ENGINEERING & TECHNOLOGY

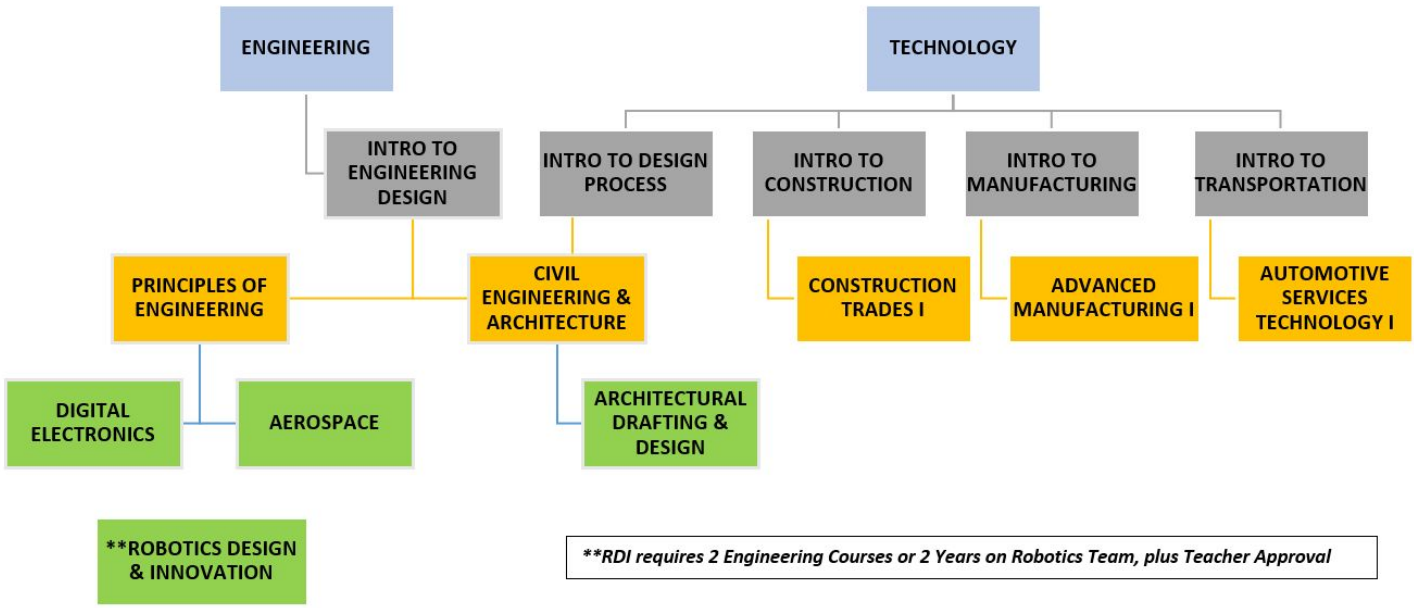
Our mission is to inspire, educate, and mentor tomorrow's engineering and technology innovators and industry leaders. With a multi-disciplinary, hands-on approach and a focus on career specific research that aims to ensure both post-secondary and employment success, our offerings address state demands as well as pending and emerging global challenges.

PROJECT LEAD THE WAY and ENGINEERING COURSES

PLTW or "Project Lead the Way" is a national pre-engineering curriculum that builds partnerships among high schools, colleges, universities, business and industry to provide students with relevant, reality-based knowledge necessary to pursue engineering or engineering technology in college. The hands-on, project and problem-based approach adds rigor to the traditional technical programs and relevance to traditional academies. Many colleges and universities across the country accept PLTW classes for college credit. At Carmel High School, **all PLTW classes are fully weighted** and help satisfy a Technical Honors diploma. In addition, **Aerospace Engineering will earn a science credit for all diplomas.** See the PLTW site for more information on these programs. https://www.pltw.org/

TECHNOLOGY COURSES

Our technology courses utilize project-based learning in an engaging and interactive format. Courses with a hands-on focus allow learners to dig into content and learn skills they can use the rest of their lives as DIY enthusiasts or hobbyists. Students enrolled in our technology courses will be prepared to dive into the workforce or begin a focused, rigorous college path. Our college-bound students often return to thank ETE teachers for the hands-on experiences, mentioning that the CHS technology classes put them far ahead of their peers who may have never held a tool.



INTRODUCTION TO ENGINEERING DESIGN 1-2 (4802)
Classification: Career-Technical, PLTW
Prerequisite: Algebra 1 with a C or better
Open to: 9, 10, 11, 12
Credit: 2, Full Weight, Dual Credit through IvyTech

Introduction to Engineering Design is an introductory course which develops a student's problem solving skills with an emphasis placed on the development of three-dimensional solid models. Student work will progress from sketching simple geometric shapes to advanced solid modeling using state of the art computer software. They will learn the engineering design process and how it is used in industry to design products. The Computer Aided Design System (CAD) will also be used to analyze and evaluate the product design. Both techniques and equipment are state of the art technology being used by engineers throughout the United States. Rapid prototyping, CNC and other designing and manufacturing aids will be discussed and demonstrated. This course is recommended for students interested in an engineering career path. As part of the "Project Lead the Way" curriculum, many colleges and Universities across the country offer college credit or advanced placement for this course. As part of the PLTW curriculum, many colleges and universities across the country offer college credit or advanced placement for this course.

PRINCIPLES OF ENGINEERING 1-2 (5644)
Classification: Career-Technical, PLTW
Prerequisite: Intro to Engineering Design 2 and Geom 2 (may take POE and DE simultaneously with teacher approval)
Open to: 10, 11, 12
Credit: 2, Full Weight, Dual Credit through IvyTech

Students will explore several areas of engineering throughout the course including: thermodynamics, mechanisms, fluid power, electrical control systems, strength of materials, statics, characteristics and properties of materials, quality control, review of the design process, material testing, and kinematics. By exploring various technology systems and processes, students will learn how engineers and technicians use math, science, and technology within a design process to benefit mankind. Autodesk Inventor and other material testing simulation software are used frequently through the course. Hands-on, problem-based activities supplement the lessons provided within the curriculum. As part of the PLTW curriculum, many colleges and universities across the country offer college credit or advanced placement for this course.

DIGITAL ELECTRONICS 1-2 (5538)
Classification: Career-Technical, PLTW
Prerequisite: Principles of Engineering 2 or Physics (may take POE and DE simultaneously with teacher approval)
Open to: 10, 11, 12
Credit: 2, Full Weight, Dual Credit through IvyTech

Digital Electronics allows a student to receive a broad-based, technically oriented education that emphasizes the application of today's technology to solve problems, design solutions, and improve processes. The course introduces basic gate and flip-flop logic devices and their application in digital circuits. Digital Electronics will explore logic application of electronic circuits and devices. Students will use computer simulation software to design and test digital circuitry prior to the actual construction of circuits and devices. This course is recommended for students interested in an engineering career path. As part of the "Project Lead the Way" curriculum, many colleges and universities across the country offer college credit or advanced placement for this course.

AEROSPACE ENGINEERING 1-2 (5518)
Classification: Career-Technical, PLTW
Prerequisite: Principles of Engineering 2 or Physics
Open to: 10, 11, 12
Credit: 2, Full Weight, Fulfills a **science** requirement for all diplomas

Aerospace engineering transforms the dream of flight into vehicles that ignite our imagination. Students explore fundamentals of flight in air and space through software simulations and hands-on experiences. Students will investigate aerodynamic design, flight characteristics, and the impact of aerospace technology on the environment. Students will learn how these concepts apply to a career in aerospace engineering and to other engineering fields. As part of the PLTW curriculum, many colleges and universities across the country offer college credit or advanced placement for this course.

CIVIL ENGINEERING AND ARCHITECTURE (5650)
Classification: Career-Technical, PLTW
Prerequisite: IED or Intro to Design Processes (with a C or Better)
Open to: 10, 11, 12
Credit: 2, Full Weight, Dual Credit through IvyTech

Civil Engineering and Architecture introduces students to the fundamental design and development aspects of civil engineering and architectural planning activities. Application and design principles will be used in conjunction with mathematical and scientific knowledge. Students will design, simulate, and evaluate the construction of buildings and communities by hand and by computer software. Activities also include the preparation of cost estimates as well as a review of regulatory procedures that would affect the project design. As part of the PLTW curriculum, many colleges and universities across the country offer college credit or advanced placement for this course.

ROBOTICS DESIGN AND INNOVATION (4728)
Classification: Career-Technical
Application Required: Teacher Approval Only
Prerequisite: 2 years of pre-engineering courses, or robotics team for 2 years and Teacher Approval
Recommended Grade Level: 11,12
Credit: 1 or 2 semester course, 1 credit per semester, 2 credits maximum, Full Weight

Robotics Design and Innovation allows students to design, program, and test innovative technological designs related to robotic systems. Topics involve mechanics, pneumatics, control technologies, computer fundamentals, and programmable control technologies. Students design, build, and optimize robots to perform a variety of predesignated tasks. Individuals will participate in FIRST (For Inspiration and Recognition of Science and Technology) Robotics competitions or develop their own events during the course. Through this course, students will investigate exciting career and collegiate programs of study.

INTRODUCTION TO DESIGN PROCESS 1-2 (4794)
Classification: Career-Technical
Prerequisite: None
Open to: 9, 10, 11, 12
Credit: 2 RW

This design class is a hands-on in depth study into the world of Engineering Graphics and Drafting. Engineering Graphics is the international “language” of communicating ideas, creative design and all stages of product development in the construction, manufacturing and design industries. Artistic ability for this type of drawing and design is not required as the drawings are accomplished with technical equipment. The student’s time is spent at the drawing board creating drawings and learning the proper use of the equipment and the accepted standards of the industry. Neatness, accuracy, attention to detail and a better understanding of measurement and scale are some of the additional skills students gain throughout the course of study. Demonstrations and discussions give insight into the various industries and career opportunities that incorporate the design process on a regular basis. The ability to better visualize and read a “blueprint” acquired in this class can be a great benefit in several career areas. Students will develop and utilize skills in creating physical models and prototypes. Individual and group design problems reinforce the engineering and design process.

ARCHITECTURAL DRAFTING AND DESIGN 1-2 (5640)
Classification: Career-Technical
Prerequisite: Civil Engineering and Architecture 2 and Teacher Approval
Open to: 11, 12
Credit: 2 RW

Architectural Drafting and Design I gives students a deeper understanding of the detailing skills commonly used by drafting technicians and architects. Areas of study include: lettering, sketching, the proper use of equipment, geometric construction, three-dimensional drawing and modeling techniques, and general sketching. Students will be able to create and interpret commonly used construction documents as well as models.This course also provides students with an understanding of the features and considerations associated with the operation of a computer-aided design (CAD) system. Students will pursue topics of interest within the field of architecture and design by completing several projects while mastering these skills.

INTRODUCTION TO MANUFACTURING 1-2 (4784)
Classification: Career-Technical
Prerequisite: None
Open to: 9, 10, 11, 12
Credit: 2 RW

This introductory lab-based course in materials and processes explores the technological processes used to obtain resources and change them into industrial materials and finished consumer products. Students will learn the processing of woods, metals, polymers, acrylics, and laminates. Safety is a central focus from day one, where students will be exposed and taught how to correctly use a variety of technology and tools to manipulate materials. Mass production projects will allow the students an opportunity to learn what a real manufacturing environment might look like. Various skills will be learned and performed through the use of hand tools, industrial machines, robots and computer controlled equipment. Students will produce and take home a variety of individual and group produced products and projects.

ADVANCED MANUFACTURING I (5608)
Classification: Career-Technical
Prerequisite: Introduction to Manufacturing 2 and Teacher Approval
Open to: 10, 11, 12
Credit: 2 RW

Advanced Manufacturing I is a laboratory-centered course focussing on two broad areas: Rapid Prototyping and Industrial Manufacturing Processes. Areas of study include safety, mass production, rapid prototyping, computer aided manufacturing and mechanical principles. Hands-on projects and team activities will allow students to apply learning on the latest industry technologies. Students take this course with the goal of being a skilled machine operator, repair technician, manufacturing engineer, mechanical engineer, or working in management at any company that produces goods and services using advanced manufacturing techniques.

INTRODUCTION TO CONSTRUCTION 1-2 (4792)
Classification: Career-Technical
Prerequisite: None
Open to: 9, 10, 11, 12
Credit: 2 RW

This introductory course in construction is designed to help students of all levels understand how technology is used to produce our constructed environment. In this lab-based hands-on course, students will learn basic home building and repair. Other topics of study include plan reading and material estimating, as well as proper construction principles, and processes. The areas to be explored include carpentry, concrete and masonry, plumbing, electrical, insulation, and wall finishing. Each class is assigned a building lot inside the lab/classroom where they will be responsible for building a home from the foundation all the way to the roof system. Each class will design and build their home featuring different architectural design elements.

CONSTRUCTION TRADES I (5580)
Classification: Career-Technical
Prerequisite: Introduction to Construction 2 and Teacher Approval
Open to: 10, 11, 12
Credit: 2 RW

Classroom and hands-on experiences involve the design, construction and sale of an entirely student built structure sometimes referred to as a **Tiny Home**. Students will be involved with all facets of a startup construction business. Students will be involved with planning, design, purchasing, construction, marketing and sales of our residential construction. Students will have options to be a part of all or specialize in particular parts of the overall process. Some students might specialize in green aspects of construction, material purchasing, interior and exterior design, construction techniques, marketing and sales. Students may also choose to be a part of multiple aspects of the project. All students will be exposed to local building codes, blueprint reading, professional documentation, safety standards and practices, and current standards of the industry. Students will work in tandem with the instructor as well as making contacts with local professionals to team our efforts into a professional build on par with industry standards.

INTRODUCTION TO TRANSPORTATION 1-2 (4798)
Classification: Career-Technical
Prerequisite: None
Open to: 9, 10, 11, 12
Credit: 2 RW

This introductory course exposes the student to the fundamental properties within society's transportation industry. Students will gain knowledge as well as experience in the service and preventative maintenance of today's land, air, and sea vehicles. Students will become familiar with EPA laws, ASE certification, vehicle warranty, and manufacturer's scheduled maintenance pertaining to the service and repair of today's vehicles. Students will also better understand how to compare and shop for service and repair, as well as purchasing new and used vehicles. Teams of students will learn to problem solve, demonstrate troubleshooting, and gain service knowledge while performing various tasks on school owned vehicles and test engines. Students with interest in careers in the automobile technology, mechanical engineering, and service industry will benefit greatly from this course.

AUTOMOTIVE SERVICES TECHNOLOGY I (5510)
Classification: Career-Technical
Prerequisite: Introduction to Transportation 2 and Teacher Approval
Open to: 10, 11, 12
Credit: 2 RW

This advanced course in automotive service is a one year course that encompasses many of the advanced areas of an automobile and allows students to independently strive forward in subject areas of their own choosing. These subjects include but are not limited to steering & suspension, braking systems. manual transmissions, welding, differentials, automatic transmissions, air conditioning, and engine repair should be covered as time permits. The open lab set-up provided allows students to truly pursue what most interests them, while at the same time, forcing them to utilize other academic skills to accomplish their goals. Mathematical skills will be reinforced through precision measuring activities as well as cost estimation and calculation activities. Practical physics will be reinforced in this course including the study such as viscosity, friction, thermal expansion, and compound solutions. Written and oral skills will also be emphasized to help students communicate with customers, colleagues, and supervisors.