

Manufacturing Product/Process Development Pathway

A. Project Lead the Way

9th Grade:

Introduction of Engineering Design

This course teaches problem-solving skills using a design development process. Models of product solutions are created, analyzed and communicated using solid modeling computer design software. Involves language arts, math and science applications linked to state standards.

10th Grade:

Principles of Engineering

Helps students understand the field of engineering/engineering technology. Exploring various technology systems and manufacturing processes helps students learn how engineers and technicians use math, science, and technology in an engineering problem solving process to benefit people. The course also includes concerns about social and political consequences of technological change.

11th Grade:

Digital Electronics

A course in applied logic that encompasses the application of electronic circuits and devices. Computer simulation software is used to design and test digital circuitry prior to the actual construction of circuits and devices.

12th Grade:

Computer Integrated Manufacturing

Applies principles of robotics and automation in manufacturing through computer control. Builds on computer solid modeling skills developed in Introduction to Engineering Design. Students use CNC equipment to produce actual models of their three-dimensional designs. Fundamental concepts of robotics used in automated manufacturing and design analysis are included.

Or an alternate curriculum.

B. Engineering by Design

9th Grade:

Foundations of Technology

Focuses on the three dimensions of technological literacy: knowledge, ways of thinking and acting, and capabilities, so students develop as technology literate citizens. It engages students in exploring and deepening their understanding of “big ideas” regarding technology. Involves language arts, math and science applications linked to state standards.

10th Grade:

Technological Design

Engineering scope, content, and professional practices are presented through practical applications. Students working in teams research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors, and ethics.

11th Grade:

Advanced Design Applications

This course consists of four units including Manufacturing, Energy and Power, Construction and Transportation. Each unit provides an examination of particular aspects in these fields such as advances that maintain manufacturing efficiency, factors influencing the design of structures, how power systems may be utilized in problem solving, and the impact of transportation technologies on society and culture.

12th Grade:

Advanced Technological Applications

In this course, students study four components of the Designed World including Information Technology, Agriculture and Bio-related Technologies, Medical, and Entertainment/Recreation. The social and ethical implications of product and systems innovations are also studied.

Automated Systems

9th Grade: (Engineering and Technology Orientation)

[Course Title]

Includes reading and math applications to bring students to grade level and prepare them for early college opportunities to pursue pathways in various clusters.

Illinois Plan description: Production Technology

Production Technology is a course designed to foster an awareness and understanding of manufacturing and construction technology. Through a variety of learning activities, students are exposed to many career opportunities in the production field. Experiences in manufacturing include product design, materials and processes, tools and equipment including computers, safety procedures, corporate structure, management, research and development, production planning, mass production, marketing and servicing. In construction, students are exposed to site preparation, foundations, building structures, installing utilities, and finishing and servicing structures.

Principles of Technology I –

This course provides learning experiences related to the principles that underlie today's high technology: force, work, rate, resistance, energy, power, and force transformers. The course deals with these principles as they apply in each of the four systems that make up both the simplest and the most complex technological devices and equipment: mechanical systems, fluid systems,

electrical systems, and thermal systems. Learning experiences are designed to allow students to acquire knowledge and skills which are transferable to postsecondary technical programs.

10th grade: (*Manufacturing Technology Orientation*)

[Course Title]

Includes additional reading and math applications to bring students to grade level, prepare them for early college opportunities and the Workkeys National Career Readiness Certificate and provide an early start on MSSC certification.

Principles of Technology II –

This course includes learning experiences related to the principles that underlie today's high technology: momentum, waves and vibrations, energy converters, transducers, radiation, optical systems, and time constraints. The course deals with these principles as they apply in each of the systems that make up both the simplest and the most complex technological devices and equipment: mechanical systems, fluid systems, electrical systems, and thermal systems. Learning experiences are designed to allow students to acquire knowledge and skills which are transferable to postsecondary technical programs.

11th Grade:

Automated Systems I / Industrial Maintenance I

This course is intended to provide students with planned learning experiences and activities that include safety, basic hand and power tools, applied mathematics, precision measurement, print and schematic reading, job planning and introduction to electricity. In addition, students are introduced to robotics and the elements of automation: a repeatable manufacturing process, a control system and a material placement system. Principles of electro-mechanical and fluid power systems are also introduced.

12th Grade:

Automated Systems II / Industrial Maintenance II

This course builds on the skills and concepts introduced in Automated Systems I and provides planned learning experiences and activities in safety, advanced mathematics, precision measurement, print and schematic reading, circuit diagrams, and control systems. In addition students are introduced to the use of sensors, Programmable Logic Controllers (PLC's) and programmable robots in automated systems. Students will apply skills and knowledge gained to solving problems of testing, maintaining and repairing electrical/electronic and hydraulic/pneumatic equipment used in automated systems.

Production Pathways

(Precision Machining)

9th Grade: (*Engineering and Technology Orientation*)

[Course Title]

Includes reading and math applications to bring students to grade level and prepare them for early college opportunities to pursue pathways in various clusters.

Illinois Plan description: Production Technology

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Principles of Technology I –

This course provides learning experiences related to the principles that underlie today's high technology: force, work, rate, resistance, energy, power, and force transformers. The course deals with these principles as they apply in each of the four systems that make up both the simplest and the most complex technological devices and equipment: mechanical systems, fluid systems, electrical systems, and thermal systems. Learning experiences are designed to allow students to acquire knowledge and skills which are transferable to postsecondary technical programs.

10th grade: (*Manufacturing Technology Orientation*)

[Course Title]

Includes additional reading and math applications to bring students to grade level, prepare them for early college opportunities and the Workkeys National Career Readiness Certificate and provide an early start on MSSC certification.

Principles of Technology II –

This course includes learning experiences related to the principles that underlie today's high technology: momentum, waves and vibrations, energy converters, transducers, radiation, optical systems, and time constraints. The course deals with these principles as they apply in each of the systems that make up both the simplest and the most complex technological devices and equipment: mechanical systems, fluid systems, electrical systems, and thermal systems. Learning experiences are designed to allow students to acquire knowledge and skills which are transferable to postsecondary technical programs.

11th Grade:

Fundamentals of Machining

Provides students with basic technical skills needed in precision machining. Topics include shop safety, hand tool use, print reading, operation and maintenance of machine tools, precision measurement, layout, quality assurance, manufacturing processes and materials, and job planning.

12th Grade:

CNC Machining

Focuses on CNC machining operation, setup and programming with mills and lathes. Includes topics in heat treating and metal finishing and Geometric Dimensioning & Tolerancing.

Logistics Pathway

9th Grade: (*Engineering and Technology Orientation*)

[Course Title]

Includes reading and math applications to bring students to grade level and prepare them for early college opportunities to pursue pathways in various clusters.

Illinois Plan Description: Transportation Technology

Transportation Technology is a course designed to foster an awareness and understanding of the various transportation customs that make up our mobile society. Through laboratory activities, students are exposed to the technologies of and career opportunities involved in material handling, atmospheric and space transportation, marine transportation, terrestrial transportation, and computer uses in transportation technology.

Principles of Technology I –

This course provides learning experiences related to the principles that underlie today's high technology: force, work, rate, resistance, energy, power, and force transformers. The course deals with these principles as they apply in each of the four systems that make up both the simplest and the most complex technological devices and equipment: mechanical systems, fluid systems, electrical systems, and thermal systems. Learning experiences are designed to allow students to acquire knowledge and skills which are transferable to postsecondary technical programs.

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11th Grade:**Warehouse Operations I**

This course provides knowledge and skills applicable to the Parts, Warehousing, and Inventory Management operations. Topics covered include safety, warehousing and distribution operations in manufacturing and retailing, traffic and transportation and customer service activities, inventory control, and the supply chain. This class will develop hands-on activities using warehouse simulation and computer applications for inventory control and resource planning.

12th Grade:**Warehouse Operations II**

Building on Warehouse Operations I, this course will go deeper into inventory control, parts identification, and customer service. Topics include Enterprise Requirements planning (ERP), Warehouse management systems (WMS), and Customer Relationship Management (CRM) softwares. Supply logistics, supplier relations, inventory management decisions, purchasing, and packaging, Hazmat, and global logistics concepts are also covered.