Advance students' ability to innovate, think critically, and collaborate to solve problems

PLTW Engineering is more than just another high school engineering program. It is about applying engineering, science, math, and technology to solve complex, open-ended problems in a real-world context. Students focus on the process of defining and solving a problem, not on getting the "right" answer. They learn how to apply STEM knowledge, skills, and habits of mind to make the world a better place through innovation.

PLTW students have said that PLTW Engineering influenced their post-secondary decisions and helped shape their future. Even for students who do not plan to pursue engineering after high school, the PLTW Engineering program provides opportunities to develop highly transferable skills in collaboration, communication, and critical thinking, which are relevant for any coursework or career.

In PLTW Engineering, students engage in open-ended problem solving, learn and apply the engineering design process, and use the same industry-leading technology and software as are used in the world's top companies. Students are immersed in design as they investigate topics such as sustainability, mechatronics, forces, structures, aerodynamics, digital electronics and circuit design, manufacturing, and the environment, which gives them an opportunity to learn about different engineering disciplines before beginning post-secondary education or careers.

Curriculum: Schools offer a minimum of three courses by the end of the third year of implementation: Introduction to Engineering Design, Principles of Engineering, and any specialization course or the capstone course.

FOUNDATION COURSES

Introduction to Engineering Design (IED, 1 year)
Students dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They work both individually and in teams to design solutions to a variety of problems using 3D modeling software, and use an engineering notebook to document their work.

Principles of Engineering (POE, 1 year)
Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

SPECIALIZATION COURSES

Aerospace Engineering (AE, 1 year)
This course propels students' learning in the fundamentals of atmospheric and space flight. As they explore the physics of flight, students bring the concepts to life by designing an airfoil, propulsion system, and rockets. They learn basic orbital mechanics using industry-standard software. They also explore robot systems through projects such as remotely operated vehicles.

Civil Engineering and Architecture (CEA, 1 year)
Students learn important aspects of building and site design and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3D architecture design software.

Computer Integrated Manufacturing (CIM, 1 year)
Manufactured items are part of everyday life, yet most students have not been introduced to the high-tech, innovative nature of modern manufacturing. This course illuminates the opportunities related to understanding manufacturing. At the same time, it teaches students about manufacturing processes, product design, robotics, and automation. Students can earn a virtual manufacturing badge recognized by the National Manufacturing Badge system.

Computer Science and Software Engineering (CSE, 1 year)
Open doors in any career with computer science! In CSE, students create apps for mobile devices, automate tasks in a variety of languages, and find patterns in data. Students collaborate to create and present solutions that can improve people's lives, and weigh the ethical and societal issues of how computing and connectivity are changing the world. This course aligns with the AP Computer Science Principles course.
*CSE is also the first course in PLTW's Computer Science program. Students will be able to count CSE as both the third course of PLTW Engineering and the first course of PLTW Computer Science if they decide to pursue and complete two programs of study.

Digital Electronics (DE, 1 year)
From smart phones to appliances, digital circuits are all around us. This course provides a foundation for students who are interested in electrical engineering, electronics, or circuit design. Students study topics such as combinational and sequential logic and are exposed to circuit design tools used in industry, including logic gates, integrated circuits, and programmable logic devices.

Environmental Sustainability (ES, 1 year)
In ES, students investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. Applying their knowledge through hands-on activities and simulations, students research and design potential solutions to these true-to-life challenges.
Environmental Sustainability will replace Biotechnical Engineering, which PLTW will continue to support through the end of the 2016-17 school year.

Capstone Course - Engineering Design and Development (EDD, 1 year)
The knowledge and skills students acquire throughout PLTW Engineering come together in EDD as they identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing EDD ready to take on any post-secondary program or career.

Bring the FUTURE OF THE BIOMEDICAL SCIENCES ALIVE

It was a hot summer morning, 92°F. An emergency call came in at 9:45 a.m. A man contacted the police to report that he was worried about his next-door neighbor, a woman named Anna. He said he had spoken to Anna the previous morning when he saw her walking her dog around 6:30 a.m. He decided to call the police this morning because Anna's dog had been barking excitedly for the last two hours. He tried to call Anna on the telephone, but no one answered. Both the police and an EMT arrived at the scene at 9:56 a.m. The EMT determined that Anna was dead. The police immediately notified your team of crime scene investigators as well as the medical examiner, both of which were dispatched to the house. Has a crime been committed?

This is an excerpt from the case presented to students in the first course of the **PLTW Biomedical Science** program, Principles of Biomedical Science. From the moment students walk into the classroom, they are immersed in the mysterious death of Anna and asked to investigate, document, and analyze evidence to solve the case. Case-based scenarios like this one span all PLTW Biomedical Science courses. Students explore a range of careers in biomedical sciences as they learn content in the context of real-world, hands-on activities, projects, and problems.

The rigorous and relevant four-course PLTW Biomedical Science sequence allows students to investigate the roles of biomedical professionals as they study the concepts of human medicine, physiology, genetics, microbiology, and public health. Students engage in activities like investigating the death of a fictional person to learn content in the context of real-world cases. They examine the structures and interactions of human body systems and explore the prevention, diagnosis, and treatment of disease, all while working collaboratively to understand and design solutions to the most pressing health challenges of today and the future.

Curriculum: Each course in the Biomedical Science sequence builds on the skills and knowledge students gain in the preceding courses. Schools offer the three PLTW Biomedical Science foundation courses within a period of three academic years from the start of implementation and may also offer the capstone course.

FOUNDATION COURSES

Principles of Biomedical Science
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
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
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 real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

CAPSTONE COURSE

Biomedical Innovation
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 College and Career pathway for PLTW

Each pathway emphasizes applied learning and consists of three components:

- PLTW courses are designed to introduce students to the field
- AP courses and exams provide an opportunity for advanced placement and/or college credit
- PLTW specialization courses focus on knowledge and skills needed for rewarding careers

Level	Engineering	Biomedical Science
Readiness –PLTW courses	Introduction to Engineering Design	Principles of Biomedical Engineering
College AP courses	• AP Biology • AP Calculus AB • AP Environmental Science • AP Physics • AP Statistics	• AP Biology • AP Chemistry
Career-PLTW courses	• Principles of Engineering • Aerospace Engineering • Civil Engineering Architecture • Computer Integrated Manufacturing • Digital Electronics • Engineering Design Development • Environmental Sustainability	• Human Body Systems • Medical Interventions • Biomedical Innovation

Student Recognition

Students who complete the requirements of their chosen pathway earn the AP + PLTW student recognition, a qualification that demonstrates to colleges and employers that the student is ready for advanced course work and interested in careers in this discipline.

To earn the recognition, the student must satisfactorily complete three courses in the pathway — one AP course; one PLTW course; and a third course, either AP or PLTW — and earn a qualifying score of 3 or higher on the AP Exam(s) and a score of Proficient or higher on the PLTW End of Course (EoC) assessment(s).