

PLTW Sample Course Descriptions

Project Lead The Way (PLTW) offers nationally recognized STEM courses that help students build the knowledge and skills needed for success in college, career, and life. Through hands-on, project-based learning, students engage in solving real-world challenges while developing both technical and transferable skills.

This document provides sample course descriptions for all PLTW high school courses across three pathways—**Biomedical Science**, **Computer Science**, and **Engineering**. These descriptions are based on educator and student feedback and are intended to help schools clearly communicate course offerings. Schools may use the samples as-is or adapt them to reflect local context (e.g., credit units, weighting, prerequisites, honors).

Key Features of PLTW High School Courses:

- **Full-Year Courses:** PLTW courses are designed as full-year (180 days) offerings, providing students with a comprehensive learning experience.
- **Open to All Students:** PLTW courses are designed to be inclusive and accessible to students of all backgrounds and abilities and research shows that all subgroups benefit from PLTW exposure.
- **Real-World Problem Solving:** Students apply knowledge to meaningful, real-world contexts through hands-on projects.
- **College Credit & Scholarships:** Based on course and pathway completion, students can qualify for [college credit and scholarships](#) through [End-of-Course \(EoC\) exams](#)
- **Recognized as Advanced Coursework:** All PLTW high school courses count as advanced coursework in the Massachusetts DESE school accountability system, and many districts across the state weigh PLTW courses similarly to AP or Honors classes. To learn more about how PLTW courses can count in accountability, course catalogs, and other reporting systems, see [this document](#).
- **State Reporting & Recognition:** PLTW courses have specific SIMS codes in the [EPIMS appendices](#), which supports Perkins reporting and recognition on transcripts.
- **Supports Innovation Career Pathways (ICP):** PLTW courses align with the instructional requirements of Massachusetts Innovation Career Pathways and can help schools meet key program elements. To learn more about how PLTW supports ICPs across different pathways, see [this document](#).

If you have questions or feedback, please don't hesitate to contact the Mass Learning Project (info@masslearning.org).

PLTW Biomedical Science

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. The PLTW Biomedical Sciences pathway offers students the opportunity to solve medical mysteries and explore different biomedical professions, including: surgeon, geneticist, microbiologist, and medical investigator. A full four course pathway is offered that counts as advanced coursework in Massachusetts. All courses also offer students the opportunity to earn college credit and scholarship based on their coursework.

PLTW Principles of Biomedical Science In the introductory course of the PLTW Biomedical Science program, students explore the human body by stepping into the roles of scientists and health professionals. They conduct experiments to investigate the cause of death, examine chronic health conditions, explore the role of genetics in disease, and develop diagnoses and treatment plans. Students take on roles such as members of a disease defense team investigating a mysterious outbreak and first responders managing medical emergencies. Building on their experiences, they compete for lab space in an innovation incubator by proposing the design of a new medical innovation, applying their learning to address real-world biomedical challenges.

PLTW Human Body Systems In Human Body Systems (HBS), students explore human anatomy and physiology, including systems like neurology, movement, immunity, and homeostasis. They apply their learning to real-world biomedical problems, working with BioDigital™ 3D models and simulations to visualize the body's systems and engage in hands-on activities using the same tools as professionals. Through interviews, case studies, and projects, students develop skills in technical documentation, ethical reasoning, and clinical empathy as they work to create solutions and communicate findings.

PLTW Medical Interventions In Medical Interventions, students follow a family through a series of medical challenges, learning alongside them how to prevent, diagnose, and treat diseases. Students explore the wide variety of professions in the biomedical sciences field as they learn how to detect and fight infection, screen and evaluate the code in human DNA, and evaluate cancer treatment options. Students apply their learnings to design a nanotechnology-based or immunotherapy cancer treatment and create a clinical trial to test its safety and efficacy, just like work currently being done by scientists in biomedical companies right in our own Massachusetts backyard.

PLTW Biomedical Innovation In this capstone course of the PLTW Biomedical Science sequence, students apply their knowledge and skills to answer questions and solve open-ended problems related to biomedical sciences. The course covers areas such as clinical medicine, physiology, biomedical engineering, and public health, and involves working through a series of missions that focus on designing solutions for real-world health challenges. Students also have the opportunity to work on an independent project, which could include an internship, research project, or an entrepreneurial venture focusing on a community health issue. The course emphasizes collaboration with mentors or advisors from universities, hospitals, or industry, and students

develop skills in research, experimentation, and technical communication to create innovative solutions.

PLTW Capstone This course is the culminating experience for students completing any PLTW high school program. Students work in teams to research, define, and solve a real-world, open-ended problem of their choice. Drawing on the knowledge, skills, and interests of each team member, students engage in a rigorous process that includes problem selection, stakeholder interviews, research, design planning, prototyping, and testing. Along the way, they build project management, communication, and technical skills while learning from mentors and subject matter experts.

Students are empowered to apply what they've learned across PLTW and academic courses to develop innovative, user-centered solutions. The course culminates in a formal presentation and defense of their original solution to a panel of professionals. Past projects have included assistive devices, environmental monitoring systems, and new digital tools—each tailored to the students' unique interests and communities.

PLTW Computer Science

Through the PLTW Computer Science pathway, students don't just learn how to code, they learn the fundamentals of computational thinking and team problem solving. The PLTW Computer Sciences pathway offers students the opportunity to learn about the fast-paced world of CS. With an accessible intro course, dedicated cybersecurity class, and two AP-aligned courses, the CS PLTW pathway gives students an engaging and sophisticated CS experience. A full four course pathway is offered that counts as advanced coursework in Massachusetts. All courses also offer students the opportunity to earn college credit and scholarship based on their coursework.

PLTW courses are full year courses. Credit and scholarship opportunities are available based on course & pathway completion.

PLTW Computer Science Essentials In Computer Science Essentials, students begin with visual, block-based programming to build strong foundational skills in computational thinking. As they progress, they transition to text-based programming languages such as Python. Along the way, students create apps and develop websites, learning to code like professional developers. They also collaborate in teams to design an app, computing device, or program that addresses a real-world problem relevant to them or their community.

PLTW Cybersecurity Students in Cybersecurity apply their knowledge of coding and computational thinking to seek out vulnerabilities in data storage systems and online commerce sites, then design solutions to increase safety and protection. Whether seeking a career in the growing field of cybersecurity or learning to defend their own personal data or a company's data, students in Cybersecurity establish an ethical code of conduct while proactively defending data in today's complex cyberworld.

PLTW Computer Science Principles In Computer Science Principles, students solve digital challenges by developing the computational thinking and technical skills of leading computer scientists. Learning by doing, students:

- Become fluent in Python, professionals' primary computational language
- Debug code to ensure programs act as intended and are useful to the user

- Create an engaging computer game
- Code and decode data to keep it safe on the internet
- Make sense of large quantities of data by creating data visualizations

The PLTW Computer Science Principles course is aligned to the AP Curriculum Framework and PLTW is recognized by the College Board as an endorsed provider.

PLTW Computer Science A Helping to answer the now ubiquitous question “is there an app for that?”, in Computer Science A, students focus on their mobile app development skills. Using the same tools as the pros – Android Studio, Java, XML, and device emulators – students collaborate to create mobile app solutions to problems they’re currently facing. This course emphasizes coding fundamentals, modularity, control structures, data structures, and object-oriented programming through hands-on experience with Java. Additionally, it is designed to align with the College Board Computer Science A framework and includes preparation for the Oracle Certified Associate, Java SE 8 Programmer Certification. Students will also analyze and test code, exploring both technical solutions and the ethical and social implications of computing systems. This course aims to prepare students to successfully take the AP CS A exam.

PLTW Capstone This course is the culminating experience for students completing any PLTW high school program. Students work in teams to research, define, and solve a real-world, open-ended problem of their choice. Drawing on the knowledge, skills, and interests of each team member, students engage in a rigorous process that includes problem selection, stakeholder interviews, research, design planning, prototyping, and testing. Along the way, they build project management, communication, and technical skills while learning from mentors and subject matter experts.

Students are empowered to apply what they’ve learned across PLTW and academic courses to develop innovative, user-centered solutions. The course culminates in a formal presentation and defense of their original solution to a panel of professionals. Past projects have included assistive devices, environmental monitoring systems, and new digital tools—each tailored to the students’ unique interests and communities.

PLTW Engineering

From launching space explorations to delivering safe, clean water to communities, engineers find solutions to pressing problems and turn their ideas into reality. The PLTW Engineering pathway offers students the opportunity to learn real-world skills and solve real-world problems. These hands-on courses allow students to apply math, science, computer science, and design skills. All courses offered in the pathway count as advanced coursework in Massachusetts. All courses also offer students the opportunity to earn college credit and scholarship based on their coursework.

PLTW courses are full year courses. Credit and scholarship opportunities are available based on course & pathway completion.

PLTW Introduction to Engineering Design In the first course of the engineering pathway, students learn the foundational skills of an engineer and apply what they learn to manage an engineering design process from concept to solution. Working collaboratively on a team, students apply human-centered design principles to develop solutions to real-world problems. They build and test prototypes, evaluate effectiveness, and iterate to improve their designs based on data and

user feedback. Students use the same 3D modeling and design tools as engineering professionals and reverse engineer products to understand the decisions behind their design. Along the way, students explore sustainability, systems thinking, and ethical considerations in design, while developing transferable skills in collaboration, communication, and project management.

PLTW Principles of Engineering This course explores how engineers use systems thinking to solve complex, real-world problems across a variety of fields, including computer hardware, electrical, environmental, mechanical, and materials engineering. Students investigate how understanding both technical requirements and human needs can lead to more effective and equitable solutions. Collaboration is a key component, and students work in teams on hands-on projects that integrate science, math, and technology to design, prototype, and test their ideas. Throughout the course, students take on challenges such as restoring damaged irrigation systems, improving food production methods, programming robots to complete synchronized tasks, and engineering machines capable of driving, chipping, and putting a golf ball with precision.

PLTW Civil Engineering and Architecture In this course, students experience the work of civil engineers and architects by applying the stylistic and technical skills (e.g., 3D drawing, measurement, and meeting a spec) to create plans for both residential and commercial design projects. Students select a homeowner client and follow the Habitat for Humanity guidelines to develop an Affordable Housing Design, aiming to make it comfortable, usable, efficient, and environmentally responsible. The second project will find students applying their skills to transform a shuttered factory into a community library, applying both creativity and technical know-how.

PLTW Computer Integrated Manufacturing Get introduced to the high-tech, innovative field of modern manufacturing that develops products we rely on every day. Students learn advanced manufacturing processes, including additive and automated manufacturing, product design, and robotics. After exploring the many factors that influence the design of a product, including cost, safety, and functionality, students choose a product and design a system to manufacture it. Building on 3D design CAD experience, students use Computer Aided Manufacturing (CAM) software to translate a digital design into a program that 3D Printers and Computer Numerical Controlled (CNC) mills use to transform raw material into a final product.

PLTW Computer Science Principles In Computer Science Principles, students develop computational thinking and technical skills by tackling digital challenges and creating meaningful projects. They learn to code in Python, debug programs to improve functionality, and explore data security through encryption and decryption. Students also create engaging computer games and develop data visualizations to make sense of large datasets. Throughout the course, students build a strong foundation in computer science concepts while learning by doing. PLTW is recognized by the College Board as an endorsed provider, and this course aligns with the AP Computer Science Principles Curriculum Framework and assessment.

PLTW Capstone This course is the culminating experience for students completing any PLTW high school program. Students work in teams to research, define, and solve a real-world, open-ended problem of their choice. Drawing on the knowledge, skills, and interests of each team member, students engage in a rigorous process that includes problem selection, stakeholder interviews, research, design planning, prototyping, and testing. Along the way, they build project management, communication, and technical skills while learning from mentors and subject matter experts.

Students are empowered to apply what they've learned across PLTW and academic courses to develop innovative, user-centered solutions. The course culminates in a formal presentation and defense of their original solution to a panel of professionals. Past projects have included assistive devices, environmental monitoring systems, and new digital tools—each tailored to the students' unique interests and communities.