

Project Lead the Way (PLTW)

The PLTW middle and high school STEM education programs provide the inspiration for a new generation of innovators, the practical skills and hands-on experience to make students' knowledge count in the real world, and the basis for the next generation of leadership in the sciences, technology, engineering, and mathematics.

PLTW develops motivated, well-rounded students by instilling confidence, stressing the importance of self-discovery, encouraging innovative problem solving and critical thinking, teaching team building, and rewarding creativity.

Your student will develop skills essential for achievement in the classroom and success in college and at work. Additionally:

- PLTW students achieve significantly higher scores in reading, mathematics, and science.
- PLTW graduates earn higher GPA's as college freshmen.
- PLTW graduates are 5 to 10 times more likely to study STEM related fields.

Project Lead the Way is a non-profit organization focused on introducing and preparing high school students for Biomedical, engineering and technical careers of the future. PLTW forms partnerships with public schools, higher education institutions and the private sector to increase opportunities for students in engineering and technical fields. Particularly, PLTW provides a high rigor, project-based curriculum meeting national science and math standards, professional development for teachers and guidance counselors and a comprehensive national support network. PLTW courses are accessible to ALL students, and the initial biomedical courses expose students to multiple career options in the biomedical arena. All of the courses are based on problem-solving, teamwork, communication and leadership as the students also build the math, science and technology skills to prepare for and succeed in tomorrow's careers.

Students are eligible for college credit for all four PLTW Biomedical Sciences courses and IED, POE, and DE in the PLTW Engineering program. (For Biomedical Sciences courses, please see Science Curriculum portion of this handbook).

Engineering

PLTW: Introduction to Engineering

Design (IED) (Dual Credit)

Grades: 9, 10, 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of or concurrent enrollment in Algebra or above

Introduction to Engineering Design is a course that teaches problem-solving skills by using the design development process. The design process is an engineering activity that turns a concept into reality. The design process from concept to solution is a

logical sequence of steps to develop the best solution to a specific problem. Models of product solutions are created, analyzed and communicated using solid modeling computer design software.

Units include:

Student Portfolio Development Model Analysis and Verification
Sketching and Visualization Presentation
Geometric Relationships Production
Modeling, Assembly Modeling & Marketing

PLTW: Principles of Engineering (POE) (Dual Credit)

Grades: 9, 10, 11, 12

Length: Year

Credit: 1 or Equivalent (semester-long block)

Prerequisite: C or better in Algebra; completion or concurrent enrollment in Geometry

Students explore technology systems and engineering processes to find out how math, science, and technology help people. This course helps students develop better problem-solving skills by immersing them in real-world engineering problems in a technology lab setting. The course uses project-based, hands-on experiences to teach students the key elements and skills of engineering and technology-based careers.

Units include:

Definitions and Types of Engineering Statics and Strength of Materials
Communication and Documentation Design Process
Engineering Systems Engineering for Reliability
Materials and Materials Testing in Engineering
Introduction to Dynamics/Kinematics

PLTW: Digital (Dual Credit)

Electronics (DE)

Grades: 10, 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of or concurrent enrollment in Geometry or above

Digital Electronics is a course of study in applied digital logic. Students will be introduced to digital circuits found in video games, watches, calculators, digital cameras, and thousands of other devices. Students will use computer simulations to learn about the logic of electronics as they design, test, and actually construct circuits and devices. Students will study the application of digital logic and how digital devices are used to control automated equipment. The use of digital circuitry is present in virtually all aspects of our lives and its use is increasing rapidly. This course is similar

to a first semester college course and is an important course of study for a student exploring a career in engineering or engineering technology.

**PLTW: Engineering
Design &
Development (EDD) (Portfolio Dual Credit)**

Grades: 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of one prior PLTW engineering course (POE, IED, DE, CEA)

This capstone course allows students to design a solution to a technical problem of their choosing. They have the chance to eliminate one of the "Don't you hate it when..." statements of the world. This is an engineering research course in which students will work in teams to research, design, test, and construct a solution to an open-ended engineering problem. The product development lifecycle and a design process are used to guide and help the team to reach a solution to the problem. The team presents and defends their solution to a panel of outside reviewers at the conclusion of the course. The EDD course allows students to apply all the skills and knowledge learned in previous Project Lead The Way courses. The use of 3D design software helps students design solutions to the problem their team has chosen. This course also engages students in time management and teamwork skills, a valuable asset to students in the future. This course is designed for 11th and 12th grade students.

Biomedical Sciences

PLTW: Principals of the Biomedical
Sciences (PBS)

Grades: 9, 10, 11, 12

Length: Year or Equivalent (semester-long block)

Students investigate the human body systems and various health conditions including heart disease, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. They determine the factors that led to the death of a fictional person, and investigate lifestyle choices and medical treatments that might have prolonged the

person's life. The activities and projects introduce students to human physiology, medicine, research processes and bioinformatics. Key biological concepts including homeostasis, metabolism, inheritance of traits, and defense against disease are embedded in the curriculum. Engineering principles including the design process, feedback loops, and the relationship of structure to function are also incorporated. This course is designed to provide an overview of all the courses in the Biomedical Sciences program and lay the scientific foundation for subsequent courses.

PLTW: Human Body Systems (HBS)

Grades: 9, 10, 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of or concurrent enrollment in Principles of the Biomedical or consent of Global Academy Advisor

Students examine the interactions of body systems as they explore identity, communication, power, movement, protection, and homeostasis. Students design experiments, investigate the structures and functions of the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Exploring science in action, students build organs and tissues on a skeletal manikin, work through interesting real world cases, perform multiple dissections, and often play the role of biomedical professionals to solve medical mysteries.

PLTW: Medical

Interventions (MI)

Grades: 10, 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of or concurrent enrollment in Human Body Systems (HBS) or successful completion (B- or better) of an AP science or advanced science course. Or consent of Global Academy Advisor.

Students investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the lives of a fictitious family. The course is a "How-To" manual for maintaining overall health and homeostasis in the body as students explore: how to prevent and fight infection; how to screen and evaluate the code in human 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 and reinforces concepts learned in the previous two courses, as well as presenting 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 roles scientific thinking and engineering design play in the development of interventions of the future.

Biomedical Innovations (BI)

Grades: 11, 12

Length: Year or Equivalent (semester-long block)

Prerequisite: Completion of or concurrent enrollment in Medical Interventions (MI) or completion (B- or better) of an AP science course. or advanced science course. Or consent of Global Academy Advisor.

In this capstone course, 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