



Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

Pathway: Production Design

Career Management Success
Credit: 1/2 - 1
SDE Course Code: 5701
MNPS Course Code: VOC8160

Career Management Success is a core course for career clusters. The course provides students with tools for achieving success in their academic, work, and personal lives. Course content emphasizes the basic skills and knowledge needed for employment success, as identified by industry and supported by relevant national standards. All course content is presented in a real-world context, providing concrete opportunities for developing personal and career goals, effective communication skills, teamwork abilities, and successful work attitudes. Upon completion of the course, students will be able to complete the Professional Development Program Level I and Level II of SkillsUSA or other degree programs in other career and technical youth organizations.

Computer Aided Design (CAD)
Credit: 1 - 2
SDE Course Code: 5788/3823
MNPS Course Code: VO8531/IND3823

Engineering Design/CAD is a course in which students learn the basic concepts of scale drawings and orthographic projections by making simple two-and-three-dimensional drawings using manual drafting tools and computer-aided design (CAD). Course content will enable students to make the transition into the use of CAD software by having them make increasingly sophisticated drawings. Students will work in teams and will culminate in a class project to create a complete set of construction and assembly drawings for a mechanical product.

Advanced Computer Aided Design (CAD)
Credit: 1
SDE Course Code: 5789/3824
MNPS Course Code: VO8431/IND3824

CAD is a course in which students will learn to use a CAD program to create engineering drawings

including: plan drawings, assembly drawings, welding and process drawings, cross sections, 3D representations and bills of materials. This course consists primarily of individual drawing projects with some group projects. Emphasis is on drawing projects of increasing complexity.

Principles of Engineering
Credit: 1
SDE Course Code: 5784 or 3820
MNPS Course Code: VOC8150 or IND3820

Principles of Engineering is a course in which students explore the nature of engineering and the skills fundamental to all engineering fields, as well as the role of quality-assurance and quality control procedures in manufacturing. Emphasis is placed on actual projects and presentations and the use of modern tools (e.g., CAD). The course can be enhanced by cooperation with local manufacturing facilities, which can provide real measurement data and opportunities for on-site visits to witness engineering tasks and projects, and quality-control data collection.

Pathway: Operations and Maintenance

Career Management Success
Credit: 1/2 - 1
SDE Course Code: 5701
MNPS Course Code: VOC8160

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course content is presented in a real-world context, providing concrete opportunities for developing personal and career goals, effective communication skills, teamwork abilities, and successful work attitudes. Upon completion of the course, students will be able to complete the Professional Development Program Level I and Level II of SkillsUSA or other degree programs in other career and technical youth organizations.

Principles of Manufacturing
Credit: 1
SDE Course Code: 5781 or 3818
MNPS Course Code: VO8184 or IND3818

Principles of Manufacturing focuses on the essential principles that must be mastered for a person to be effective in manufacturing production work. The course is intended for students more interested in production than engineering. The course covers customers, quality principles and processes, systems, information

in the workplace, the business of manufacturing, and statistical process control. The course is contextual by design. It connects what is being learned to the learner's current experience, past knowledge, and future conduct. Wherever possible, real-world or simulation hands-on experiences become the context in which instruction is delivered.

Basic Principles of Welding

Credit: 1 - 2

SDE Course Code: 5786

MNPS Course Code: VO5786

Basic Principles of Welding is a course in which students will learn basics skills and knowledge related to cutting and welding applications. Welding and cutting skills will be developed in the context of a series of projects. Combined with the second year course, Welding Applications, the student should be prepared for Entry Level Welding Certification, as defined by American Welding Society QC10.

Advanced Welding Applications

Credit: 1 - 2

SDE Course Code: 5787

MNPS Course Code: VO5787

Advanced Welding Applications* is a course designed to follow Principles of Welding, in which students will learn more advanced techniques and skills related to cutting and welding applications, particularly as they relate to stainless steel and aluminum. Welding and cutting skills will be developed in the context of a series of projects. Following the completion of this course, the student should be prepared for Entry Level Welding Certification, as defined by American Welding Society QC10.

Pathway: Precision Productions

Principles of Manufacturing

Credit: 1

SDE Course Code: 5781 or 3818

MNPS Course Code: VO8184 or IND3818

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Programming and Logic

Credit: 1

SDE Course Code: 5780

MNPS Course Code: VO8183

Programming and Logic is a course in which students will develop skills in problem analysis, construction of algorithms, and computer implementation of algorithms as they work on programming projects of increasing complexity. The recommended programming environment is DrScheme, as it permits an emphasis on development of analytic skills

rather than any particular language syntax or vocabulary. Emphasis is on actual programming projects, both individual and group. Course content should be repeatedly applied to increasingly complex projects.

Principles of Machining & Manufacturing

Credit: 2

SDE Course Code: 3819 or 5782

MNPS Course Code: VOC8442 or IND3819

Principles of Machining and Manufacturing focuses on the concepts and practices that support careers in manufacturing, industrial maintenance, metrology, automation, industrial design, or industrial support. The course introduces the technology of machining and manufacturing processes. While working as team members, students will apply leadership and organizational skills relating to designing, producing, and maintaining a product. Emphasis is placed on quality control, codes and standards, and production systems. The course is contextual by design. The course connects what is being learned to the learner's current experience, past knowledge, and future conduct. Laboratory exercises provide active and cooperative learning opportunities.

Manufacturing Applications

Credit: 2

SDE Course Code: 5785 or 3822

MNPS Course Code: VO8154 or IND3822

Manufacturing Applications is a 12th-grade course for students interested in entering the workforce or pursuing higher education in the manufacturing area. The course requires students to solve problems in a real-world manufacturing context. Problems address critical areas identified by industry and supported by relevant national standards. The course is structured as a series of simulation units. The simulations require students to identify problems in a manufacturing company based on data supplied in typical management reports. Students work in teams of four to six. Teams test and refine proposed solutions with computer simulations. All teams work on the same problem concurrently. At the end of each unit, students present team findings and recommendations to the class and to a panel of manufacturing industry representatives, which acts as the board of directors.

Pathway: Engineering

Principles of Engineering

Credit: 1

SDE Course Code: 5784 or 3820

MNPS Course Code: VO8150 or IND3820

Principles of Engineering is a course in which students explore the nature of engineering and the skills fundamental to all engineering fields, as well as the role of quality-assurance and quality control procedures in manufacturing. Emphasis is placed on actual projects and presentations and the use of modern tools (e.g., CAD). The course can be enhanced by cooperation with local manufacturing facilities, which can provide real measurement data and opportunities for on-site visits to witness engineering tasks and projects, and quality-control data collection.

Introduction to Engineering Design

Credit: 1

SDE Course Code: 5783 or 3818

MNPS Course Code: VOC5783 or IND3819

A course that teaches problem-solving skills using a design development process. Models of product

solutions are created, analyzed and communicated using solid modeling computer design software. In NYS, Circuit test the course is called Design and Drawing for Production and follows the syllabus developed by the State Education Department.

Digital Electronics

Credit: 1

SDE Course Code: 5783 or 3821

MNPS Course Code: VO8148 or IND3821

Digital Electronics is a course in which students will construct and test fundamental digital logic circuits such as gates, counters, oscillators, and switches. A/D and D/A converters will be applied to signal processing. Microcontroller programs will be modified and microcontrollers applied to closed-circuit control systems. The course culminates in a group project to create a digital servo control loop. Emphasis is on hands-on activities, real-world equipment, and current technology.

Computer Integrated Manufacturing

Credit: 1

SDE Course Code: 3830

MNPS Course Code: VOC8183

A course that applies principles of robotics and automation. CAD design The course builds on computer solid modeling skills developed in Introduction to Engineering Design, and Design and Drawing for Production. 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.

Engineering Design and Development

Credit: 1

SDE Course Code: 5798

MNPS Course Code: VO5798

An engineering research course in which students work in teams to research, design and construct a solution to an open-ended engineering problem. Students apply principles developed in the four preceding courses and are guided by a community mentor. They must present progress reports, submit a final written report and defend their solutions to a panel of outside reviewers at the end of the school year.

Pathway: Project Lead the Way Engineering

Principles of Engineering

Credit: 1

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Civil Engineering and Architecture

Credit: 1

SDE Course Code: 3831

MNPS Course Code: IND3831

This course provides an overview of the fields of Civil Engineering and Architecture, while emphasizing the interrelationship and dependence of both fields on each other. Students use state of the art software to solve real world problems and communicate solutions to hands-on projects and activities. This course covers topics such as:

- *The Roles of Civil Engineers and Architects
- *Project Planning
- *Site Planning
- *Building Design
- *Project Documentation and Presentation