** (1 year) In the introductory course of the PLTW Biomedical Science program, 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.

**Human Body Systems** (1 year) 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.

**Medical Interventions** (1 year) Students follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through realworld cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

**Biomedical Innovation** (1 year) In the final course of the PLTW Biomedical Science sequence, students build on the knowledge and skills gained from previous courses to design innovative solutions for the most pressing health challenges of the 21st century. Students address topics ranging from public health and biomedical engineering to clinical medicine and physiology. They have the opportunity to work on an independent design project with a mentor or advisor from a university, medical facility, or research institution.

A link to learn more: <https://www.pltw.org/our-programs/pltw-biomedical-science>