8A200 Agricultural Mechanics and Metal Technologies (R) **1 credit** **Gr: 10-12**

Prerequisite: Principles of AFNR
Description (only at GHS and SGHS) This course is designed to develop an understanding of agricultural mechanics as it relates to safety and skills in tool operation, electrical wiring, plumbing, carpentry, fencing, painting, concrete, and metal working techniques; specialty welding and cutting techniques; use of oxy-fuel equipment and electric arc welding equipment; cost effective construction techniques; and specialized non-metallic fabrication techniques. Basic terminology, mathematical computations, and application of scientific principles related to agricultural metal fabrication technology will be reinforced.

8M970 Basic Fluid Power (R) (Spring) **1 credit** **Gr: 11-12**

GRCTC

Prerequisite: Recommended prerequisites: Algebra I, and Geometry
Description: .Basic Fluid Power is an overview of automated manufacturing principles. It includes coverage of the manufacturing process, control systems, and measurement theory. Students will identify terminology and fundamental concepts of manufacturing; describe the trends of manufacturing careers within the industry cluster; identify safety, health, environmental, and ergonomic issues in manufacturing; discuss quality and continuous improvement methods; describe the importance of maintenance within manufacturing; and identify processes and production steps in manufacturing. Students must complete and interest form. Course requirements to be met.

8M980 Blueprint Reading for Manufacturing Applications (R) (Fall) **1 credit** **Gr: 11-12**

GRCTC

Prerequisite: Basic Fluid Power (Fall class) Recommended prerequisites: Algebra I, and Geometry and Principles of Construction
Description: .Blueprint Reading for Manufacturing Applications is an introduction to reading and interpreting working drawings for fabrication processes and associated trades. Student will learn sketching techniques to create pictorial and multiple-view drawings including dimensions, notes, symbols, sections and auxiliary views. Students must complete and interest form. Course requirements to be met.

8M220 Diversified Manufacturing I (R) **1 credit** **Gr: 10-12**

Prerequisite: None; R. Prerequisite: Algebra I
Description: In Diversified Manufacturing I, students gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. The study of manufacturing systems allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings in a manufacturing setting. Diversified Manufacturing I allows students the opportunity to understand the process of mass production by using a wide variety of materials and manufacturing techniques. Knowledge about career opportunities, requirements, and expectations and the development of skills prepare students for workplace success.

8M320 Diversified Manufacturing II (R) **1 credit** **Gr: 11-12**

Prerequisite: Diversified Manufacturing I; R. Prerequisite: Algebra I
Description: In Diversified Manufacturing II, students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. The study of manufacturing systems allows students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings in a manufacturing setting. Diversified Manufacturing II allows students the opportunity to understand the process of mass production by using a wide variety of materials and manufacturing techniques. Knowledge about career opportunities, requirements, and expectations and the development of skills prepare students for workplace success.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

8O230 Engineering Design and Presentation I (R) **1 credit** **Gr: 10-12**

Prerequisite: Algebra I
Description: Students enrolled in this course will demonstrate knowledge and skills of the process of design as it applies to engineering fields using multiple software applications and tools necessary to produce and present working drawings, solid model renderings, and prototypes. Students will use a variety of computer hardware and software applications to complete assignments and projects. Through implementation of the design process, students will transfer advanced academic skills to component designs. Additionally, students explore career opportunities in engineering, technology, and drafting and what is required to gain and maintain employment in these areas.

8M130 Introduction to Welding (R) **1 credit** **Gr: 9-12**

Prerequisite: None
Description: (SGHS) Introduction to welding technology with an emphasis on basic welding laboratory principles and operating procedures. Students will be introduced to the three basic welding processes. Topics include: industrial safety and health practices, hand tool and power machine use, measurement, laboratory operating procedures, welding power sources, welding career potentials, and introduction to welding codes and standards.

8M940 Manufacturing Engineering Technology I (R) **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: R. Prerequisite: Algebra I
Description: In Manufacturing Engineering Technology I, students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. Students will prepare for success in the global economy. The study of manufacturing engineering will allow students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings in a manufacturing setting. Students must complete and interest form. Course requirements to be met.

8M950 Manufacturing Engineering Technology II (R) **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: Manufacturing Engineering Technology I; R. Prerequisite: Algebra II, Computer Science, or Physics
Description: In Manufacturing Engineering Technology II, students will gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. The study of Manufacturing Engineering Technology II will allow students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. **This course satisfies a math credit.** Students must complete and interest form. Course requirements to be met.

8M900 Metal Fabrication and Machining I **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: Recommended prerequisite: Algebra I or Geometry
Description: Metal Fabrication and Machining I provides the knowledge, skills, and certifications required for equal employment opportunities in the metal production industry. Students must have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Students must complete and interest form. Course requirements to be met.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

8M910 Metal Fabrication and Machining II **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: Precision Metal Manufacturing or Metal Fabrication and Machining I. Recommended prerequisites: Geometry and Algebra II

Description: Metal Fabrication and Machining II builds on the knowledge, skills, and certifications students acquired in Metal Fabrication and Machining I, or Precision Metal Manufacturing. Students will develop advanced concepts and skills as related to personal and career development. This course integrates academic and technical knowledge and skills. Students will have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Students must complete and interest form. Course requirements to be met.

8M470 Practicum in Manufacturing - Diversified (R) **2 credits** **Gr: 12**

Prerequisite: None; R. Prerequisite: Diversified Manufacturing II

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

8M474 Practicum in Manufacturing - Diversified / Extended Practicum (R) **3 credits** **Gr: 11-12**

Prerequisite: Diversified Manufacturing II

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Extended Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

8M940 Practicum in Manufacturing - Metal Fabrication and Machining (R) **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: Metal Fabrication and Machining I

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

8M923 Practicum in Manufacturing - Metal Fabrication and Machining / Extended(R) 3 credits **Gr: 11-12**

GRCTC

Prerequisite: Metal Fabrication and Machining I

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Extended Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

8M960 Practicum in Manufacturing - Engineering (R) **2 credits** **Gr: 11-12**

GRCTC

Prerequisite: Metal Fabrication and Machining I

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

8M963 Practicum in Manufacturing - Engineering/ Extended(R) **3 credits** **Gr: 11-12**

GRCTC

Prerequisite: Metal Fabrication and Machining I

Description: The practicum course is a paid or unpaid capstone experience for students participating in a coherent sequence of career and technical education courses in the Manufacturing Career Cluster. The Extended Practicum in Manufacturing course is designed to give students supervised practical application of previously studied knowledge and skills. Practicum experiences can occur in a variety of locations appropriate to the nature and level of experience.

8M200 Precision Metal Manufacturing I (R) **2 credit** **Gr: 10-12**

8M205 Precision Metal Manufacturing I (DC)

Prerequisite: Recommended prerequisite: Principles of Manufacturing and completion of or concurrent enrollment in Algebra I or Geometry

Description: (GHS only) Precision Metal Manufacturing I will provide the knowledge, skills, and technologies required for employment in precision machining. While the course is designed to provide necessary skills in machining, it also provides a real-world foundation for any engineering discipline. This course may address a variety of materials such as plastics, ceramics, and wood in addition to metal. Students will develop knowledge of the concepts and skills related to precision metal manufacturing to apply them to personal and career development. This course supports integration of academic and technical knowledge and skills. Students will have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Knowledge about career opportunities, requirements, and expectations and the development of workplace skills prepare students for success.

8M300 Precision Metal Manufacturing II (R) **2 credit** **Gr: 11-12**

8M305 Precision Metal Manufacturing II (DC) Ⓓ

Prerequisite: Precision Metal Manufacturing I

Description: (GHS only) Precision Metal Manufacturing II will provide students the knowledge, skills, and technologies required for employment in precision machining. While this course is designed to provide necessary skills in machining, it also provides a real-world foundation for any engineering discipline. This course addresses a variety of materials such as plastics, ceramics, and wood in addition to metal. Students will develop knowledge of the concepts and skills related to these systems to apply them to personal and career development. This course supports integration of academic and technical knowledge and skills. Students will have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Knowledge about career opportunities, requirements, and expectations and the development of workplace skills prepare students for success. This course is designed to provide entry-level employment for the student or articulated credit integration into a community college and dual credit with a community college with completion of the advanced course.

NOTE: All courses may not be offered on every campus.
2019-2020 Course Guide

8M100 Principles of Manufacturing (R) **1 credit** **Gr: 9-12**

Prerequisite: Recommended prerequisite: Algebra I or Geometry.
Description: In Principles of Manufacturing, students gain knowledge and skills in the application, design, production, and assessment of products, services, and systems and how those knowledge and skills are applied to manufacturing. In addition to general academic and technical knowledge and skills, students gain an understanding of career opportunities available in manufacturing and what employers require to gain and maintain employment in these careers. In this course, students will use manufacturing techniques and processes to construct projects of wood, metal, and plastic materials. Student learning activities; organize an enterprise, conduct market research, plan an automated factory, plan a computer-integrated manufacturing (CIM) system, research the cost effectiveness of a production run, make jigs and fixtures, and program robots. Examples of equipment used are computer numerical-controlled (CNC) machine tools, computer hardware/software, robots, computer-aided drafting/computer-aided manufacturing (CAD/CAM) systems, and general production equipment.

8M230 Welding I (R) **2 credits** **Gr: 10-12**

Prerequisite: Recommended prerequisites: Algebra I, or Principles of Manufacturing,
Description: (SGHS only) Welding I provides the knowledge, skills, and technologies required for employment in metal technology systems. Students will develop knowledge and skills related to this system and apply them to personal career development. This course supports integration of academic and technical knowledge and skills. Students will reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Knowledge about career opportunities, requirements, and expectations and the development of workplace skills prepare students for future success. This course is offered to students who are interested in pursuing a career in the areas of welding and metal technologies. Students should be interested in obtaining technical knowledge and developing skills that enable students to enter into the workforce of the should be interested in obtaining technical knowledge and developing skills that enable students to enter into the workforce of the welding industry. Students are provided opportunities to use all available types of welding equipment including shield metal arc, oxygen-acetylene, gas metal arc welding (Mig) and gas tungsten metal arc (Tig). A study of blueprint reading and welding terminology is also included in the course of study.

8M330 Welding II (R) **2 credits** **Gr: 12**

Prerequisite: Welding I, Recommended Prerequisite: Algebra I or Geometry
Description: (SGHS only) Welding II builds on the knowledge and skills developed in Welding I. Students will develop advanced welding concepts and skills as related to personal and career development. Students will integrate academic and technical knowledge and skills. Welding II builds on knowledge and skills developed in Welding. Students will develop advanced welding concepts and skills as they relate to personal and career development. The second year welding program assists students in preparing to become a job shop operator. Students are required to estimate, bid, and complete a welding job. The instructor covers advanced arc welding with multiple pass technique, metal inert gas welding, tungsten inert gas welding, metallurgy, and blueprint reading for welders. Welding II students are provided training to prepare for the welders certification and the AWS certification exam.