

Technology and Engineering Education

We are living in a unique age, a time of unprecedented change brought about by technology. Because of this change the High School's technology department has evolved from an industrial-based, shop-oriented program to a laboratory-based program. Students are introduced to the world of modern technology using investigative, design and construct, and problem-solving approaches. Technology education is concerned with technical systems: their evolution, significance, techniques, resources and social and cultural impact. Structured courses offer students experiences which encourage individual creativity, exploration, methodical work habits, and skill development. The program recognizes the differences in goals and aptitudes among students, and provides opportunities to explore various fields of technology and areas of future employment. Courses in Technology and Engineering Education fulfill credits towards the STEM and fine and practical art graduation requirement.

Technology & Engineering Education

Tech Ed: Applications of Physics and Chemistry 1

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Credit may be received from either the Science Department or the Technology Education Department. This course is designed for students looking for an alternative to a full year of Chemistry or Physics. The course can be used to meet the STEM graduation requirement or the Fine/Practical Arts graduation requirement but not both.

Prerequisite: Biology and Earth Science.

Course Objectives: 1. To introduce students to basic principles of Physics and Chemistry such as physical and chemical changes, electricity and magnetism, simple machines, energy, forces and motion, and measurement. 2. To apply basic physical science concepts in the design, construction and testing of real world devices and/or products. 3. To promote and enhance general technological and scientific literacy. 4. To develop skills and qualities of effective workers such as positive interdependence, effective communication, individual accountability, self-management, leadership, creative thinking, and problem solving.

Description: Students will be exposed to physical science topics in a cooperative program between the Science and Technology Education departments. Topics focus on science concepts that can be applied to the students' experiences in everyday life. Learning will be facilitated through making connections between concrete applications and abstract concepts. An independent and collaborative research and experimentation as a student project-based, multi-sensory approach will address individual learning styles and facilitate the use of alternative assessments. Instruction will be activity centered and use a mix of whole class activities, large and small group presentations, cooperative learning, and individual projects. The course will be taught in a laboratory setting providing access to tools and materials for individual and collaborative projects. Tools will include hand tools for wood, metal, electronic, and simple chemical projects. Computers will be used for design, problem-solving, and research.

Expectations: Students will be asked to observe, investigate and problem solve in a small group setting. It is expected that students complete reading assignments, participate in class, research some topics, and use critical thinking skills in the development of their projects. Students should be prepared to display and explain various physical science concepts using "real world" examples.

Tech Ed: Applications of Physics and Chemistry 2

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Credit may be received from either the Science Department or the Technology Education Department. This course is designed for students looking for an alternative to a full year of Chemistry or Physics. The course can be used to meet the STEM graduation requirement or the Fine/Practical Arts graduation requirement but not both.

Prerequisite: Biology and Earth Science.

Course Objectives: 1. To introduce students to basic principles of Physics and Chemistry such as atomic structure, chemical reactions, acids and bases, waves, radioactivity, energy sources, electronics and computers. 2. To apply basic physical science concepts in the design, construction, and testing of real world devices and/or products. 3. To promote and enhance general technological and scientific literacy. 4. To develop skills and qualities of effective workers such as positive interdependence, effective communication, individual accountability, self-management, leadership, creative thinking, and problem solving.

Description: Students will be exposed to physical science topics in a cooperative program between the Science and Technology Education Departments. Topics focus on science concepts that can be applied to the students' experiences in everyday life. Learning will be facilitated through independent and collaborative research and experimentation as students make connections between concrete applications and abstract concepts. A project-based, multi-sensory approach will address individual learning styles and facilitate the use of alternative assessments. Instruction will be activity centered and use a mix of whole-class activities, large and small group presentations, cooperative learning, and individual projects. The course will be taught in a laboratory setting providing access to tools and materials for individual and collaborative projects. Tools will include hand tools for wood, metal, electronic, and simple chemical projects. Computers will be used for design, problem solving, and research.

Expectations: Students will be asked to observe, investigate and problem solve in a small group setting. It is expected that students complete reading assignments, participate in class, research some topics, and use critical thinking skills in the development of their projects. Students should be prepared to display and explain various physical science concepts using "real world" examples.

Tech Ed: [Architecture 1](#)

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Option to take for a full year or by semester for a maximum of 2 semesters.

Prerequisite: None

Course Objectives: 1. To gain an understanding of the history of Architecture and how it has influenced societies. 2. To apply design and engineering principles to residential construction while balancing form and function. 3. To develop skills to graphically and orally present ideas. 4. To gain a basic understanding of the REVIT CAD program. 5. To gain insight into the architectural engineering, construction, and design methods of modern house design.

Description: An introduction to the design history and construction of residential buildings. Students will study basic principles of residential building design and design processes including programming, site planning, design elements, and construction methods. Students will use REVIT, an architectural computer aided drafting program with state of the art applications. Instruction will be given to develop a solid foundation of two and three dimensional CADD skills. These skills will be applied to creating architectural plans, sections, and elevations according to professional drafting standards, techniques, and practices.

Expectations: Drawing assignments and projects will be completed in floor plans, elevations, renderings. Students will be able to discuss their work intelligently and will develop a portfolio of their work.

Tech Ed: [Architecture 2](#)

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 750

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Students can take this course multiple times

Prerequisite: Architecture 1

Course Objectives: 1. To successfully interview a client and assess their needs. 2. To demonstrate the ability to compromise with a client and clearly explain their house design. 3. To apply design and engineering principles to residential construction while balancing form and function. 4. To develop skills to graphically and orally present ideas. 5. To gain an in-depth understanding of the REVIT program. 6. To gain insight into the architectural engineering, construction, and design methods of modern house design. 7. To show understanding of current green and environmental building design.

Description: Students will go into more depth on the green construction and makeup of a home. The design project will demonstrate a student's understanding of form versus function as

it applies to building design such as room layout and location, and visual balance. Understanding of modern construction practices will also be evident in the design project.

Expectations: Students will complete assignments and a series of hands-on, researched based projects as assigned by the teacher. Oral, visual, and written presentations will be part of course work. A final packet consisting of a completed residential house design project will demonstrate the work done throughout the semester and may be used to apply to colleges in the fields of engineering, art, and architecture.

Tech Ed: CADD (Computer Aided Drafting and Design)

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Notes: This course was formerly known as Drafting. CADD will run every other year on odd graduation years i.e. 2026-2027

Prerequisite: None

Course Objectives: 1. To introduce the universal language of graphic communication with a main focus on mechanical engineering. 2. To learn computer aided drafting procedures so ideas and problem-solving solutions can be presented graphically. 3. To provide individual experiences to students using CAD stations. 4. To use CAD as a problem solving tool to create and manufacture solutions using computer aided manufacturing (3D printing and CNC milling). 5. To explore potential career opportunities in the area of CAD and mechanical engineering.

Description: This course will introduce students with the methods, procedures, and equipment used to present thoughts graphically using professional 3D computer aided drafting tools such as Autodesk Inventor. Students will learn the same standards of the drafting and design used by industry professionals. Students will learn the power of CAD by bringing their 3D geometric designs to life using equipment such as 3D printers and CNC (computer numeric controlled) machines.

Expectations: Drawings, assignments and projects will be completed such as sketches, 3D computer renderings, multiview drawings, and models. Students will be able to discuss and reflect on their work intelligently. Students will develop a portfolio to be presented at the end of the course.

Tech Ed: DIY (Do It Yourself)

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Prerequisite: None

Course Objectives: 1. Students will be prepared for successful independent life. 2. Students will gain confidence and knowledge to make educated decisions involving home repairs and automotive maintenance. 3. Students will learn to take responsibility for the care of their property.

Description: During this semester-long course, students will be exposed to and gain experience in maintaining a home and automobile. One marking period will be dedicated to automotive maintenance and troubleshooting while plumbing, electrical and home repair will be covered in the remaining marking period. Students will gain experience on a real car and be able to evaluate the condition of brakes, fluids, belts, tire pressure, and overall well being of the car. Students will gain experience in replacing bulbs, replacing windshield wipers, changing oil, changing a flat tire, properly adding fluids and jump starting a car. Students will gain an understanding of how an internal combustion engine works in order to help diagnose potential problems that a car may have. Students will learn what utilities on a home are, what they do, and how they enter the home. Students will locate main water, electrical, and furnace/boiler shut offs in their own home. Students will gain experience with repairing/replacing water supply pipes and lines, shut off valves, faucets, showers, toilets, as well as troubleshooting and repairing drainage and sewage line problems. Students will gain experience in testing, evaluating, repairing and replacing residential electrical outlets, single pole switches, 3-way switches, and light fixtures.

Expectations: Students will be expected to work within team structures, and individually to complete assignments, use equipment properly and safely, and participate in class and laboratory activities.

Tech Ed: Electronics

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Electronics will run every other year on even graduation years i.e. 2025-2026

Prerequisite: None

Course Objectives: 1. To teach students alternating and direct current applications. 2. To teach students basic understanding of electronic circuits. 3. To teach students the use of common electronic testing equipment. 4. To introduce students to concepts of integrated circuits.

Description: Students will be exposed to the theory of AC and DC circuits, to the theory and operation of basic testing equipment, and analog and digital applications. Practical laboratory experience is emphasized.

Expectations: Students will be expected to work within team structures, complete assignments, use equipment properly and safely, and participate in class and laboratory activities.

Tech Ed: Fundamentals of Engineering

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Prerequisite: None

Course Objectives: 1. To discuss and experiment in present and future technologies. 2. To learn steps in design and to use these steps in the creation of new products, techniques, and systems. 3. To understand how technology can be used to solve sophisticated problems and how it impacts our lives.

Description: The course includes discussion and experimentation in design, communications, production and manufacturing, and transportation systems. Typical topics will include robotics, computers, bio-engineering and alternative energy. Units include Communication, Energy and Power, Transportation, Manufacturing, and Bio Engineering.

Expectations: Students will be expected to work within team structures, complete assignments, use equipment properly and safely, and participate in class and laboratory activities.

Tech Ed: Independent Projects in Engineering

Open to Grades: 11, 12

Number of Semesters: 4

Number of Credits: 2.0

Level: 900

Type: Elective - **Partially Fulfills Fine/Practical Arts or STEM Requirement**

Notes: Class meets as a mini period (outside class hours required)

Prerequisite: None

Course Objectives: 1. To apply engineering principles to creatively and uniquely solve real world problems and challenges. 2. To gain an understanding of technology and engineering principles. 3. To think outside of the box and explore the world of engineering and design. 4. To learn the basics of sketching so ideas and problem solving skills can be presented graphically. 5. To effectively communicate both visually and orally, ideas and plans. 6. To gain experience using programs that are actually used in the engineering and design industries.

Description: During the first semester of the program (fall of each year) students will take a 0.5 credit class in "What is Engineering". This class will be an introduction to the field of engineering and technology in which the instructor will arrange for experts and engineers in the different areas of engineering to come into the class to speak about their fields. Each area of engineering will also have a small hands-on project involved with it giving the students an understanding of the occupation. The second half of the first year will be used to do research and choose a topic and area for their research. Students will also be taught about technical writing and problem solving strategies. Students will then spend the remainder of the time in the program completing their chosen long term project in the field of engineering or technology they are studying. Students are expected to take this course for two years.

Expectations: Students will be expected to complete a series of hands-on problem solving projects, engage a mentor and review current issues in the theories and area of their study, conduct progress meetings with instructor and class, present outcomes using multiple media to the program participants and school community, and complete a final large scale project based on the chosen engineering or technology field of study.

Tech Ed: Principles of Engineering

Open to grades: 9, 10, 11, 12

Number of semesters: 1

Number of credits: 0.5

Level: 750

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Notes: Students can take this course multiple times

Prerequisite: Fundamentals of Engineering

Course Objectives:

1. To discuss, experiment, and problem-solve in the present and future technologies. 2. To work within teams on long-term projects.

Description: This course is a continuation of the concepts and hands-on activities presented in Fundamentals of Engineering but on a more advanced level. It will include discussion and in-depth experimentation in the areas of manufacturing, robotics systems and CNC technologies.

Expectations: Students will be expected to work within team structures, keep a designer's log (engineering notebook), use equipment properly and safely, and participate in-class activities.

Tech Ed: Woodworking 1

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Prerequisite: None

Course Objectives: 1. To design and construct wood projects. 2. To use woodworking tools, machines, and materials. 3. To provide background experiences in the general area of woodworking. 4. To progress to more complex operations and in-depth understanding of woodworking.

Description: Woodworking deals with industrial tools, machines, processes, and materials. Students will be encouraged to learn basic tool and machine operations and to progress to more complex operations. Emphasis will be placed on safety and accepted industrial practices.

Expectations: Students will select and construct projects that show an understanding of good woodworking design and construction. Students will display growth and progress in the complexity of their projects.

Tech Ed: Woodworking 2

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 750

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Notes: Students can take this course multiple times

Prerequisite: Woodworking 1

Course Objectives: 1. To develop advanced skills use of woodworking tools and machines. 2. To make students more knowledgeable about the design and construction of woodworking hand tools and machinery. 3. To make students more aware, as consumers, of wood and wood products. 4. To acquaint students with job opportunities in woodworking.

Description: Through the projects chosen, the students develop knowledge of craftsmanship, proper work habits, and technical skills.

Expectations: Students will assume responsibility for selecting suitable projects. They will progress as rapidly as their individual abilities and interests will allow.

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