0711 DESIGN & DRAWING FOR PRODUCTIONS (DDP)

GRADES 9-12 ♦ FULL YEAR - 1 UNIT (PLTW Basic Course)

Design & Drawing for Production is a blend of artistic hand drawing, technical drawing, and computer aided design & drawing (CADD) all rolled into one course. Students will learn how to solve problems presented in the class by using their knowledge, communication, and drawing skills that will be developed during the course of a year. Students will brainstorm new ideas, draw their ideas on paper, and then mock up their designs using inventor software on the school computers. Students will be given opportunities to build prototypes and test working models of their problem solving techniques. Students practice working in groups and as individuals on problem solving projects. They may give presentations to the class on their findings and designs. Students will then be given an opportunity to evaluate themselves at the end of these activities. Activities may include designing, building and testing a Puzzle Cube, using the laser engraver to make a plaque or a key chain, and using the 3D printer to make a part they have designed. When the students are done with these activities, they get to take their projects home and keep them!

0742 DIGITAL ELECTRONICS

PREREQUISITE: 2 YEARS REGENTS MATH

GRADES 9-12 ♦ FULL YEAR - 1 UNIT (PLTW Basic Course)

[SHS: OFFERED IN 2016-2017 AND 2018-2019 MHS: OFFERED IN 2017-2018 AND 2019-2020]

Digital electronics is a full year class that is geared to those students who enjoy hands on learning. Digital Electronics is a course of study in how to design, build and test Digital Circuits. This course is patterned after the first semester course in Digital Electronics taught at two and four year colleges. Students will study the application of electronic logic circuits (which are found in watches, calculators, video games, and thousands of other devices), and apply Boolean logic to the solutions of problems. The use of smart circuits is abundant in industry today. Its use is rapidly increasing, making Digital Electronics an important course of study for a student exploring a career in engineering/ engineering technology. Students will learn how to simulate a circuit design on the computer using the latest software called Multisim. Students will get out the electronic components they need, plug them into a digital trainer (PGA bread board), to test simple and complex real live digital circuits. Students will also learn how to soldier these components to a printed circuit board and take their projects home to keep.

0723 COMPUTER AIDED DRAWING (CAD)

GRADES 10-12 ♦ SEMESTER - ½ UNIT

Advanced Technical Drawing expands upon skills, techniques and knowledge acquired in prior drafting courses. This course makes extensive use of the computer CAD software as both a design and a drawing tool. Students increase proficiency in problem solving skills and develop sophisticated assembly drawings. This course also allows the student to enhance their creative ability through the design of new and innovative product ideas.

0721 CIVIL ENGINEERING AND ARCHITECTURE (CEA)

PREREQUISITE: 2 YEARS REGENTS MATH AND SCIENCE
GRADES 10-12 ♦ FULL YEAR - 1 UNIT

This course is designed to provide students with a solid background in Architectural Design and an introduction to Civil Engineering. Students complete individual as well as group design activities. The students learn to use design problem solving techniques to draw complete plans for their designs. These plans include site plans, floor plans, elevations, detail drawings, electrical and plumbing plans, and structural calculations for residential and small commercial projects. Computer Aided Drawing skills as well as presentation skills will develop through the presentation of projects to the class. Computers will be used to complete the drawing projects. Students will explore, on an introductory level, the many skills used in civil engineering. These range from surveying to soil testing and structural design activities.

0731 PRINCIPLES OF ENGINEERING

PREREQUISITE: DDP, 2 YEARS REGENTS MATH, 2 YEARS REGENTS SCIENCE
GRADES 10-12 ♦ F ULL YEAR - 1 UNIT (PLTW Advanced Course)

This course is an innovative, hands-on, laboratory based set of case studies and engineering activities that convey the concepts, principles, skills, activities, and attitudes needed to be successful in the field of engineering. This course will provide direct application of math, science and technology concepts to real world design problems. Students will complete a variety of activities (both hands-on and research based) to further develop their skills in modeling, systems, optimization, technology/society interaction, design, ethics, and basic engineering activities. Engineering activities include: hydraulic pneumatic testing, bridge construction, and simulated auto crash test.

0743 COMPUTER INTEGRATED MANUFACTURING (CIM)

PREREQUISITE: DDP
GRADES 10-12 ♦ FULL YEAR - 1 UNIT (PLTW Advanced Course)

CIM is a course that applies principles of rapid prototyping, robotics and automation. This course builds upon the computer solid modeling skills developed in Design and Drawing for Production. Students will use computer controlled rapid prototyping and CNC (computer numerical code) equipment to construct physical models of their three-dimensional designs. This class will also be introduced to the fundamentals of robotics and how this equipment is used in an automated manufacturing environment. Students will learn to program a robotic arm to perform various tasks, including interaction with other machines.

0733 ENGINEERING DESIGN AND DEVELOPMENT (EDD)

PREREQUISITE: DDP, POE
GRADES 11-12 ♦ FULL YEAR - 1 UNIT (PLTW Advanced Course)

EDD is an engineering research course in which students work individually and collaboratively to research, design and construct solutions to engineering problems. EDD is split into three major components; one individual research project, a team design competition, and one individual design endeavor. Students apply principles developed in the four preceding PLTW courses and are guided by an instructor/mentor. The majority of the course will consist of each student developing an individual design solution to an open ended engineering project of their choice. They will present progress reports, create multi-media presentations and defend their solutions to a panel of reviewers at the end of the school year. As the designs progress, students will work to refine their communication skills as they become adept at collaborating with professionals within the discipline of their design.

0780 COMPUTER SCIENCE AND SOFTWARE ENGINEERING

PREREQUISITE: ONE UNIT OF REGENTS SCIENCE AND ALGEBRA I AND GEOMETRY
GRADES 11-12 ♦ FULL YEAR - 1 UNIT

This course is designed to introduce students to the world of programming. Students create apps for mobile devices, automate tasks in a variety of languages, find patterns in data, and interpret simulations. Students work in teams to develop computational thinking, solve problems and utilize computational tools that foster creativity. Students practice problem solving with structured activities and progress to open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills. Problems allow for various levels of entry whether students are novice or developing program writers. Each unit focuses on one or more computationally intensive career paths. The course invites students to consider the societal impact of computing, both present and future.

0712 PRODUCTION SYSTEMS (Wood I)

GRADES 9-12 ♦ SEMESTER - ½ UNIT

Production Systems is a basic woodworking course that is 80% hands on learning. Students will learn how to safely use the woodworking tools, machines, and equipment available in the wood lab. Students will safely use the miter saw, router table, table saws and much more. This course is designed to teach the fundamentals of materials processing (taking rough cut wood and making it into usable items.) Students learn the proper construction process: gluing, sanding, and finishing wooden projects. Students learn how to make cutting boards, picture frames, keepsake boxes, wooden wine racks and more.

0722 MANUFACTURING SYSTEMS (Wood II)

PREREQUISITE: PRODUCTION SYSTEMS
GRADES 9-12 ♦ SEMESTER - ½ UNIT
[MHS AND SHS: OFFERED IN 2016-2017 AND 2018-2019]

Manufacturing Systems is the advanced woodworking course that is 80% hands on learning. Students must take production systems (Basic Wood I) before they sign up for this class. This course is designed to teach the more advanced fundamentals of materials processing (taking rough cut wood, and making it into usable items.) In this course, students are exposed to several manufacturing techniques and processes. Students learn how to design, develop, estimate cost, and mass-produce a product. Students learn the proper construction process: gluing, sanding, and finishing the wooden projects. Students also learn how to make more advanced woodworking projects such as; a mission style desktop lamp, poker/game tables, large cutting boards, trophy shelves, wall shelves, book shelves, jewelry boxes, and more.

0732 CONSTRUCTION SYSTEMS

GRADES 9-12 ♦ SEMESTER - ½ UNIT
[MHS AND SHS: OFFERED IN 2015-2016 AND 2017-2018]

This course is based on the Systems approach to building construction. Students will learn the various processes used to build a structure both on-site and prefabricated. Students will complete activities such as wall construction, modular construction, cost estimation, and others that are used in the field of construction. This course also includes rough and finish carpentry methods and techniques.

0729 AUTOMOTIVES I

GRADES 11-12 ♦ SEMESTER - ½ UNIT
(At Mendon High School)

Automobile maintenance is a fact of life in today's society. The increasing complexity of automobiles provides greater challenges to owners and mechanics than ever before. This basic course offers instruction in the theory of four stroke cycle engines, brake systems, cooling systems, tire and wheel care, fuel systems, exhaust systems, lubrication, buffing and waxing, and interior care. Instruction is also provided in engine trouble-shooting and the use of automotive test equipment. Related laboratory activities include seasonal maintenance, minor general repairs, and brake service. It is helpful, but not mandatory, for the student to have access to a car for lab activities.

0736 AUTOMOTIVES II

PREREQUISITE: AUTOMOTIVES I
GRADES 11-12 ♦ SEMESTER - ½ UNIT
(At Mendon High School)

This course is a continuation of Auto Technology I. It is designed for those students who want in-depth understanding of automotive systems and how they are serviced. This course provides students with instructional experiences in diagnosis and trouble shooting, utilizing various types of testing equipment, buying used cars, and pursuing careers in automotives. Laboratory exercises serve to reinforce and illustrate the basic concepts while providing an opportunity for each student to learn hands-on automotive maintenance and repair. Included in this course is an independent activity of the student's choice. This activity could involve anything from installing a stereo system in their car to mounting running boards or shock absorbers. It is helpful, but not mandatory, for the student to have access to a car for lab activities.

0746 AUTOMOTIVES III

PREREQUISITE: AUTOMOTIVES I, II
GRADES 11-12 ♦ SEMESTER - ½ UNIT
(At Mendon High School)

This course provides students with the opportunity to build upon skills mastered in Auto I and Auto II. Activities performed are designed for students seeking a career in an automotives related field. Specific activities relate to engine diagnosis/troubleshooting and operation. Students test electrical systems, adjust steering systems and develop skills related to engine operation and function. Included in this course is a mandatory completion of an activity of their choice. This allows students to explore an area of automotives that they have specific interest in.

0725 COMMUNICATIONS SYSTEMS

GRADES 9-12 ♦ SEMESTER - ½ UNIT

This course introduces students to the world of video, image, sound, audio-visual manipulation, computer animation and graphic communication. Students will explore different ways to communicate using digital media. Students will use cutting edge software for the following:

- Image manipulation (Photoshop Professional)
- Sound and audio recording and manipulation (Soundbooth and Encore)
- Video production (Premier)
- Special video effects (After Effects)
- Computer animation (Blender, Flash and Maya)
- Graphic communication (Illustrator and InDesign)

Activities used for instruction include: music videos, digital imagery, producing commercials, music and sound mixing, digital special effects, stop animations, and school video shows (pre-morning and special events productions) and silk screening images. This course is a project based curriculum.

0728 TRANSPORTATION SYSTEMS

GRADES 9-12 ♦ SEMESTER - ½ UNIT

This course delves into methods of transportation, such as rocketry, watercraft and land transportation. Activities include model building of each mode of transportation and discussions of their functionality. A unit in small engines is included that instructs students in configuration, maintenance and repair.