

Grade 8 Technology and Engineering

Technology and Engineering

Grade 8

Course Overview

The course is designed to gain advanced exposure to technology and the impact on modern society.

Scope and Sequence

Timeframe	Unit	Instructional Topics
10 Day(s)	Technology Overview	<ol style="list-style-type: none"> 1. Definition of Technology 2. Applications 3. Impact on Society 4. Famous Inventors
10 Day(s)	Transportation	<ol style="list-style-type: none"> 1. Land 2. Air 3. Water 4. Space
10 Day(s)	Engineering and Design	<ol style="list-style-type: none"> 1. Pencil and Paper Technical Drawing 2. Solidworks 3. Mastercam 4. Corel Draw X3 5. Laser Engraver 6. CNC Router
10 Day(s)	Manufacturing	<ol style="list-style-type: none"> 1. Safety 2. Woodworking
5 Day(s)	Overview of LCHS Technology/Engineering Courses	<ol style="list-style-type: none"> 1. Woodworking 2. Metals 3. Drafting 4. Other Courses
Ongoing	Literacy Integration	<ol style="list-style-type: none"> 1. Writing 2. Presentation 3. Speaking/Listening

Academic Vocabulary

Board Foot
 Kerf
 Rip
 Crosscut
 Joint
 Surface
 Grain
 Annular Rings
 Aris
 Corner
 Side
 End
 Edge

Materials and Resources

Pencil
 Notebook
 3 ring binder

Supportive teacher materials can be found in the classroom or shop.

Course Details

UNIT: Technology Overview -- 10 Day(s)

Description

Students will learn to identify how technology impacts our daily lives.

TOPIC: Definition of Technology [Ongoing]

Description

Technology is the use of knowledge, skills, tools and abilities to solve practical problems and extend human capabilities.

Learning Targets

Differentiate between the specific pieces associated with the definition of technology.

Technology is the use of knowledge, skills, tools, and abilities to solve practical problems and extend human capabilities.

Students will break the definition down and explain how each of the four areas help us solve problems and why that extends our capabilities.

TOPIC: Applications [Ongoing]

Description

Students discuss various technological advancements and how they can be used to develop future technologies.

Learning Targets

Describe the evolution of modern tools and machines

Students learn how complex modern tools and machines have evolved from simple stone tools used by early man.

TOPIC: Impact on Society [Ongoing]

Description

Students compare and contrast the impact of various inventions on society and hypothesize about what future technologies may be invented.

Learning Targets

Analyze the positive and negative impacts of a given invention

TOPIC: Famous Inventors [Ongoing]

Description

Students will conduct research utilizing the library and online sources to create a multimedia presentation on a given inventor.

Learning Targets

Create a multimedia presentation to showcase an inventor's impact on technology and engineering.

Power Point
Movie Maker
Webpage

UNIT: Transportation -- 10 Day(s)

Description

Transportation is essential to modern society. Without an efficient means of transporting people, goods, and materials modern society would not exist in the way we know it.

Academic Vocabulary

Ailerons
Flaps
Airfoil
Aerodynamics
Rudder
Lift
Thrust
Drag
Gravity
Horizontal Stabilizer
Vertical Stabilizer

Elevator
Transoceanic
Inland Waterway
Apollo
Gemini
Mercury
Space Shuttle
Ares Rocket
Redstone Rocket
Interstate
Highway
Barge

TOPIC: Land [Ongoing]

Description

Students will learn how people, goods, and materials are moved across land.

Learning Targets

Describe types of land transportation and the impact on their life.

TOPIC: Air [Ongoing]

Description

Students will learn how people, materials, and goods are transported in the air. Students will use flight simulation software in order to better understand how an airplane flies and the various forces acting upon it.

Learning Targets

Describe and identify airplane parts and controls

Explain why and airplane flies related to Newton's laws and Bernoulli's venturi experiment.

Navigate from one airport to another using pilotage and radio navigation of Microsoft flight Simulator.

Student will learn to use Pilotage, GPS, VOR, and NDB navigation to fly from one airport to another. They will use the plan that they developed using the sectional charts and other instruments to complete the trip.
Use a sectional chart and other resources to plan a trip from one airport to another.

TOPIC: Water [Ongoing]

Description

Students will learn how people, goods, and materials are moved across water. This includes inland waterways and transoceanic.

Learning Targets

Describe types of water transportation and the impact on their life

TOPIC: Space [Ongoing]

Description

Students will learn how people, goods, and materials are move through space.

Learning Targets

Describe types of space transportation and the impact on their life.

List the parts of a rocket and describe their function

UNIT: Engineering and Design -- 10 Day(s)

Description

Students learn to use Solidworks, MasterCam, and Corel Draw X3 to create drawings and parts to be cut out on the CNC Routers and Laser Engraver.

Academic Vocabulary

1. X, Y, Z coordinates
2. Vector

3. G-Code
4. Post-Processor
5. CNC (Computer Numerical Control)
6. CAM (Computer Aided Manufacturing)

Materials and Resources

Wood
Engraving Materials
Paper
Pencil
Internet

TOPIC: Pencil and Paper Technical Drawing -- 2 Day(s)

Description

Students create drawings and sketches using a variety of drafting tools.

Learning Targets

Demonstrate the use of various drafting tools.

Students will use a variety of hand drafting tools to create technical drawings.

Describe and utilize the appropriate line types and weights while drawing.

Drafters use different types and weights of lines in order to show detail on a drawing. Students learn to recognize various line types and use them to create technical drawings.

Draw the top, front, and side views of a three dimensional object

Students will learn to draw a three-dimensional object in two-dimensions by creating a three-view drawing. Three view drawings are used in a variety of different disciplines.

TOPIC: Solidworks -- 3 Day(s)

Description

Students will use Solidworks computer program to create both 2-D and 3-D technical drawings.

Learning Targets

Create a three dimensional drawing of a selected object using the program.

Students learn how to use Solidworks to create technical drawings in a three-dimensional environment.

Create a three view drawing using the program

Students will create two-dimensional technical drawings

Describe the function of various icons and demonstrate their use.

Students will be assigned specific drawings that will focus on certain features of the computer program. By completing the assigned drawing students will demonstrate the use of certain features.

TOPIC: Mastercam -- 3 Day(s)

Description

Mastercam is a program used for designing parts and programming a CNC machine. It is commonly found in industry.

Learning Targets

Create a contour toolpath

A contour toolpath is used to tell the machine to follow a line or series of lines.

Create a pocket toolpath

Pocketing toolpaths are used to remove material in a given location

Create an accurate drawing using the CAD functions of Mastercam

Students learn to create technical drawings using Mastercam. These drawings are then used to write CNC programs to run CNC machines.

Describe the vocabulary terms associated with CNC programming

CNC programming has a variety of technical terms associated with it. It is imperative that students understand the terms in order for them to understand how to use the machine.

Describe the proper use of the CNC router and the associated safety precautions

TOPIC: Corel Draw X3 -- 1 Day(s)

Description

Corel draw allows students to create drawings and designs on a computer that can be laser engraved.

Learning Targets

Demonstrate how to import clip art and convert it to a usable image

Students learn to convert clipart to a bitmap and make the changes appropriate to laser engraving.

Demonstrate the use of the program to create a design

Students will learn basic commands and features that will allow them to create a design to be used on the laser engraver.

TOPIC: Laser Engraver -- 1 Day(s)

Description

Students learn the basic concepts of using a laser engraver

Learning Targets

Demonstrate the ability to properly set up the laser engraver and the print setup portion of Corel Draw.

Students learn how to properly set-up the laser for project specific applications. These applications include raster and vector cutting. We also discuss how to adjust the laser for cutting various materials such as wood, glass, leather, lexan, and various others.

Demonstrate the laser engraving process on a useful product

Students design a product to be laser engraved given specific criteria.

Describe the proper and safe use of the laser engraver

The laser engraver has a number of hazards associated with it if not used correctly. Students gain a working knowledge of these hazards and learn how to use the machine safely.

TOPIC: CNC Router -- 1 Day(s)

Description

Students will gain hands on experience learning basic CNC programming and processes

Learning Targets

Demonstrate the procedure for zeroing the axes of the CNC router

Demonstrate the proper way to open a cnc program.

Describe the proper use of the CNC router and the associated safety precautions

UNIT: Manufacturing -- 10 Day(s)

Description

Students will utilize tools in the woodworking shop to create a useful project. Safety and proper use of tools and equipment will be stressed throughout the unit.

Materials and Resources

Wood

Screws

Glue

Nails

Various determined by project

TOPIC: Safety -- 10 Day(s)

Description

Students will be introduced various woodworking tools and machines. They will learn the correct and safe operation practices associated with each machine. Each student must pass a written knowledge test with 100% and demonstrate the safe operation of each tool to be used in the woodworking lab.

Learning Targets

Demonstrate and safely use portable and stationary woodworking power tools.

Students will pass with 100% accuracy the power tool safety test and they will demonstrate the their use in a safe

manner.

Demonstrate safe use of hand tools

Students will pass with 100% accuracy the safety rules for the woods lab and use the tools correctly.
Demonstrate the safe use of CNC equipment and Laser Engraver

Students will pass with 100% accuracy the safety test and will use them in a safe manner.

TOPIC: Woodworking -- 0 Day(s)

Description

Students will build a useful project using various hand and power tools in the woodworking lab.

Learning Targets

Describe and follow the proper sequence when squaring up a board.

Students will use the woodworking tools and equipment to machine a rough sawn board to a finished product by following the proper sequence.

Describe the procedure for applying woodworking finishes

Students will learn how to apply penetrating and non penetrating finishes with brushes and spray guns.

Identify and use adhesives to construct a useful project

Students will learn how to use various types of adhesives to fasten together materials.

Identify and use various fasteners to construct a useful project

Students will use screws, nails, brads, and a variety of other fasteners to assemble a useful project.

Identify different types of common woodworking joints and their uses

Students will learn how to identify various woodworking joints and where they are commonly used. In addition they will create simple joints when constructing a useful project.

UNIT: Overview of LCHS Technology/Engineering Courses -- 5 Day(s)

Description

Students have the opportunity to take Technology and Engineering courses as electives in 9th grade. This unit is intended as a preview to these courses.

TOPIC: Woodworking -- 0 Day(s)

Learning Targets

Describe briefly what a student will learn and what projects are made in Manufacturing

Describe briefly what a student will learn and what projects are made in Woods 1

Describe briefly what a student will learn and what projects are made in Transportation

TOPIC: Metals -- 0 Day(s)

Learning Targets

Describe briefly what a student will learn and what projects are made in Metals 1

Describe briefly what a student will learn and what projects are made in Metals 2

TOPIC: Drafting -- 0 Day(s)

Learning Targets

Describe briefly what a student will learn and what projects are made in Architectural Drafting 1

Describe briefly what a student will learn and what projects are made in Architectural Drafting 2

Describe briefly what a student will learn and what projects are made in Mechanical Drafting 1

Describe briefly what a student will learn and what projects are made in Mechanical Drafting 2

TOPIC: Other Courses -- 0 Day(s)

Learning Targets

Describe briefly what a student will learn and what projects are made in Building Construction

Describe briefly what a student will learn and what projects are made in Communication Technology

Describe briefly what a student will learn and what projects are made in Materials and Processes

Describe briefly what a student will learn and what projects are made in Transportation

UNIT: Literacy Integration -- Ongoing

TOPIC: Writing [Ongoing]

Learning Targets

Locate and review an article/career of choice dealing with technology and engineering today.

TOPIC: Presentation [Ongoing]

Learning Targets

Conduct research, organize ideas and present using a multimedia format

TOPIC: Speaking/Listening [Ongoing]

Learning Targets

Actively participate in large and small group discussions.