

PLTW – Project Lead the Way Pre-engineering Curriculum

PLTW's curriculum makes math and science relevant for students. By engaging in hands-on, real-world projects, students understand how the skills they are learning in the classroom can be applied in everyday life. This approach is called activities-based learning, project-based learning, and problem-based learning.

Progression of PLTW Courses

9th Grade – IED *or* POE if recommended by 8th grade counselor and PLTW teacher

10th Grade – IED, POE, DE, CIMS or CEA

11th Grade – POE, DE, CIMS, CEA, AE, BE or EDD

12th Grade – POE, DE, CIMS, CEA, AE, BE or EDD

IED

INTRODUCTION TO ENGINEERING DESIGN (IED) (PLTW)

2 Sem. 2 Credits Grades 9-10

Course Code: 4812M

RECOMMENDED PREPARATION: Enrollment in Algebra 1

COURSE DESCRIPTION: This is an introductory course that develops student problem solving skills with emphasis placed on project based activities, and the development of three-dimensional solid models. Students will work from sketching simple geometric shapes to applying a solid modeling computer software package. Students will experience a problem-solving design process and how it is used in industry to manufacture a product. Computer Aided Design (CAD) will also be used to analyze and evaluate the product design. The equipment used and the techniques learned is state-of-the art, and is currently being used by engineers in the industry.

Course is aligned with postsecondary Dual Credit

POE

PRINCIPLES OF ENGINEERING (POE) (PLTW)

2 Sem. 2 Credits. 1.0 Weight

Course Code: 4814M Grades 9-10-11-12

RECOMMENDED PREPARATION: Successful completion of Algebra I and completed Intro. To Engineering Design

COURSE DESCRIPTION: This is a "hands-on" course applying engineering principles. The course exposes students to major concepts they'll encounter in a post-secondary engineering course of study. Topics include mechanisms, energy, statics, materials, and kinematics. Students develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges, document their work and communicate solutions. Course is aligned with postsecondary Dual Credit

CIMS

COMPUTER INTEGRATED MANUFACTURING SYSTEMS - CIMS (PLTW)

Weighted Class 1.0 Weight

2 Sem. 2 Credits Grades 10-11-12

Course Code: 4810M

RECOMMENDED PREPARATION: Successful completion of IED or POE and Algebra I

COURSE DESCRIPTION: This course simulates the use of the computer in the manufacturing environment. We use nine different software packages and eight different machines to produce programs which allow these machines to operate individually and to communicate with each other. Real parts are designed and produced in this course. Starting with the design of a part and employing the “cell” concept of manufacturing, robots will load blank material into a CNC operated mill to produce a part and then palletize the finished parts simulating the manufacturing process. Students utilize computers applications to communicate with these machines and write programs which control the simulations. Dual credit with post-secondary education is available.

CIMS II – Non PLTW 5534

Computer Integrated Manufacturing II 5534M

2 Sem. 2 Credits Grades 11-12

Course Code: 5534M

PREREQUISITES: Must successfully complete CIMS.

Advanced Manufacturing (CIM 2) will be a follow-up to the PLTW CIM curriculum. It will dive deeper into more advanced milling techniques using CAD and CAM software to design and mill parts using a CNC mill. The lab is stocked with print and manufacturing equipment such as laser engraver, vinyl printer and cutter with lamination machine, sublimation and 3D sublimation machines, punch and press machines, Imprintor printing machine, and more. Students will learn the basics of layout and design software for use in the awards and printing industries. Students will build and program robotic arms to perform tasks as well as learn handshaking with previously learned systems like VEX and ROBOTC to create a manufacturing work cell. Real world work skills and expectations will be the focus of this highly hands on course. Students will also be working with real clients and fulfilling orders using the shop equipment throughout the year.

CEA

CIVIL ENGINEERING AND ARCHITECTURE (CEA) (PLTW)

2 Sem. 2 Credits Grades 11-12; 10th grade by Instructor Approval

Course Code: 4820M

Weighted Class 1.0 Weight

RECOMMENDED PREPARATION: Concurrent enrollment in Algebra II and successful completion of Introduction to Engineering Design or Principles of Engineering.

COURSE DESCRIPTION: This course places its emphasis on civil and architectural engineering. Students will take part in project based learning and solving real-world problems as they relate to civil and architectural engineering. Units will include project and site planning and building design. Students will work in teams and learn the skills required for jobs and postsecondary education.

DE

DIGITAL ELECTRONICS (DE) (PLTW)

2 Sem. 2 Credits Grades 10-11-12

Course Code: 4826M 1.0 Weight

RECOMMENDED PREPARATION: Completion of either: Introduction to Engineering (IED) or Principles of Engineering (POE)

COURSE DESCRIPTION: Digital Electronics is a course of study in applied digital logic. This course is patterned after the first semester course in Digital Electronics taught in two and four year colleges. Students will study the application of Boolean logic to the solution of problems. Such circuits are found in watches, calculators, video games, computers, and thousands of other devices. The use of smart circuits is present in virtually all aspects of our lives, and its use is increasing rapidly, making digital electronics an important course of study for a student exploring a career in engineering/engineering technology. Using MultiSIM, the industry standard, students will test and analyze simple and complex digital circuitry. Students will design circuits using MultiSIM, export their designs to a printed circuit auto-routing program that generates printed circuit boards, and construct the design using chips and other components.

Digital Electronics – Non PLTW

DIGITAL ELECTRONICS (DE)

2 Sem. 2 Credits Grades 11-12

Course Code: 5538M To be taken by V.U. Early College students in IT Pathway

RECOMMENDED PREPARATION: Completion of either: Introduction to Engineering (IED) or Principles of Engineering (POE)

COURSE DESCRIPTION: Digital Electronics is a course of study in applied digital logic. This course is patterned after the first semester course in Digital Electronics taught in two and four year colleges. Students will study the application of Boolean logic to the solution of problems. Such circuits are found in watches, calculators, video games, computers, and thousands of other devices. The use of smart circuits is present in virtually all aspects of our lives, and its use is increasing rapidly, making digital electronics an important course of study for a student exploring a career in engineering/engineering technology. Using MultiSIM, the industry standard, students will test and analyze simple and complex digital circuitry. Students will design circuits using MultiSIM, export their designs to a printed circuit auto-routing program that generates printed circuit boards, and construct the design using chips and other components.

AE

AEROSPACE ENGINEERING (AE) (PLTW)

2 Sem. 2 Credits Grades 11-12

Course Code: 4816M

(Weighted Class) 1.0 Weight

RECOMMENDED PREPARATION: Completion of: Introduction to Engineering (IED) or Principles of Engineering (POE)

COURSE DESCRIPTION: Aerospace Engineering is a “one of a kind” partnership between Rolls-Royce Aerospace Engineering and McKenzie Center for Innovation and Technology. This course engages students in engineering design problems related to aerospace information systems, astronautics, rocketry, propulsion, the physics of space science, biomedical sciences, material sciences, space life sciences, the biology of space science, principles of aeronautics, structures and materials, and systems engineering. Using 3-D design software, students work in teams utilizing hands-on activities, projects and problems and are exposed to various situations encountered by aerospace engineers. Rolls-Royce engineers will partner with the instructor to add relevant problems encountered by those in the field. Students will also be exposed to the world of defense contracts and the requirements and standards that companies must uphold to employ those who work on defense contract projects.

ES

Environmental Sustainability (ES) (PLTW)

2 Sem. 2 Credits Grades 11-12

Course Code: 4818M

(Weighted Class) 1.0 Weight

PREREQUISITES: Must be a 11 or 12th Grader

COURSE DESCRIPTION: Environmental Sustainability (ES) is an advanced-level engineering course that investigates technical solutions to the world's environmental problems: clean drinking water, a stable food supply, and renewable energy. Students solve open-ended projects and design challenges like building water testing and filtration systems, creating biofuel out of plants, genetic engineering of plants & bacteria, and using natural systems to clean polluted water. This project-based course prepares students for college and STEM careers, with a focus on designing experiments, conducting research, executing biotechnology & engineering skills, and documenting design solutions.

EDD

ENGINEERING DESIGN AND DEVELOPMENT (EDD) (PLTW)

2 Sem. 2 Credits Grades 11-12

Course code: 4828M

PREREQUISITES: Students must have completed at least two years of the pre-engineering course or who have been actively involved with the FIRST Robotics team for two or more years. An application must be submitted.

COURSE DESCRIPTION: This course helps students apply what they have learned in academic and pre-engineering courses as they complete challenging, self-directed projects. Students work in teams to design and build solutions to authentic engineering problems. Students keep journals of notes, sketches, mathematical calculations, and scientific research. Student teams make progress reports to their peers, mentor, and instructor, and exchange constructive criticism and consultation. At the end of the course, teams present their research paper and defend their projects to a panel of engineers, business leaders and engineering college educators for professional review and feedback. This course equips students with the independent study skills they will need in postsecondary education.

