

## Career and Technical Education (CTE)

**#1: *Introduction to Agriculture, Food, and Natural Resources (AFNR)*** introduces students to the range of agricultural opportunities and the pathways of study they may pursue. Science, mathematics, reading, and writing components are woven in the context of agriculture and students will use the introductory skills and knowledge developed in this course. Students will experience hands-on activities, projects, and problems. Student experiences will involve the study of communication, the science of agriculture, plants, animals, natural resources, and agricultural mechanics. While surveying the opportunities available in agriculture and natural resources, students will learn to solve problems, conduct research, analyze data, work in teams, and take responsibility for their work, actions, and learning. For example, students will work in groups to determine the efficiency and environmental impacts of fuel sources in a practical learning exercise.

### **#2 Agriculture Science: ½ Credit, Elective for grades 10-12**

**Prerequisite: Must have completed Intro to Agriculture or Intro to CTE**

Agriculture is both an art and a science. As an art, it is one of the skills required in the production of food, fiber, and other production useful to society. As a science, it consists of a working knowledge of the different laws of nature, their cause and effect. The student enrolled in Agriculture Science I will be further introduced to the areas of agriculture and society, agriculture and the environment, production agriculture, agribusiness, crop production, equine science, livestock production, meat and animal science. Other areas of study will include agricultural leadership, occupational opportunities, FFA and it's activities.

### **#3: *Food Science and Safety* ½ Credit, Elective for grades 10-12**

This course is a specialization course of Study. Students will complete hands-on activities, projects, and problems that simulate actual concepts and situations found in the food science and safety industry, allowing students to build content knowledge and technical skills. Students will investigate areas of food science including food safety, food chemistry, food processing, food product development, and marketing. Students will maintain a research level Laboratory Notebook throughout the course documenting their experiences in the laboratory. Research and experimental design will be highlighted as students develop and conduct industry appropriate investigations. In addition, students will explore connections between the *Food Science and Safety* lessons, Supervised Agricultural Experience, and FFA components that are important for the development of an informed agricultural education student. Students will investigate, experiment, and learn about documenting a project, solving problems, and communicating solutions to their peers and members of the professional community.

### **#4 Companion Animals (quarter) ½ Credit, Elective for grades 10-12**

Prerequisite: None

Credit: 1/2

Grade: 10-12

College Credit: No

This course is for those interested in companion animals; dogs, cats, fish, etc. We will look at different breeds, care and management, disease and health, and more. The class will also be responsible for the care and maintenance of the class animals. Veterinary medicine for companion animals will also be discussed and contact with local professionals will be made.

### **#5 College Animal Science (quarter) ½ Credit, Elective for grades 10-12**

This course is **4 college credits** and fulfills U of M Requirements for degree credit requirements, such as departmental major requirements or elective requirements. ANSC 1101 is Sponsored by the U of M Academic Department: Department of Animal Science (College of Food, Agricultural and Natural Resource Sciences): CIS Animal Science is taught concurrently through the University of Minnesota TC Campus as an Introduction to animal science and fulfills the science requirement for most Minnesota Colleges and Universities The class emphasizes on fundamental concepts of physiology, nutrition, animal breeding and management as they apply to production systems of livestock, poultry, and companion animals. College Animal Science is taught in the classroom, online, and through site visits where required labs occur off school grounds

Prerequisites

1. students must be in the top 50% of their class
2. must have passed biology with a B- or better

### **#6: Natural Resources and Ecology ½ Credit, Elective for grades 10-12**

This course provides students a variety of experiences that in the fields of natural resources and ecology. Students will explore hands-on projects and activities while studying topics such as land use, water quality, stewardship, and environmental agencies. Study of the natural world including biomes, land, air, water, energy, use and care as well as a focus on issues surrounding man's interaction with the Earth will be addressed in this course. Students will select an ecosystem to study throughout the course and apply principles of natural resources and ecology from each unit of study to that ecosystem.

### **#7 Floriculture ½ Credit, Elective for grades 10-12**

Prerequisite: None

Credit: 1/2

Grade 10-12

College Credit: No

Students enrolled in the Floriculture class will learn identification of cut flowers. Students will study floral and foliage arrangements, problem solving and skills that include flower arranging, floral design, and unique uses for cut flowers. A Class fee will allow students to take home the floral arrangements they create in class.

### **#8: Plant Propagation CIS ½ Credit, Elective for grades 11-12**

This is a **4 college credits course** and fulfills U of M Requirements for Liberal Education – Biological Science. (HORT 1001 is a 4 credits course sponsored by U of M Academic Department: Horticultural Science).

**Student Qualification Requirements - Students must be juniors or seniors in high school and in the top 50% of their class to participate and must have passed biology with a B- or better**

Principles and techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles; labs on practice of various propagating techniques.

Plant Propagation offers students the opportunity to learn fundamental biological concepts of plant morphology, physiology, and reproduction, and to apply these concepts in the greenhouse and growth facility to the techniques of ornamental, fruit, and vegetable plant propagation. The lecture section focuses on plant structure and function, while the labs highlight how to grow and multiply plants. By the end of the course, we expect that students will know how to recognize, describe, and define key concepts of plant structure and function using the language of biology, and know how these concepts are interconnected in the big picture of plant growth and reproduction. Students will also know how to use scientific ways of inquiry to investigate plant propagation questions. As a result of the lab exercises we expect students to be able to successfully propagate plants using several different methods.

**#9 On the Job Training - Work Based Learning (OJT) (quarter, 1 1st or 4th block) ½ credit**

**AG # 11 On the Job Training-Work Based Learning (OJT) (quarter 4, 1st or 4th block) ½ credit**

Prerequisite: None – Career Tech Education Course Preferred

Credit: 1/2 credit per quarter

Grade 12

This on-the-job program allows students to learn in the workplace and get an idea if they have an interest in a certain career. Work sites may vary from sales, service, banking retail, construction, farming, and home business opportunities. Records, training agreements and training plans are required of all students. Weekly assignments and timesheets are required. All students enrolled must currently be employed. A student must work a minimum of 7.0 -hours Monday through Friday (weekend hours do not count). Numbers may be limited. This course is a pass/fail course, those who fail will be removed the program for the remainder of the year.

**#10 METALWORKING TECHNOLOGY: 1/2 credit, Elective Grades 9-12 (\*College Credit may be earned for this course. See “Tech Prep”)**

**Prerequisite: Must have passed Intro to CTE with a C- or better**

In this course the student will learn about metalworking as a career, hand tool use and safety, print reading, metallurgy, heat treatment, metal finishing, resources and project planning and fabrication. We will also tour a business to see the many different careers that are associated with the metalworking industry.

**#11 Introduction to machining/fluid power: ½ credit, elective grades 10-12**

If you drive to work or school, if the building you're in is climate controlled, if you're reading this course description, fluid power and machining has touched your life. This course introduces basic concepts, terminology, applications, and automation processes used throughout the fluid power and machining industry. Students in this course can expect to learn basic operating procedures on lathes and milling equipment. Fluid power will be taught through hands-on labs in designing and implementing fluid power circuits that can be found virtually all aspects of life

### **#12 Welding I 1/2 credit, Elective 10-12.**

**Prerequisite: Must have passed Metals with a C- or better**

Students will be introduced to the shop and learn shop safety, tool identification and proper care and operation of all power tools. They will develop knowledge and skill in using basic hand tools, ARC, MIG and acetylene welding, sheet metal and soldering. Time will be allotted for project development and construction in many areas.

### **#13 Welding II 1/2 credit, Elective for 11-12 (\*College Credit may be earned for this course. See "Tech Prep")**

**Prerequisite: Must have passed Welding I with a C- or better**

This course focuses on the technology and skills used in the welding and fabrication industry. Students will concentrate on the following welding technologies: shielded metal arc, metal inert gas (MIG), oxy-fuel (gas), plasma arc cutting, and oxyacetylene cutting. Along with power tool safety and tool operations, students will be instructed on fabrication techniques. We will be touring a business to see some of the high tech equipment that is being used in the welding and fabrication industry.

### **#14 Machine Tool Technology: ½ credit, Elective for grades 11-12 (College Credit may be earned for this course. See "Tech Prep")**

**Prerequisite: Must have passed Introduction to machining/fluid power with a C- or better**

This course focuses on the technology of the machine tool industry. Students will study machine lathe operations, milling operations, power sawing, drill press operations and grinding and abrasive operations. The class will tour a high tech precision manufacturing facility in the area for a better understanding of what is being used in industry. Students that are thinking about studying to be a machinist, a mechanical designer or engineer will benefit from this course.

### **#15 SMALL ENGINES: 1/2 credit, Grades 10-12**

In this course students will learn the principles of the two and four cycle combustion engine and lawn and garden automated tools. Students will be given the opportunity to recondition, repair, and overhaul small engines and lawn and garden tools. Each major engine component will be studied with special emphasis on the proper maintenance and servicing of these components. Troubleshooting, tune-up and major engine overhaul or repair will be emphasized during the second half of the semester. Practical laboratory work will make-up about one half of the course time.

### **#16 Advanced Mechanics (quarter, 1 and 2)**

Prerequisite: Small Gas Engines

Credit: 1/2 credit per quarter

Grade 12 (Juniors with Instructor's permission)

**DESCRIPTION:** This course is designed for students that want to work in the autobody, ag mechanic, or automotive service industry. Laboratory experiences include projects in maintenance and repair of power equipment, engine service, engine controls, drivetrain configuration, brakes, fuel systems, cooling system, and welding and auto body repair procedures. Students must be prepared to provide engines, automobiles, and equipment for laboratory exercises.

### **#17 Intro to CTE (Career and Technical Education): ½ credit, Elective for grade 9**

The purpose of Intro to CTE is to expose the students to the processes required to produce a product. In this course students creative abilities will be engaged in the production of an individual product. Students will gain basic wood and metal working skills. The production process will give the students exposure to selected power tools and hand tools available in our Technology Education Labs.

### **#18 Introduction to Woodworking Technology: ½ credit, Elective for grade 9**

The purpose of 9th Grade Technology Education is to expose the students to the processes required to design and produce a product. In this unit, the students creative abilities and problem-solving skills will be engaged in the production of an individual product. Students will also gain a basic understanding of the materials used in todays market for building with wood. Students will be able to identify various woods and finishing products. The production process will give the students exposure to selected power tools and hand tools available in our Technology Education Labs.

**#19 Cabinetry: ½ credit, Elective for grade 10-12**  
**(\*College Credit may be earned for this course. See “Tech Prep”)**

This course is the study of wood fiber classifications, physical properties and the proper care, safety and use of traditional tools, new hand tools, portable power tools, and accessories. We will also study the employment opportunities that the wood fiber industry provides in our state. This class is a prerequisite for two classes: Applied Woodworking Technology and Construction Technology. This course is also articulated through St. Cloud Technical College for carpentry hand tools.

**#20 Advanced Woodworking A: ½ credit, Elective for grade 11-12**  
**#21 Advanced Woodworking B: ½ credit, Elective for grade 11-12**

\*Students must register for two quarters of this course

Prerequisite: Must have passed Cabinetry with a C- or better

This is an advanced course in production related to the woodworking industry. Emphasis is placed on safety, product design, production planning, wood and material identification, hand and machine tool procedures, and finishing techniques. The student will use approximately 70% of the class time for laboratory activities.

**#22 Ag Construction A: ½ credit, Elective for grade 11-12**  
**#23 Ag Construction B: ½ credit, Elective for grade 11-12**  
**(College Credit may be earned for this course. See “Tech Prep”)**

\*Students must register for two quarters of this course

Prerequisite: Must have passed Cabinetry and Civil Engineering and Architecture (CAD) with a C- or better

The Ag Construction class is designed for students who want to learn the basic skills necessary for the building trade. This two hour course offers training and practical experience in safety, planning, basic carpentry, rough carpentry, finish carpentry, electrical, plumbing, insulation, and other techniques. The main project will be a constructed building. This is an excellent course for students interested in carpentry or any of the many related jobs, and also for any future homeowner.

**#24 Basic Principles of Electricity: 1/2 credit Grades 10-12**

In this course students will study the basic principles of electricity, Electronics, magnetism, direct and alternating current. Students will learn basic wiring design and how to wire for their own needs. Students will be given instruction in the use of electronic controls and sensing devices. This course will also give an introduction to field of electronic which encompasses almost everything we come in contact with throughout our daily lives. This course will give the student theory and hands-on experience including circuits, meters, various electronic components, plus an opportunity to actually build a combination of circuits.

**#25 Independent Study in Research and Development: ½ credit, Elective grade 12**

Prerequisite: Successful completion of an upper level Technology Education Course. Must meet application requirements.

The primary aim of an independent study is to enable a student to investigate a subject more thoroughly than the regular course may permit. It should not be a substitute for a course that is already offered. The contract application will be reviewed by the instructor and counselor and at that time they will either accept or reject the application for the desired course of study. SPECIAL REQUIREMENTS: Limited to six students. Must contract with the instructor and counselor.

**#26 AUTO AND HOME CARE: 1/2 credit, Elective for grades 10-12**

Auto and Home Care is a class for anyone who owns, or plans on owning a car and/or home. In this class you will learn how a car works and the maintenance it needs to keep it your vehicle in running. Automobile areas covered include: change engine oil, cooling system maintenance, battery care, tire care, rear axel disassembly, drum and disk brake maintenance, and car interior and exterior maintenance. Home maintenance areas covered include: how to install ceramic/porcelain tile, roof and siding repair, mounting door hinges, finishing concrete, brick paving, simple home wiring, home plumbing repairs, hanging and finishing drywall, and trim work.

**PLTW Gateway Courses****#27 Design & Modeling**

Students apply the design process to solve problems and understand the influence of creativity and innovation in their lives. They work in teams to design a playground and furniture, capturing research and ideas in their engineering notebooks. Using Autodesk® design software, students create a virtual image of their designs and produce a portfolio to showcase their innovative solutions.

**#28 Technology Education 8: Automation & Robotics**

Students trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics® platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.

## PLTW Engineering Courses

**#29 IED- Introduction to Engineering Design A: ½ credit, Elective for grade 9**

**#30 IED- Introduction to Engineering Design B: ½ credit, Elective for grade 9  
(\*College credit may be earned for this course)**

\*Students must register for two quarters of this course

Students dig deep into the engineering design process, applying math, science, and engineering standards to hands-on projects. They work both individually and in teams to design solutions to a variety of problems using 3D modeling software, and use an engineering notebook to document their work.

**#31 (Coming in 2016-2017) POE- Principles of Engineering A: ½ credit, Elective for grade 10**

**#32 (Coming in 2016-2017) POE- Principles of Engineering A: ½ credit, Elective for grade 10  
(\*College credit may be earned for this course)**

\*Students must register for two quarters of this course

Prerequisite: Must have passed Introduction to Engineering Design with a C- or better

Through problems that engage and challenge, students explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. Students develop skills in problem solving, research, and design while learning strategies for design process documentation, collaboration, and presentation.

**#33 (Coming in 2016-2017) CIM- Computer Integrated Manufacturing A: ½ credit, Elective for grades 11-12**

**#34 (Coming in 2016-2017) CIM- Computer Integrated Manufacturing A: ½ credit, Elective for grades 11-12  
(\*College credit may be earned for this course)**

\*Students must register for two quarters of this course

Prerequisite: Must have passed Introduction to Engineering Design with a C- or better

Manufactured items are part of everyday life, yet most students have not been introduced to the high-tech, innovative nature of modern manufacturing. This course illuminates the opportunities related to understanding manufacturing. At the same time, it teaches students about manufacturing processes, product design, robotics, and automation. Students can earn a virtual manufacturing badge recognized by the National Manufacturing Badge system.

**#35 (Coming in 2015-2016) CEA- Civil Engineering and Architecture A: ½ credit, Elective for grades 10-12)**

**#36 (Coming in 2015-2016) CEA- Civil Engineering and Architecture B: ½ credit, Elective for grades 10-12)  
(\*College credit may be earned for this course)**

\*Students must register for two quarters of this course



Prerequisite: Must have passed Introduction to Engineering Design with a C- or better

Students learn important aspects of building and site design and development. They apply math, science, and standard engineering practices to design both residential and commercial projects and document their work using 3D architecture design software.