

CAREER AND TECHNICAL EDUCATION (CTE) DEPARTMENT

CTE Courses

Course	Grade Level	Prerequisite	Credit
Information Technology (CTE) - Programming			
1 – Principles of Information Technology	9-10	None	1
2 – Computer Programming I	10-12	None	1
3 – Computer Programming II	11-12	None	1
4 – AP Computer Science Principles	11-12	Algebra I	1
4 – AP Computer Science A	11-12	Algebra I	1
Information Technology (CTE) - Interactive Media			
1 – Principles of Information Technology	9-10	None	1
2 – Digital Media	10-12	None	1
3 – Web Technologies	10-12	None	1
4 – Audio/Video Production I	10-12	None	1
Course	Grade Level	Prerequisite	Credit
Arts, A/V Technology & Communications (CTE)			
1 – Principles of Arts, A/V, Technology & Communications	9-12	None	1
2 – Graphic Design and Illustration I	10-12	None	1
3 – Graphic Design and Illustration II	10-12	Graphic Design and Illustration I	1
STEM (CTE) - Engineering			
1 – Principles of Applied Engineering	9-12	None	1
2 – Robotics I	10-12	None	1
3 – Engineering Design & Presentation I	11-12	Algebra I	1
3 – Engineering Design & Presentation II	11-12	Algebra I & Geometry	2
4 – Engineering Design & Problem Solving	11-12	Algebra I & Geometry	1

CAREER AND TECHNICAL EDUCATION (CTE) DEPARTMENT

Course	Grade Level	Prerequisite	Credit
<i>PLTW Biomedical Science</i>			
Principles of Biomedical Science	9-10	None	1
Human Body Systems	10-12	None	1
Medical Interventions	11-12	None	1
Biomedical Innovation	11-12	None	1
<i>PLTW Computer Science</i>			
Computer Science Essentials	9-10	None	1
(AP) Computer Science Principles	10-12	Algebra I	1
(AP) Computer Science A	10-12	Algebra I	1
Cyber-security	10-12	Will be available fall 2018.	1
<i>PLTW Engineering</i>			
Introduction to Engineering Design	9-12	None	1
Principles of Engineering	10-12	None	1
One Specialization Course	11-12	*Check CTE folder	1

CAREER AND TECHNICAL EDUCATION (CTE) DEPARTMENT*Course Descriptions***Principles of Information Technology***Offered in: 9-10 Credits: 1 Level: On level***Prerequisites:**

Students develop computer literacy skills to adapt to emerging technologies used in the global marketplace. Students implement personal and interpersonal skills to prepare for a rapidly evolving workplace environment. Students enhance reading, writing, computing, communication, and reasoning skills and apply them to the information technology environment.

Computer Programming I*Offered in: 10-12 Credits: 1 Level: On level***Prerequisites:**

Students acquire knowledge of structured programming techniques and concepts appropriate to developing executable programs and creating appropriate documentation. Students analyze the social responsibility of business and industry regarding the significant issues relating to the environment, ethics, health, safety, and diversity in society and in the workplace as it relates to computer programming. Students apply technical skills to address business applications of emerging technologies.

Computer Programming II*Offered in: 11-12 Credits: 1 Level: On level***Prerequisites:**

Students expand their knowledge and skills in structured programming techniques and concepts by addressing more complex problems and developing comprehensive programming solutions. Students analyze the social responsibility of business and industry regarding the significant issues relating to environment, ethics, health, safety, and diversity in society and in the workplace as it relates to computer programming. Students apply technical skills to address business applications of emerging technologies.

AP Computer Science Principles*Offered in: 11-12 Credits: 1 Level: AP/Dual***Prerequisites: Algebra I**

AP Computer Science Principles offers a multidisciplinary approach to teaching the underlying principles of computation. The course will introduce students to the creative aspects of programming, abstractions, algorithms, large data sets, the Internet, cybersecurity concerns, and computing impacts. AP Computer Science Principles will give students the opportunity

to use technology to address real-world problems and build relevant solutions. Together, these aspects of the course make up a rigorous and rich curriculum that aims to broaden participation in computer science.

AP Computer Science A*Offered in: 11-12 Credits: 1 Level: AP/Dual***Prerequisites: Algebra I**

AP Computer Science is typically taught as a one year, stand-alone course, or as a two year sequence that includes an introductory course. An introductory Computer Science course, which introduces many fundamental Computer Science topics, is recommended, but not required as the first course in the sequence. Students can take AP Computer Science A after the introductory Computer Science course or take AP Computer Science A as their first Computer Science course. Students who have completed the AP Computer Science a course have the option to continue on and take additional courses. The A+ curriculum for the AP Computer Science a course includes all topics and the course descriptions for AP Computer Science A as described in the AP Computer Science Course Description. This course concentrates on Object Oriented Design and the building of a strong logic foundation, including heavy concentration on the AP Computer Science Grid World Case Study. All students taking AP courses are encouraged to take the AP exam.

Digital Media*Offered in: 10-12 Credits: 1 Level: On level***Prerequisites:**

Through the study of digital and interactive media and its application in information technology, students will analyze and assess current and emerging technologies, while designing and creating multimedia projects that address customer needs and resolve a problem. Students implement personal and interpersonal skills to prepare for a rapidly evolving workplace environment. The knowledge and skills acquired and practiced will enable students to successfully perform and interact in a technology-driven society. Students enhance reading, writing, computing, communication, and reasoning skills, and apply them to the information technology environment.

Web Technologies

Offered in: 10-12 *Credits:* 1 *Level:* On level

Prerequisites:

Through the study of web technologies and design, students learn to make informed decisions and apply the decisions to the field of information technology. Students implement personal and interpersonal skills to prepare for a rapidly evolving workplace environment. The knowledge and skills acquired and practiced will enable students to successfully perform and interact in a technology-driven society. Students enhance reading, writing, computing, communication, and critical thinking and apply them to the information technology environment.

Audio/Video Production I

Offered in: 10-12 *Credits:* 1 *Level:* On level

Prerequisites:

Careers in audio and video technology and film production span all aspects of the audio/video communications industry. Within this context, in addition to developing technical knowledge and skills needed for success in the Arts, Audio/Video Technology, and Communications career cluster, students will be expected to develop an understanding of the industry with a focus on pre-production, production, and post-production audio and video activities.

Principles of Arts, Audio/Video Technology, & Communications

Offered in: 9-12 *Credits:* 1 *Level:* On level

Prerequisites:

Careers in the Arts, Audio/Video Technology, and Communications career cluster require, in addition to creative aptitude, a strong background in computer and technology applications, a strong academic foundation, and a proficiency in oral and written communication. Within this context, students will be expected to develop an understanding of the various and multifaceted career opportunities in this cluster and the knowledge, skills, and educational requirements for those opportunities.

Graphic Design and Illustration I

Offered in: 9-12 *Credits:* 1 *Level:* On level

Prerequisites:

Careers in graphic design and illustration span all aspects of the advertising and visual communications industries. Within

this context, in addition to developing knowledge and skills needed for success in the Arts, Audio/Video Technology, and Communications career cluster, students will be expected to develop an understanding of the industry with a focus on fundamental elements and principles of visual art and design.

Graphic Design and Illustration II

Offered in: 10-12 *Credits:* 1 *Level:* On level

Prerequisites: *Graphic Design and Illustration I*

Careers in graphic design and illustration span all aspects of the advertising and visual communications industries. Within this context, in addition to developing advanced technical knowledge and skills needed for success in the Arts, Audio/Video Technology, and Communications career cluster, students will be expected to develop an advanced understanding of the industry with a focus on mastery of content knowledge and skills.

Principles of Applied Engineering

Offered in: 9-12 *Credits:* 1 *Level:* On level

Prerequisites:

Concepts of Engineering and Technology provides an overview of the various fields of science, technology, engineering, and mathematics and their interrelationships. Students will use a variety of computer hardware and software applications to complete assignments and projects.

Upon completing this course, students will have an understanding of the various fields and will be able to make informed decisions regarding a coherent sequence of subsequent courses. Further, students will have worked on a design team to develop a product or system. Students will use multiple software applications to prepare and present course assignments.

Robotics I

Offered in: 11-12 *Credits:* 1 *Level:* On level

Prerequisites:

Students enrolled in this course will demonstrate knowledge and skills necessary for the robotic and automation industry. Through implementation of the design process, students will transfer advanced academic skills to component designs in a project-based environment. Students will build prototypes or use simulation software to test their designs. Additionally, students explore career opportunities, employer expectations, and educational needs in the robotic and automation industry.

Engineering Design and Presentation I

Offered in: 10-12 *Credits:* 1 *Level:* On level

Prerequisites: Algebra I

Students enrolled in this course will demonstrate knowledge and skills of the process of design as it applies to engineering fields using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Students will use a variety of computer hardware and software applications to complete assignments and projects. Through implementation of the design process, students will transfer advanced academic skills to component designs. Additionally, students explore career opportunities in engineering, technology, and drafting and what is required to gain and maintain employment in these areas.

Engineering Design and Presentation II

Offered in: 11-12 *Credits:* 1 *Level:* On level

Prerequisites: Algebra I & Geometry

This course will provide students the opportunity to master computer software applications in a variety of engineering and technical fields. This course further develops the process of engineering thought and application of the design process.

Engineering Design & Problem Solving

Offered in: 11-12 *Credits:* 1 *Level:* On level

Prerequisites: Algebra I & Geometry

1- Engineering design is the creative process of solving problems by identifying needs and then devising solutions. This solution may be a product, technique, structure, process, or many other things depending on the problem. The design process and problem solving are inherent to all engineering disciplines.

2- Engineering Design and Problem Solving reinforces and integrates skills learned in previous mathematics and science courses. This course emphasizes solving problems, moving from well-defined toward more open ended, with real-world application.

3- This course is intended to stimulate students' ingenuity, intellectual talents, and practical skills in devising solutions to engineering design problems. Students use the engineering design process cycle to investigate, design, plan, create, and evaluate solutions. At the same time, this course fosters awareness of the social and ethical implications of technological development.

PLTW BIOMEDICAL SCIENCE

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

Offered in: 9-10 *Credits:* 1 *Level:* On level

Prerequisites:

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

Offered in: 10-12 *Credits:* 1 *Level:* On level

Prerequisites:

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

Offered in: 11-12 *Credits:* 1 *Level:* On level

Prerequisites:

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

Offered in: 11-12 Credits: 1 Level: On level

Prerequisites:

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.

PLTW COMPUTER SCIENCE

Computer Science Essentials

Offered in: 9-10 Credits: 0.5 Level: On level

Prerequisites:

In Computer Science Essentials, students will use visual, block-based programming and seamlessly transition to text-based programming with languages such as Python to create apps and develop websites, and learn how to make computers work together to put their design into practice. They will apply computational thinking practices, build their vocabulary, and collaborate just as computing professionals do to create products that address topics and problems important to them.

Computer Science Essentials helps students create a strong foundation to advance to Computer Science Principles, Computer Science A, and beyond.

(AP) Computer Science Principles

Offered in: 10-12 Credits: 1 Level: On level

Prerequisites: Algebra I

Using Python® as a primary tool and incorporating multiple platforms and languages for computation, this course aims to develop computational thinking, generate excitement about career paths that utilize computing, and introduce professional tools that foster creativity and collaboration. Computer Science Principles helps students develop programming expertise and explore the workings of the Internet. Projects and problems include app development, visualization of data, cybersecurity, and simulation. PLTW is recognized by the College Board as an endorsed provider of curriculum and professional development for AP® Computer Science Principles (AP CSP). This endorsement affirms that all components of PLTW CSP's offerings are aligned to the AP Curriculum Framework standards and the AP CSP assessment.

(AP) Computer Science A

Offered in: 11-12 Credits: 1 Level: On level

Prerequisites: Algebra I

Computer Science A focuses on further developing computational-thinking skills through the medium of Android™ App development for mobile platforms. The course utilizes industry-standard tools such as Android Studio, Java™ programming language, XML, and device emulators. Students collaborate to create original solutions to problems of their own choosing by designing and implementing user interfaces and Web-based databases. This course aligns with the AP CS A course.

Cybersecurity

Offered in: 10-12 Credits: 1 Level: On level

Prerequisites: Algebra I

Cybersecurity introduces the tools and concepts of cybersecurity and encourages students to create solutions that allow people to share computing resources while protecting privacy. Nationally, computational resources are vulnerable and frequently attacked; in Cybersecurity, students solve problems by understanding and closing these vulnerabilities. This course raises students' knowledge of and commitment to ethical computing behavior. It also aims to develop students' skills as consumers, friends, citizens, and employees who can effectively contribute to communities with a dependable cyber-infrastructure that moves and processes information safely. Cybersecurity will be available fall 2018.

PLTW ENGINEERING

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

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

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

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites: Introduction to Engineering Design

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

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

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 & Architecture

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

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

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

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.

Digital Electronics

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites: Algebra I & Geometry

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

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

In Environmental Sustainability, students investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply, and renewable energy. Applying their knowledge through hands-on activities and simulations, students research and design potential solutions to these true-to-life challenges.

CAPSTONE COURSE

Engineering Design and Development

Offered in: 9-12 Credits: 1 Level: On level

Prerequisites:

The knowledge and skills students acquire throughout PLTW Engineering come together in Engineering Design and Development 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 Engineering Design and Development ready to take on any post-secondary program or career.