

# ENGINEERING & TECHNOLOGY DEPARTMENT Sequence of Course Offerings

Content provided by Engineering & Technology Department...revised 11/2017...Ben Modlin, Chair

	HS Course #s		HS Course Name/College #	# Semesters	HS Cr per Sem	Dual Credit Prereq			College Credit	Eligible Grades			
	Fall	Spring				Read	Write	Math		9	10	11	12
	0801	0802	COMP IN DESN (CAD A)	2	1					9			
	0803	0804	CAD I/VU DRAF140	2	1				VU 3		10	11	12
	0805	0806	CAD II/VU DRAF150	2	1				VU 2			11	12
	0807	0808	INTRO TO COMMS	2	1					9	10	11	12
	0811	0812	DESIGN PROC (R&D)	2	1							11	12
Q	0813	0814	ENG DESIGN & DEV (nonPLTW)	2	H1							11	12
	0827	0828	INTRO TO CONSTR	2	1					9	10	11	12
	0834	Both	INTRO TO MFG	1	1					9	10	11	12
NP	0837	0838	ADV MFG1-2/ADMF 101	2	1				IvyT 3		10	11	12
	0861	0862	CONST TECH I/CONT101	2	3				IvyT 3			11	12
	0863	0864	CONST TECH II/CONT102	2	3				IvyT 3				12
	0865	0866	INTRO ENG DES/DESN101	2	H1				IvyT 3	9	10	11	12
Q	0867	0868	PRINC OF ENGIN/DESN104	2	H1				IvyT 3		10	11	12
Q	0869	0870	CIVIL ENG ARCH/DESN105	2	H1				IvyT 3			11	12
Q	0871	0872	COMP INTG MFG/ADMF116	2	H1				IvyT 3			11	12
Q	0877	0878	AEROSPACE ENG 1-2	2	H1							11	12
Q	0879	0880	ENG DESIGN & DEVL 1-2	2	H1								12
	0815	0816	AUTOMAT & ROB I	2	1							11	12
	0817	0818	AUTOMAT & ROB II	2	1							11	12

Courses in gray are AP or dual credit.

N=New

P=Dual Credit pending

Q=Quantitative Reasoning

Dual Credit prerequisite scores are based on the PSAT or equivalent.

H=Honors

D=On priority dual credit list

P/F=Pass/Fail

## COMPUTERS IN DESIGN AND PRODUCTION (CAD A)

Prerequisites: CAD/Drafting I

**COURSE:** The students will work in teams to plan, design and supervise a product from concept to completion. Activities include the development of parts and sub systems which may be applied to the MHS Engineering class's fuel-efficient vehicle. Students will use computers to design and tools/machines to build their products. This is a hands/minds on course.

## ARCHITECTURAL DRAFTING AND DESIGN I (CAD I) VU DRAF 140 (3 CREDITS)

Prerequisite: none

**COURSE:** Architectural Drafting and Design I will provide students with a basic understanding of the detailing skills commonly used by a drafting technician. Areas of study include: lettering, sketching, proper use of equipment, geometric constructions with emphasis on orthographic (multi-view) drawings that are dimensioned and noted to ANSI standards. Areas of emphasis will include print reading and drawing. Students will gain valuable hands-on experience with Auto CAD. They will be expected to complete several projects relating to command topics. Topics include: 2D drawing commands, coordinate systems, editing commands, paper and model space, inquiry commands, layers, plotting, text, and basic dimensioning. This course will also include Basic Architectural AutoCAD practices.

## ARCHITECTURAL DRAFTING AND DESIGN II (CAD II) VU DRAF 150 (2 CREDITS)

Prerequisite: CAD I

**COURSE:** Architectural Drafting and Design II presents a history and survey of architecture and focuses on creative design of buildings in a studio environment. This course will focus on advanced CAD features, including fundamentals of three dimensional modeling for design. Includes overview of modeling, graphical manipulation, part structuring, coordinate system, and developing strategy of modeling. Advanced CAD will enable the student to make the transition from 2D drafting to 3D modeling. Various Architectural software packages and applications may be used.

## INTRODUCTION TO COMMUNICATION (AND CODING)

**COURSE:** Introduction to Communications is a course that specializes in identifying and using modern communication to exchange messages and information. This course explores the application of the tools, materials, and techniques used to design, produce, use, and assess systems of communication. Students will produce graphic and electronic media as they apply communication technologies. This course will also explore the various technical processes used to link ideas and people through the use of electronic and graphic media. Students will explore mass media communication processes including radio and television broadcasting, publishing and printing activities, telecommunication networks, recording services, computer and data processing networks, and other related systems.

## DESIGN PROCESSES (R&D)

**Prerequisites:** CAD/Drafting I

**COURSE:** *Introduction to Design Processes is a course that specializes in modern design and engineering processes with a focus on creative problem solving in developing, testing, communicating, and presenting post-evaluation of products. Students use the design process to analyze research, develop ideas, and produce products solutions. Students will demonstrate and utilize design principles and elements for visual presentation. Designing aspects will also cover aesthetics, ergonomics, the environment, safety, and production. The design process is a core-learning tool for many courses enabling the student to solve problems in a systematic, logical and creative manner. Students develop a good understanding of the way the process helps them think creatively and developing aesthetic ideas. The design process encourages the students to engage in higher level thinking to create solutions for many types of problems.*

## ENGINEERING DESIGN & DEVELOPMENT (NON PLTW) (QR)

**Prerequisite:** Process level course in any technology area, with instructor recommendation.

**COURSE:** *The Mishawaka Engineering class provides engineering and technology students with a challenging design project that involves the development and construction of a single-person, fuel-efficient vehicle. Vehicles are powered by a small four-cycle engine. Students have the opportunity to set a world fuel economy record.*

## INTRODUCTION TO CONSTRUCTION

**COURSE:** *Introduction to Construction is a course where students will study how different types of structures are designed, engineered, and built. Students will use basic problems solving skills & applied math to design, engineer, and build simplified engineering projects. Students will draw simple plans, frame a scale model house, and explore the many phases of construction. Design, site selection, site preparation, foundations, framing, and finishing the structures are just a few phases to be explored. The second semester will be filled with many hands-on experiences. Students will learn some basic surveying skills taking elevation readings and drawing a plot plan. Students will become familiar with many aspects of the construction industry. Any student considering a career in construction trades or taking the Construction Technology (building trades) course should take this class.*

## INTRODUCTION TO MANUFACTURING SYSTEMS

**COURSE:** *Introduction to Manufacturing is a course where students will gain knowledge and basic skills in working with industrial materials such as wood & plastics. Students will learn through classroom and hands on experiences how to plan and use of a variety of tools and machines to process wood into useful projects/ products. Safety around power tools, using tools and equipment properly, making projects/ products, precision measurement, basic math skills, and learning about industrial processes are the major emphasis of this class.*

## INTRO TO ADVANCED MANUFACTURING

**Prerequisite:** Introduction to Manufacturing

**COURSE:** *Introduction to Advanced Manufacturing is a course where students will learn advanced knowledge and*

*skills in working with industrial materials such as wood & plastics. Students will design, draw plans, and calculate material needs for projects/products. This class will be mainly hands on experiences using a variety of tools and machines to process wood into useful projects/ products. Safety around power tools, project/ product activities, precision measurement, basic math skills, and learning about advanced industrial processes are the major emphasis of this class.*

## CONSTRUCTION TECHNOLOGY I & II (BUILDING TRADES) IvyT CONT 101/102 (3 CREDITS EACH)

**COURSE:** *This course is designed to give students practical experience in the various phases of house construction. Students will be working in the field, and construct a new home during the course period. They will be involved with all phases of the project. They will start with layout of walls, framing, and erecting them. Setting trusses, and installing windows, siding, and roofing. They will work along side professionals in the electrical, heating and air conditioning, and plumbing fields. They will be painting, installing ceramic tile, hardwood floors, hanging doors, cabinets, and installing trim. Students will gain knowledge and understanding of all phases of construction. After successful completion of this course, students should be better prepared to enter some phase of the building trades, join an apprenticeship program, or attend college with an emphasis in the construction field. Two year students can apply to the Building Trades Board for a scholarship to the college of their choice.*

## PROJECT LEAD THE WAY

The PLTW Pre-Engineering Program is designed for the student who is interested in being an engineer or technologist as a possible career choice. PLTW classes are part of the honors program, most yield college credit to include freshman and sophomore classes, and quantitative reasoning credit (QR).

## INTRODUCTION TO ENGINEERING DESIGN/ IvyT DESN 101 (3 CREDITS)

**COURSE:** *In this course, students use 3D solid modeling design software to help them design solutions to solve proposed problems. Students will learn how to document their work and communicate solutions to peers and members of the professional community. This course is designed for 9th or 10th grade students. The major focus of the IED course is to expose students to the design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards and technical documentation.*

## PRINCIPLES OF ENGINEERING (QR)/ IvyT DESN 104 (3 CREDITS)

**Prerequisite:** Introduction to Engineering Design

**COURSE:** *This survey course of engineering exposes students to some of the major concepts they'll encounter in a postsecondary engineering course of study. Students have an opportunity to investigate engineering and high-tech careers and to develop skills and understanding of course concepts. They develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges.*

## **CIVIL ENGINEERING AND ARCHITECTURE (QR)/ IvyT DESN 105 (3 CREDITS)**

**Grades:** 11–12

**Length of Course:** Two Semesters - 1 Credit each

**Prerequisite:** Principles of Engineering

**COURSE:** *The major focus of this course is completing long-term projects that involve the development of property sites. As students learn about various aspects of civil engineering and architecture, they apply what they learn to the design and development of a property. Students work in teams, exploring hands-on activities and projects to learn the characteristics of civil engineering and architecture. In addition, students use 3D design software to help them design solutions to solve major course projects.*

## **COMPUTER INTEGRATED MANUFACTURING (QR)/ IvyT ADMF116 (3 CREDITS)**

**Prerequisite:** IED and POE to qualify for dual credit

**COURSE:** *Computer Integrated Manufacturing is a course that applies principles of rapid prototyping, robotics, and automation. This course builds upon the computer solid modeling skills developed in Introduction of Engineering Design. Students will use computer controlled rapid prototyping and CNC equipment to solve problems by constructing actual models of their three-dimensional designs. Students will also be introduced to the fundamentals of robotics and how this equipment is used in an automated manufacturing environment.*

## **AEROSPACE ENGINEERING (QR)**

**Prerequisite:** Principles of Engineering

**COURSE:** *The major focus of this course is to expose students to the world of aeronautics, flight and engineering through the fields of aeronautics, aerospace engineering and related areas of study. Lessons engage students in engineering design problems related to aerospace information systems, astronautics, rocketry, propulsion, the physics of space science, space life sciences, the biology of space science, principles of aeronautics, structures and materials, and systems engineering. Students work in teams utilizing hands-on activities, projects and problems and are exposed to various situations faced by aerospace engineers.*

## **ENGINEERING DESIGN AND DEVELOPMENT (QR)**

**Prerequisite:** Principles of Engineering

**COURSE:** *Engineering Design and Development is designed to introduce students to the fundamental aspects of engineering and engineering technology. Instruction will emphasize underlying principles of engineering processes and the development of three-dimensional solid models. Instructional activities will build skills ranging from sketching simple geometric shapes to applying a solid modeling computer software package. Students will develop critical thinking and problem-solving skills through instructional activities that pose design and application challenges for which they develop solutions. The techniques learned, and equipment used, should be state of the art and reflect equipment and processes currently being used by engineers throughout the United States.*

## **INDUSTRIAL AUTOMATION AND ROBOTICS I & II**

**Prerequisites:** none

**COURSE:** *Students will gain skills to design and build basic robots that use sensors and actuators to solve specific problems and complete specific tasks. This will include introductory programming autonomous mode. This course will provide fundamental knowledge and skills in basic lasers, pneumatics, hydraulics, mechanics, basic electronics, and programmable logic controllers along with an understanding of career pathways in this sector.*