Technology Education Program

Engineering and Technology

We live in a society that increasingly depends upon technology. Citizens who understand and are comfortable with the concepts and workings of modern technology will be better prepared for the workplace and better able to participate fully in society and in the global marketplace. Technology courses teach far more than the ability to use technological tools. Technologically literate citizens employ systems-oriented thinking as they interact with the technological world, cognizant of how such interaction affects individuals, our society, and the environment. Technological studies involve:

- · Designing, developing, and utilizing technological systems
- · Open-ended, problem-based design activities
- · Cognitive, manipulative, and effective learning strategies
- ·Applying technological knowledge and processes to real world experiences using up-to-date resources
- ·Working individually as well as in a team to solve problems

TECHNOLOGY			
Grade 9	**Grade 10**	**Grade 11**	**Grade 12**
Audio Systems	Architectural Design	Architectural Design	Architectural Design
Advanced Audio Systems	3D Printing/Computer Aided Drawing	3D Printing/Computer Aided Drawing	3D Printing/Computer Aided Drawing
Pre-Engineering (Rocket and Aircraft Design)	Audio Systems	Audio Systems	Audio Systems
Construction	Advanced Audio Systems	Advanced Audio Systems	Advanced Audio Systems
Design and Drawing for Production I	Pre-Engineering (Rocket and Aircraft Design)	Pre-Engineering (Rocket and Aircraft Design)	Pre-Engineering (Rocket and Aircraft Design)
Design and Drawing for Production II	Construction	Construction	Construction
Professional Photography and Video	Design and Drawing for Production I	Intro to Set Design	Intro to Set Design
Professional Photography and Video-Advanced	Design and Drawing for Production II	Design and Drawing for Production I	Advanced Set Design
Electricity/Electronics	Professional Photography and Video	Design and Drawing for Production II	Design and Drawing for Production I
Welding & Metalworking	Professional Photography and Video-Advanced	Professional Photography and Video	Design and Drawing for Production II
Robotics	Electricity/Electronics	Professional Photography and Video-Advanced	Professional Photography and Video
Woodworking	Welding & Metalworking	Electricity/Electronics	Professional Photography and Video-Advanced
Pre-Engineering	Robotics	Welding & Metalworking	Electricity/Electronics
	Trade Electricity and Plumbing	Robotics	Welding & Metalworking
	Engineering Technology	Trade Electricity and Plumbing	Robotics
	Woodworking	Engineering Technology	Trade Electricity and Plumbing
	Pre-Engineering	Woodworking	Engineering Technology
		Carpentry/Construction I	Woodworking
		Computer Repair Technician I	Carpentry/Construction I
		Pre-Engineering	Carpentry/Construction II
			Computer Repair Technician I
			Computer Repair Technician II
			Pre-Engineering

***All courses will be offered based on sufficient student enrollment.**

Architectural Design (10,11, 12)

Semester, 1/2 Cr.

Prerequisite: DDP1 and/or Recommendation of Technology Teacher

Course Description: This class introduces students to careers in: Architecture, Interior Design, Furniture Design, Industrial & Product Design, as well as Mechanical and Civil Engineering, The course begins with the basics of home design and progresses through an entire set of house plans that will include all floor plans, elevations, interior perspectives, 3D renderings, and site plans needed if the home was actually to be built. Students will also construct scale models of residential structures, be introduced to Architectural Revit, learn how to draw isometric cutaways, and discuss green construction and design in the modern world.

3 D Printing/Computer Aided Drawing (10,11, 12)

Semester, 1/2 Cr.

Prerequisite: DDP1 and/or Recommendation of Technology Teacher

Course Description: This class centers around the cutting edge technology of 3D printing. Students will use AutoCAD and Inventor to design and draw products and objects that can be printed using state-of-the-art 3D printers. Students, as individuals as well as in teams, will be tasked to create and design parts, and items that can be assembled and function in the physical world. Students will design, draw, and create 3D objects while they gain a greater understanding of constraints, physical properties of objects, and consumer wants and needs, as they function as engineers in order to produce a workable item that applies to the modern world.

Audio Systems (9, 10, 11, 12)

Semester, 1/2 Cr.

Course Description: This is a hands-on STEAM course involving the design and construction of audio systems. Students will be involved with projects and activities explaining how to design high-quality speakers. Students will also gain an understanding of basic electronics and component function. Activities at the beginning of the course provide the base knowledge for passive crossover circuits and enclosure design. Math and Science concepts are used to calculate the optimal crossover component values, enclosure volume, and enclosure dimensions. Students are exposed to basic woodworking methods and professional grade power tools. The course culminates with a final project where the students will build a 2-way bookshelf speaker of their own design.

Advanced Audio Systems (9, 10, 11, 12)

Semester, 1/2 Cr.

Prerequisite: Successful Completion Audio Systems w/ 85 or Better

Course Description: In Advanced Audio Systems, students will build upon the knowledge gained in the Audio Systems course. Students will be able to build their own small chip based digital amplifier that can be made into a small battery powered speaker box. Students will study the differences between analog and digital music formats as well as digital compression. We will apply higher level math and physics concepts to the design of an audiophile grade loudspeaker system. Tighter tolerances and greater design variables result in a more accurate end result. Students are no longer limited to the design of a 2-way sealed bookshelf speaker. Possible designs include: 3-way, bass-reflex, open-baffle, transmission line, horn loaded, or even powered subwoofers. Enclosure shape will be designed to have higher aesthetic value and acoustic characteristics. Students will use fine woodworking techniques for a flawless finished product. This course is designed as a capstone for the engineering student who has taken a variety of Technology Education electives as well as upper level Math and Science.

Pre-Engineering (Rocket and Aircraft Design)(9, 10, 11, 12)

Semester, 1/2 Cr.

Course Description: This course is designed for students who have an interest in engineering, flying, designing, and building. Projects and activities will concentrate on selected transportation systems that emphasize the transfer of energy, manipulation of power, and engineering of structures. This is a course designed for students to apply their acquired knowledge in the design and construction of transportation vehicles while reinforcing math and science concepts.

Construction (9, 10, 11, 12)
Semester, 1/2 Cr.
Course Description: Students will use the first portion of the class to construct a scale model residential structure as they learn how a home is built from the ground up. Topics covered will include foundations, framing, siding, and roofing. As the class continues, students will work in groups as they frame a section of wall and learn basic house wiring, plumbing, and sheet rocking. Students will be exposed to surveying, reading floor plans, and creating estimates. Students will participate in every phase of the construction process from planning to the completion of a building. This is a learning-by-doing course with 75% of the course time devoted to working on projects.

Intro to Set Design (11, 12)
Alt.1/2 Cr.
Course Description: This class introduces students to set design and construction. The focus of the class is on the design requirements of multiple scene settings for musicals, comedies, and dance. Students will explore theory of set design as they construct the sets for two school plays. The course will also introduce students to techniques of lighting, audio, and control booth operation.

Advanced Set Design (12)
Alt.1/2 Cr.
Prerequisite: Intro to Set Design
Course Description: This class is for students who have successfully completed the intro class. Students in the advanced class will take on lead roles in set design and theater operations. Students will continue to explore theory and expand .

Design and Drawing for Production I (9, 10, 11, 12) Semester, 1/2 Cr., Full Yr., Alternate Days, 1/2 Cr.
Students may use this course to satisfy 1/2 unit of the one unit art and/or music requirement.
Course Description: This course is designed for students who have an interest in the fields of: design, architecture, engineering, and entrepreneurship. It will provide the student with hands-on experience in mechanical drawing and drafting. Students will build skills in sketching, developing pictorial drawings, multi-view drawings, sectional drawings, and detail drawings. Students are encouraged to work on their own inventions, innovations, and to develop drawings for production, prototype building, and market analysis.

Design and Drawing for Production II (9, 10, 11, 12)
Semester, 1/2 Cr.
Prerequisite: Design and Drawing for Production I
Students may use this course to satisfy 1/2 unit of the one unit Art and/or Music requirement.
Course Description: This course builds on the skills learned in Design and Drawing for Production I and is a natural follow up course. Students in this course continue their study of isometric drawings, orthographic projections, and sectional drawings. Students will be introduced to architectural drawing, and creating floor plans. They will also create custom font designs, logo designs, and study color and texture as it applies to technical drawing.

Professional Photography and Video (9, 10, 11, 12) Semester, 1/2 Cr.,Full Yr., Alternate Days, 1/2 Cr.
Course Description: This is a course designed to expose students to the various components that make up the rapidly growing field of digital graphics. Emphasis will be placed on the exchange of ideas in a clear and concise manner using the technology which allows for communication. Among other topics, students will be exposed to digital photography, silk screening, logo design, Photoshop and digital video production. Projects will concentrate on the importance of visual images, the impact of sound, and the organization of ideas.
Professional Photography and Video-Advanced(9, 10,11,12) Semester, 1/2 Cr.,Full Yr., Alternate Days, 1/2 Cr.
Prerequisite: Professional Photography and Video
Course Description: This course is designed to allow students an opportunity to expand upon the skills acquired in Professional Photography and Video. Students will be encouraged to express their ideas with

hands-on projects employing different forms of digital technology. The course will be structured around digital photography, the production of short films, sound production, and poster design. Students will be encouraged to pursue areas of study they are interested in. Projects will be more detailed and will require the attention of dedicated individuals. There will be a strong emphasis upon the execution and presentation of work that meets professional standards which will help in preparing students for pursuing digital graphics technology careers in the future.

Electricity/Electronics (9, 10, 11, 12)
Semester, 1/2 Cr.
Course Description: Students will gain an understanding of the electrical and electronic devices that are used in our daily lives.Students will use various hand tools, machines and test equipment to explore how electricity works. Activities will include the building, testing and troubleshooting of circuits, the use of test equipment (meters and oscilloscopes), soldering, house wiring and small appliance repair. Student projects may include burglar alarms, metal detectors, sound generators, sound to light color organs, and FM wireless microphones. Students will also learn how to install electrical outlets, light fixtures, single-pole, 3-way and 4-way switches in a residential electrical system.

Welding & Metalworking (9, 10, 11, 12)
Semester, 1/2 Cr.
Course Description: Students will fabricate various projects using metals, woods, and plastics. This course allows students to work with a wide variety of tools and machines creating multiple projects. Students will learn metalworking skills such as: sheet metal work, oxy acetylene brazing, ARC welding, and MIG and TIG welding. Students will also be exposed to basic woodworking as well as other materials processes.

Robotics (9, 10, 11, 12)
Semester, 1/2 Cr.
Course Description: Students will design, build and program robots to perform various tasks. Several interclass competitions will take place throughout the semester. Robots are constructed from parts that are easily modified with small hand tools and controllers are programmed with a user friendly language. Those students considering careers in robotics, mechanical engineering, manufacturing engineering or electronic engineering are encouraged to take this course. Although not part of the course, students are encouraged to join the Sachem Robotics Competition Team. The team, called “AFTERSHOCK,” builds unique robots for regional and national competitions under the rules of FIRST (www.usfirst.org). FIRST is highly regarded by all engineering schools and offers over three million dollars in scholarship money to participants.

Trade Electricity and Plumbing (10, 11, 12) Full Yr., 1 Cr.
Course Description: This is a course designed for students who are interested in residential or commercial electricity and/or plumbing. Included will be an in-depth study of electrical theory, applied math, electrical planning and estimating. This course will cover all aspects of residential and commercial wiring including: conduit installation (EMT & PVC), conduit bending, basic motor controls, panel and meter installation, wire pulling, transformer installation, DC circuits, maintenance and repair, electric design and lighting. Plumbing topics covered will be: safety, tools, materials, equipment, procedures, planning and estimating of basic fixture installations or repairs.

Engineering Technology (10, 11, 12)
Semester, 1/2 Cr.
Course Description: This is a course for any student interested in pursuing careers in engineering, engineering technology, and the many related fields. Projects include, but are not limited to, boat building, trebuchet design, and material strength testing. Students research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors and ethics. Hands on projects will expose students to the broad and far reaching world of engineering. For students

in the Pre-Engineering sequence, this course allows for the completion of their student engineering portfolio as well as the creation and proposal of their final community-based engineering project. This is a required course for all students enrolled in the Pre-Engineering CTE sequence.

Woodworking (9, 10, 11, 12) Full Yr. 1 Cr.

Prerequisite: None

Course Description: This hands-on course is designed to give students an opportunity to develop the skills necessary to work with various woodworking tools and machines. Students may use machines including but not limited to: the table saw, radial arm saw, jointer, planer, scroll saw, lathe, and router. Throughout the year students will apply their newly learned technological knowledge to complete projects of their choice. Students will be able to utilize these new skills in their personal lives as well as in many rewarding careers.