

TECHNOLOGY, ENGINEERING & MANUFACTURING

CONSTRUCTION COURSES

Introduction to Woods Technology 3024

Grades: 9-10-11-12

Prerequisite: None

Suggested donation of \$30 to offset materials cost.

This one trimester course is an introduction and orientation to the field of woods manufacturing and fabrication. The course covers the safe operation of both hand and power tools. Students who have little or no knowledge of woods technology are encouraged to register for this class. Specific areas to be covered in the class include pricing projects, furniture construction, gluing, laminating, and finishing techniques. Emphasis in this class will be on development of fundamental skills and knowledge along with the study of related technical information in manufacturing and fabrication. Each student will construct an oak chest lined with cedar to bring home at the end of the course.

Woods Design Lab 3025

Grades: 9-10-11-12

Prerequisite: Introduction to Woods Technology

Suggested donation of \$30 to offset materials cost.

In this one trimester, students will further develop and challenge their skills and knowledge of woods technology. Advanced techniques for wood joinery and design will be incorporated. Students could possibly incorporate designs created in the Fab Lab and produced on the Shopbot 3D machine in the Fab Lab. Projects could include night stands, wall cabinets, coffee tables with stools/chairs, baseball bats, canoe paddles, boomerangs, ping pong paddles, lacrosse sticks, hockey sticks or other sports related-projects. Students who wish to further develop and challenge their skills and knowledge of woodworking will want to pursue this course. This course can be taken multiple times in different trimesters for credit.

SKILLS FOR LIFE COURSE – RECOMMENDED FOR ALL STUDENTS

Home Repair and Problem Solving 3027

Grades: 9-10-11-12

Prerequisite: None

Suggested donation of \$30 to offset materials cost.

Technology and Engineering creates human-made products that are prone to malfunction or breakage. Students will gain confidence in troubleshooting and problem solving in order to be well prepared for future events. Concepts such as troubleshooting, redesign, retrofitting, process implementation, tool usage, system analysis and safety will be used to answer the ultimate engineering question: "How does this work?" This course will demonstrate the investigative nature of repair work, and promote confidence in troubleshooting by utilizing a problem-solving process to determine the problem, research the options for correction, and utilize the proper tools/techniques and safety standards to achieve a successful result. Additionally, knowing how to perform these repairs can save people thousands of dollars over a lifetime. Possible repair problems will be those found around the house, car, and campus.

MANUFACTURING COURSES

Introduction to Metals Technology 3044

Grades: 9-10-11-12

Prerequisite: None

Suggested donation of \$30 to offset materials cost.

This one trimester course is an introduction and orientation to the field of metals manufacturing and fabrication. The course covers the safe operation of both hand and power tools in the metals lab. Development of individual skills will be emphasized with participation in individual and/or class projects. Students will experience hands on exploratory exercises in brazing/soldering, arc welding, wire feed welding, lathe machining, mill machining and drilling. Emphasis in this class will be on exercises and development of fundamental skills and knowledge along with the study of related technical information in manufacturing and fabrication.

Metals Design Lab 3046

Grades: 9-10-11-12

Prerequisite: Introduction to Metals Technology

Length: One or More Trimesters

Suggested donation of \$30 to offset materials cost.

Students will expand their personal development of fundamental skills in metal machining areas and in welding. Students will be expected to select, design, plan, and complete manufacturing/fabrication projects, or work on assigned tasks selected by the instructor. Students could possibly incorporate designs created in the Fab Lab and produced on the 3D Plasma cutting machine. Students who wish to further develop and challenge their skills and knowledge of metalworking will want to pursue this course. This course can be taken multiple times in different trimesters for credit.

Small Engines 3023

Grades: 9-10-11-12

Prerequisite: None

Suggested donation of \$30 to offset materials cost.

This course will cover theory of operation and component design of small gas engines. Students will disassemble, measure, clean, and reassemble an internal combustion engine. In addition, troubleshooting and repair of two and four-cycle engines will be covered.

COMMUNICATIONS COURSES

Introduction to Graphics and Animation 3006

Grades: 9-10-11-12

Prerequisite: None

This course introduces the basics of graphic communications. Students learn to meet a client's needs through use of computer illustration, digital photography, animation with Adobe and AutoDesk software, video, and multimedia presentations. Projects provide students with valuable computer, artistic, and communication skills. These skills can be applied immediately to personal projects in and out of high school.

****This course meets the Arts Standard Requirement***

Graphics and Animation Design Lab 3153

Grades: 11-12

Prerequisite: Introduction to Graphics and Animation

This is a hands-on class using the concepts learned in Introduction to Computer Animation to produce an animated and rendered final project. Students will learn to work with lights, cameras, hierarchy and linking, animating, animation rendering, inverse kinematics, particle system, space warps, and nurbs.

ARCHITECTURE COURSES

Introduction to Drafting and Architecture 3070

Grades: 9-10-11-12

Prerequisite: None

This course is an introduction to architecture, covering types and styles of architecture and the basic concepts of house design. Concepts learned will involve creating hand drawn floor plans, foundation plans and elevation drawings of a predetermined house design using "Sketch-Up". It provides an introduction of drafting instruments, dimensioning, sketching, orthographic projection, isometric, pattern development, architecture, drafting, and Computer Aided Drafting (CAD) systems.

****This course meets the Arts Standard Requirement***

Drafting and Architecture Design Lab 3086

Grades: 10-11-12

Prerequisite: Introduction to Drafting and Architecture

This course encompasses the advanced study of residential interior and exterior architectural design standards and it is a guided independent exploration of Drafting or Computer Aided Design problems. Students will continue to use the Computer Aided Drafting (CAD) systems to develop their independent project drawings. This course will also introduce the latest version of AutoDesk Revit, a Computer Aided Design (CAD) application.

ENGINEERING AND PRE-COLLEGE ENGINEERING COURSES

Introduction to Engineering 3030

Grades: 9-10-11-12

Prerequisite: None

This one-trimester course provides hands-on activities that allows students to explore the field of engineering. Students will experience what it is like to be an engineer designing prototypes in a fun creative atmosphere. Being only one trimester, students will get a feel for the engineering design process and principles and be able to gauge whether or not they would like to take the full year Project Lead the Way engineering courses for college credit.

****This course meets the Arts Standard Requirement***

Engineering Design – Project Lead the Way F-3013, W-3014, S-3015

Grades: 9-10-11-12

Prerequisite: None

This full-year course is appropriate for students in grades 9-12. The major focus of Engineering Design PLTW is the design process and its application. Through hands-on projects, students apply engineering standards and document their work. Students use industry standard 3D modeling software to help them design solutions to solve proposed problems, document their work using an engineer's notebook, and communicate solutions to peers and members of the professional community. This course will follow the Project Lead the Way (PLTW) curriculum from the Engineering Design course which is a STEM (Science-Technology-Engineering-Math) course. It is a pre-college engineering level course and a strong background in science and math is recommended.

Students successfully completing Engineering Design may be able to earn COLLEGE CREDIT from the University of Minnesota, CSE 1511. Students should contact the course instructor for more information.

****This course meets the Arts Standard Requirement***

Principles of Engineering – Project Lead the Way F-3016, W-3017, S-3018

Grades: 10-11-12

Prerequisite: None

This full-year course is appropriate for students in grades 10-12. This course is more advanced than the Engineering Design course. The class exposes students to major concepts they'll encounter in a post-secondary engineering course of study. Topics include mechanisms, energy, statics, materials, and kinematics. They develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges, document their work, and communicate solutions. This course will follow the Project Lead the Way (PLTW) curriculum from the Principles of Engineering (POE) course which is a STEM (Science-Technology-Engineering-Math) course. It is a pre-college engineering level course and a strong background in science and math is recommended. ***Students successfully completing Principles of Engineering (POE) may be able to earn COLLEGE CREDIT from the University of Minnesota, CSE 1512. Students should contact the course instructor for more information.***

****This course meets the Arts Standard Requirement***

Fab Lab Essentials 3001

Grades: 9-10-11-12

Prerequisite: None

Suggested donation of \$30 to offset materials cost.

Explore the Fab Lab and learn how to create, design and produce various products. This course will be an introduction to the 2D, 3D and CNC controlled machines in the Fab Lab. Students will also be introduced to the design process and documentation used in engineering related fields. Students will be expected to complete rudimentary tasks necessary for basic operation of the Fab Lab equipment. Basic hands-on projects will be designed and created throughout the course to demonstrate mastery of the equipment operations.

Advanced Fab Lab 3002

Grades: 9-10-11-12

Prerequisite: Fab Lab Essentials

Suggested donation of \$30 to offset materials cost.

This course provides a more in-depth exploration of the hands-on resources for designing and fabricating smart systems, including CAD/CAM/CAE; CNC machining, 3D printing, injection molding, and laser cutting. This course also puts emphasis on learning how to use the tools as well as understanding how they work. Students will utilize the design process to develop a product from inception to working prototype. There will be a mentoring component as well requiring the student to communicate with a community expert of their choosing.

Fab Lab Mentorship 3003

Grades 10-11-12

Prerequisite: Fab Lab Essentials and/or Fab Lab How to Make Almost Anything

Students who have met the prerequisites have developed specific skills that can be utilized to mentor new students in the program. This course will also allow students to create, design and produce advanced independent projects while assisting the instructor and other students.

Fab Lab Production, Sale and Store 3004

Grades 10-11-12

Prerequisite: Fab Lab Essentials and/or Fab Lab How to Make Almost Anything

This course will allow students the opportunity to create, design and produce products. Additionally, students will develop business and entrepreneur skills by marketing their products in the school store.

Drone Construction, Modification and Flight 3005

Grades 10-11-12

Prerequisite: Fab Lab Essentials and/or Fab Lab How to Make Almost Anything

As the uses of drones continues to grow in society, this course will allow students to create and design their own drones through the use of our International Fabrication Lab and E3STEM program.

Advanced Drone Construction 3050

Grades 10-11-12

Prerequisite: Fab Lab Essentials and Drone Construction, Modification and Flight

The Advanced Drone Construction course builds on the skills developed in Drone Construction. This class will focus on building, modifying and flying brushless motored drones which are modified through student coding. Students will go beyond simply flying drones, learning the open firmware built into the drone, allowing for modifications through coding.

