

Worthington Technology & Engineering

High School Course & Program Offerings

High school students in Worthington have the opportunity to engage in a variety of courses and programs through the Technology Department. All of the technology and engineering offerings are built to be hands-on and promote problem solving, logical thinking, and innovation. Students who wish to participate in technology-related studies in Worthington may choose to become members of the Freshman STEM Team, complete the Project Lead The Way Engineering Pathway, or sign up for standalone technology electives. All of the options for high school students are outlined below.

**Project Lead The Way (PLTW) is a nonprofit organization that specializes in the development of STEM and engineering curricula for PreK-12 learners. PLTW “empowers students to develop and apply in-demand, transportable skills by exploring real-world challenges” and promotes skills in the areas of problem solving, critical and creative thinking, communication, and collaboration. Project Lead The Way licenses Worthington Schools to teach engineering courses in grades 9-12. Learn more at <https://www.pltw.org/>.*

OPTION 1: Join the Freshman STEM Cohort (“STEM Team”) . . .

As incoming freshmen, students may choose to engage in a STEM education with a team of students who share interests in science, technology, engineering, and math. Students on the Freshman STEM Team will explore engineering through the PLTW Introduction to Engineering Design course. They will also benefit from an integrated curriculum that is developed in cooperation with math, science, technology, English, and social studies teachers and focuses on nurturing student passion for technology and engineering.

OPTION 2: Complete the Project Lead The Way Engineering Pathway as a member of the “Engineering Academy” at TWHS or WKHS . . .

After completing the PLTW Introduction to Engineering Design course, students may continue their technological studies by taking a sequence of Project Lead The Way engineering courses throughout the remainder of high school. These courses include Principles of Engineering, Digital Electronics and/or Civil Engineering & Architecture, and Engineering Design & Development. Students who complete the PLTW Engineering Pathway will have the opportunity to graduate with a Diploma of Distinction and earn Honors Engineering Cords. Students participating in the Engineering Academy will also have the opportunity to apply for a unique summer internship experience with Abbott Labs, seamlessly transition into the Modern Manufacturing Work Study Program at Columbus State Community College upon graduation, and earn college credit at several prestigious engineering colleges and universities.

Project Lead The Way Engineering Pathway	
Year 1	IED (Intro to Engineering Design)

	*Option to join the Freshman STEM Cohort.
Year 2	POE (Principles of Engineering)
Year 3	DE (Digital Electronics) Or Blended DE (Digital Electronics) <u>AND/OR</u> CEA (Civil Engineering & Architecture) Or Blended CEA (Civil Engineering & Architecture)
Year 4	EDD (Engineering Design & Development) Or Blended EDD (Engineering Design & Development)
<p>*Graduate with an Engineering Diploma of Distinction (GPA requirements).</p> <p>*Earn college credit for each Project Lead The Way course by achieving the necessary benchmark grade in the class and benchmark score on the PLTW End of Course Exam (individual colleges and universities determine benchmark grades and scores for their institution).</p>	

OPTION 3: Take any Technology & Engineering course offering as a standalone class (eligibility to enroll in a course may depend on the completion of prerequisite courses) . . .

High school students may choose to take a variety of standalone technology courses in which they will engage in hands-on projects that focus on real-world problems. In these courses, students will learn to apply problem solving skills while studying a variety of technology disciplines. Students will also have the opportunity to improve their math and science skills in these classes.

Standalone Technology & Engineering Courses

<p>Courses may be taken any year (prerequisites may apply).</p>	<p>PLTW Introduction to Engineering Design - 2 Semesters</p> <p>PLTW Principles of Engineering - 2 Semesters</p> <p>PLTW Digital Electronics (Blended Option) - 2 Semesters</p> <p>PLTW Civil Engineering & Architecture (Blended Option) - 2 Semesters</p> <p>PLTW Engineering Design & Development (Blended Option) - 2 Semesters</p> <p>Computer Aided Drafting & Design (CAD) 1 - 1 Semester</p> <p>Computer Aided Drafting & Design (CAD) 2 - 1 Semester</p> <p>Multimedia Communications - 1 Semester</p> <p>Advanced Multimedia Communications - 1 Semester</p> <p>Webpage Design - 1 Semester</p> <p>Beginning Photography/Digital Imaging- 1 Semester</p> <p>Advanced Photography/Digital Imaging - 1 Semester</p> <p>Adaptive Technology Education (Special Placement) - 1 Semester</p>
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*****High School Course Description Guide*****

Introduction to Engineering Design

Length: 2 semesters

Prerequisites: Math 1 (may take concurrently)

Credit: 1

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

This is the first course in the Project Lead the Way program. It is designed to nurture student gifts, talents and curiosities about the design, technology and engineering related fields. Students will work side by side and on teams to develop innovative solutions to interesting design challenges. Along the way, students learn sophisticated design software applications, and practice the common sense problem solving skills that professionals use. The course applies and concurrently develops knowledge and skills

in mathematics, science, and technology. The course of study includes: design process, modeling, sketching, prototyping, measurement, statistics, and applied geometry, presentation design and delivery, engineering drawing standards, cad solid modeling, reverse engineering, consumer product design, innovation, marketing, graphic design, engineering ethics, virtual design. In addition to knowledge gleaned from the curriculum, students will also learn: problem-solving skills, traditional shop tools and skills, technology prototyping tools and equipment, and executive functioning skills associated with professional workforce attributes.

Principles of Engineering

Length: 2 semesters

Prerequisites: Introduction to Engineering Design

Credit: 1

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

Through real-world engineering problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, automation, and kinematics. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation. Through theory and practical hands-on experiences, students address the emerging social and political consequences of technological change. Principles of Engineering is a foundation course in the Project Lead The Way Engineering Academy.

Digital Electronics

Length: 2 semesters

Prerequisites: None

Credit: 1

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

The course is designed to expose students to engineering design and troubleshooting techniques that are used in the electronics field. Computer simulation software is used to design and test digital circuitry prior to actually constructing them. Students will also learn a systematic approach that engineers use to design the electronics that are used every day. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

This class is normally taken by juniors but any grade level of student is allowed to take Digital Electronics. Binary math, Kirchhoff's Laws and Ohm's Law will be covered at length so a strong foundation in mathematics will be required.

Activities will include virtual circuit simulation, breadboarding, circuit construction, robotics, programming, micro-controllers and soldering.

Civil Engineering & Architecture

Length: 2 semesters

Prerequisites: Math 2 (Can be taken concurrently)

Credit: 1

Graded: Conventional

State Tested: No

Location: TWHS & WKHS

This course teaches students about the design, technology and engineering fundamentals associated with civil engineering, architecture, landscape design, interior design, and community management fields. Many hands on activities will take place such as soil testing, real working models of structures, construction of foundation, framing, plumbing and electrical systems in both residential and commercial application. The course applies and concurrently develops knowledge and skills in mathematics, science, and technology. The course of study includes: design process, modeling, sketching, prototyping, project planning, presentation design and delivery, engineering drawing standards, CAD solid modeling, site planning, building design, innovation, project documentation & presentation, engineering ethics, and virtual design.

Engineering Design & Development

Length: 2 semesters

Prerequisites: IED, POE, & DE

Credit: 1

Graded: Conventional

State Tested: No

Location: TWHS & WKHS

This course lets students apply what they have learned in core academic and Project Lead the Way course as they complete challenging, self-directed projects. Students work individually and in teams to design and build solutions to authentic engineering problems. An engineer or other appropriate business professional from the school's partnership team mentors each student. Examples of projects may include a robotic mascot for the school, a remote-controlled hovercraft, or a solar-powered device. This course equips students with the independent study skills that they will need in post-secondary education and careers associated with the business of engineering and engineering technology.

Computer Aided Drafting and Design - CAD1

Length: 1 semester

Prerequisites: None

Credit: 0.5

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

This course is designed to provide students with skills and knowledge in the use of both traditional and computer-assisted drafting and design media, process and techniques. CAD 1 provides a means for

students to visualize and express their own ideas graphically and to interpret the ideas of others. Students will participate in many activities related to engineering, architecture and technical fields. This is a fun, fast-paced, hands-on course in which most of the required work is done in class. If you are considering a career that requires knowledge about drafting, design, computers, graphics, etc., then you should find this course beneficial to your long-term goals.

Computer Aided Drafting and Design 2 - CAD2

Length: 1 semester
Prerequisites: None
Credit: 0.5
Graded: Conventional
State Tested: No
Location: TWHS

Computer Aided Design 2 is an intermediate level course that continues the themes of CAD 1 but with strong focus on architecture. Computer aided design skills are reinforced, enhanced and challenged in this course. A significant portion of this course is dedicated to applying the learned drafting and CAD skills to challenging engineering and architectural projects.

Multimedia Communications

Length: 1 semester
Prerequisites: None
Credit: 0.5
Graded: Conventional or Pass/Fail
State Tested: No
Location: TWHS & WKHS

Multimedia Communications is a course that provides students with the opportunity to gather, arrange and manipulate computer-based digital media. Audio, video, text and graphics are integrated to create the final product. Students learn how to make presentations, manipulate files, scan images and use both a digital camera and video equipment. Problem solving skills are developed as students create, design and produce copy ready work for posters, brochures, videos or web pages for school or community groups. Students develop knowledge and skills in using a complete suite of Adobe software, including Adobe Illustrator, Dream Weaver, Photoshop and Flash. This is a production type course that requires students to learn multimedia skills and concepts and then apply them in a meaningful way. This is a fun, fast, hands-on course. Skills will benefit high school, college or professional career. Evaluation is based on completed in-class assignments, tests and projects. There is no homework. This course is also offered as a blended learning course.

Advanced Multimedia Communications

Length: 1 semester
Prerequisites: Keyboarding & Computer Skills, Multimedia or permission of instructor
Credit: 0.5
Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

Advanced Multimedia Communications provides students an opportunity to further their skills learned in the beginning class in which they were able to gather, arrange and manipulate computer based digital media. This involves integrating audio, video, text, and graphics into final products. Throughout the course students will build upon their skills using various software applications and further develop problem solving skills in order to create brochures, signs, video clips, animation, presentations, and web page items. This is a production type course that requires students to learn multimedia skills and concepts and then apply them in a meaningful way.

Web Page Design

Length: 1 semester

Prerequisites: Recommended completion of: Keyboarding & Computer Skills, Multimedia or permission of instruction

Credit: 0.5

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

Would you like to be able to design your very own web site? If so, then this course is for you. The skills you learn could lead you into a career in Web Publishing. Skills that are taught include Internet basics, HTML coding, web design fundamentals, CSS layout, and web authoring, and publishing/uploading. These topics are reinforced by hands-on computer activities in which students create several web sites. Students will have the opportunity to actually upload one of the sites they create using Adobe Dreamweaver and Photoshop. All work is done in class.

Beginning Photography/Digital Imaging

Length: 1 semester

Prerequisites: None

Credit: 0.5

Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

Beginning Photography/Digital Imaging is a course that acquaints students with the history of photography, the basic principles of photography, and the basic techniques employed in the use of a digital camera, digital imaging, and printmaking. The course is designed around classroom activities which include lectures, discussions, reading assignments, photographing subjects, and instruction in photographic techniques to complete photo assignments. No prior knowledge of photography is necessary. Students are required to provide their own digital camera for use on photography assignments (Phone camera, point shoot, Digital SLR are some examples of acceptable cameras). During the semester, students will also explore and discuss digital photography and Adobe Photoshop. Evaluation will be based on tests and the completion of photographic assignments, which involve the taking of pictures outside of class and producing portfolios of work as directed in the course.

Advanced Photography/Digital Imaging

Length: 1 semester

Prerequisites: Beginning Photography

Credit: 0.5 Graded: Conventional or Pass/Fail

State Tested: No

Location: TWHS & WKHS

Advanced Photography/Digital Imaging will give students a chance to further pursue their knowledge and skills in photography. This course will differ from the beginning photography course by being more student-centered. Students will be responsible for deciding the areas of photography they will pursue in more depth and contract with the instructor as to how they will achieve the goals which they have set. Students will have more opportunity to create a personal portfolio of their work which could be very useful for applications to some colleges or art schools. This course explores digital imaging and the use of computer software in refining and manipulating the photographic image. Evaluation will be based upon successful completion of contracts with the instructor and student presentations of portfolios and photographic work.

Adaptive Technology Education

Length: 1 semester

Prerequisites: IEP Placement

Credit: 0.5

Graded: Pass/Fail

State Tested: No

Location: WKHS

The Adaptive Technology program provides both academic and pre-vocational experiences for students in our Daily Living Skills program. Students are exposed to a variety of technological processes such as tools and machines, electricity, photography and computers. They learn in a laboratory setting with hands-on activities. Learning experiences are created to help meet the needs of each student as identified in the Individualized Education program (IEP). Although specific instructional objectives are tailored to the need of each student, some fundamental goals are designed for all special education students who take this course.