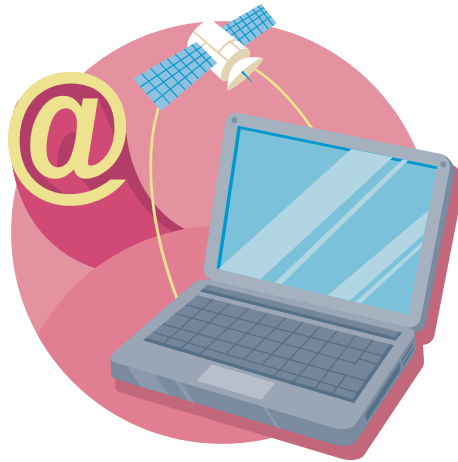


Technology Education Curriculum Guide Grades 6-12



Littleton Public Schools
5776 S. Crocker St.
Littleton, CO 80120
303-347-3300

Acknowledgements

Technology Education

Curriculum Revision Writing Team

Travis Ammonson	Goddard Middle School
Marc Finer	Newton Middle School
Mark Loptien	Arapahoe High School
David McMullen	Arapahoe High School
Pam Wilkins	Littleton High School

Mimi Leonard
Coordinator, Career and Technical Education

Susan Dalton
Coordinator, Curriculum

Mollie McDonald
Director of Curriculum, Instruction, and Assessment

Technology Education Philosophical Assumptions

Technology education is the application of technology, innovation, and design through the integration of STEM (the concepts of science, technology, engineering, and mathematics) in order to solve real world problems.

The Littleton Public Schools technology education curriculum provides students with concrete, hands-on learning experiences in a laboratory environment. These experiences will involve critical and creative thinking activities that require planning, designing, building, and testing.

The technology education curriculum will develop independent, self-directed and life-long learners who will:

- apply tools, machines, materials, and processes safely and efficiently
- gain knowledge and skills related to diverse technological systems, including functions and applications
- understand the nature and impact of technology
- solve problems using a systems approach, higher-level thinking skills, collaboration, ingenuity, and resources
- apply and integrate concepts and skills learned in other curricular areas
- discover and develop personal interests, talents, and abilities related to technology
- explore post-secondary opportunities and careers related to science, technology, engineering and math

TABLE OF CONTENTS

Philosophical Assumptions

Middle School

Modular Lab	5
Production Lab	12

High School

Design Projects	18
Digital Photography	20
Woodworking.....	22
Technology Studies	24
Animation 1	25
Animation 2	26
Architecture 1	27
Architecture 2	28
Computer Aided Design and Drafting 1 (CADD 1)	29
Computer Aided Design and Drafting 2 (CADD 2)	30
Communications 1	31
Communications 2	32
Graphic Design 1	33
Graphic Design 2	34
Manufacturing 1	35
Manufacturing 2	36
Robotics 1	37
Robotics 2	38
Web Design 1	39
Web Design 2.....	40

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MODULAR LAB MIDDLE SCHOOL

Essential Learning

Apply mathematical concepts through hands-on project-based experiences

Learner Objectives

The learner will...

- effectively apply formulas and procedures for problem solving purposes
- select and apply mathematical concept(s) appropriate for the area of study:
 - write numerical code using x, y and z axis
 - use formulas to calculate wing span and chord
 - calculate lift and drag using software and a wind tunnel
 - effectively calculate engineering efficiency
 - use CAD software to create models depicting area and perimeter
 - calculate electrical principles using current, voltage, and watts
 - incorporate timelines for linear editing

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Understand and apply technology

Learner Objectives

The learner will...

- apply problem solving method:
 - understand the problem, gather information, design solution, construct, test and evaluate, redesign, communicate
- incorporate systems model:
 - input, process, output, feedback
- identify careers where materials, processes, and skills are used in the 21st century market place
- develop an awareness and understanding regarding the benefits and consequences of technology

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Categorize and differentiate between the areas of technology: manufacturing, construction, communications, biotechnology, transportation, power and energy

Learner Objectives

The learner will...

- categorize specific elements related to each area of technology
- understand how various technology areas overlap

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Read, write, and interpret directions. Apply organizational, listening, and cooperative learning skills

Learner Objectives

The learner will...

- formulate, implement and follow a plan or procedure to produce a final project
- create sketches or technical plan using proper layout procedures
- apply organizational and listening skills to complete a task or problem

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Demonstrate an understanding and usage of tools, machines and materials

Learner Objectives

The learner will...

- review tool and machine operation and safety procedures
- use necessary machine, tool and/or material to correctly perform/solve a given task

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Formulate and apply the design process

Learner Objectives

The learner will...

- identify each activity that applies the design process
- create thumbnail, rough and final sketch resulting in a working drawing from which a product can be constructed

MODULAR LAB MIDDLE SCHOOL

Essential Learning

Become effective problem solvers and have the ability to make practical decisions

Learner Objectives

The learner will...

- show understanding of the problem to be solved
- effectively apply the problem solving method
- explore alternative solutions to problems previously addressed

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Apply mathematical concepts (measurement, fractions, like denominators, angles) through hands-on project-based experiences

Learner Objectives

The learner will...

- identify all measurements on a ruler and measure within a 16th of an inch tolerance
- identify angles
- simplify, convert, and manipulate fractions
- estimate distances and measurements for layout
- identify geometric math concepts such as diameter and radius
- calculate amount and cost of materials

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Categorize and differentiate between the six areas of technology: manufacturing, construction, communications, biotechnology, transportation, power and energy

Learner Objectives

The learner will...

- categorize specific elements related to each area of technology
- understand how various technology areas overlap

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Read, write, and interpret directions. Apply organizational, listening, and cooperative learning skills

Learner Objectives

The learner will...

- formulate, implement and follow a plan or procedure to produce a final project
- create sketches or technical plan using proper layout procedures
- apply organizational and listening skills to complete a task or assignment

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Demonstrate skills for safe and proper usage of tools and materials

Learner Objectives

The learner will...

- review tool and machine operation and safety procedures
- participate in safety demonstrations
- demonstrate proficiency on required safety tests
- use necessary machine, tool and/or material to correctly perform a given task

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Formulate and apply the design process

Learner Objectives

The learner will...

- identify each part of the activity as it applies to the design process
- create thumbnail, rough and final sketch resulting in a working drawing from which a product can be constructed

PRODUCTION LAB MIDDLE SCHOOL

Essential Learning

Become effective problem solvers and have the ability to make practical decisions

Learner Objectives

The learner will...

- show understanding of the problem to be solved
- effectively apply the problem solving method
- explore alternative solutions to problems previously addressed

DESIGN PROJECTS HIGH SCHOOL

Essential Learnings

- *identify, understand, develop and apply a plan or procedure*
- *identify, discuss and review a proposed idea*
- *brainstorm, sketch and evaluate design concepts*
- *analyze, revise and develop final design concept*
- *create and construct the final design concept*
- *apply math, science and engineering principles to test and evaluate design*
- *examine and appraise the design results*

DESIGN PROJECTS HIGH SCHOOL

Learner Objectives

The learner will...

- design a plan through the use of a sketch or drawing
- demonstrate proper safety practices
- build project to design specifications
- implement testing procedures to enhance design
- perform mathematical calculations
- problem solve design flaws for a given project
- work in a team environment

DIGITAL PHOTOGRAPHY HIGH SCHOOL

Essential Learnings

- *use a wide range of vocabulary related to the field of photography*
- *create an awareness of the processes and uses in digital photography*
- *practice safety and care in the use of digital photography equipment*
- *develop an understanding of the various styles and types of digital cameras*
- *gain experience and demonstrate skills in the use of digital photography equipment*
- *develop skills in manipulating and enhancing digital photographs through digital editing software*

DIGITAL PHOTOGRAPHY HIGH SCHOOL

Learner Objectives

The learner will...

- discuss law and ethics as it relates to digital photography and the internet
- understand the history and importance of photography
- describe the terminology and processes that digital cameras use to capture images: pixels, resolution, CCD and CMOS sensors, and exposure
- demonstrate the proper use of functions and settings of a digital camera such as aperture, shutter speed, zoom, white balance, and ISO
- employ classic photography techniques such as stop-action, back lighting, close-ups, and abstract shapes
- illustrate the basic photographic composition elements of shapes, lines, balance, lighting, depth, focus, and rule of thirds
- experiment with digital editing software for color correction, layer enhancements, blend modes, levels, cropping, and special effects
- select the proper color mode setting between RGB and CMYK
- set the correct DPI setting for output
- prepare and save images for output including print, slide show, or web
- critique and analyze personal, peer, and professional photographs

WOODWORKING HIGH SCHOOL

Essential Learnings

- *identify, understand, develop, and apply a plan or procedure*
- *develop basic hand and machine tool skills*
- *develop an awareness of and practice safe working habits*
- *identify, compare, and work with a variety of wood species*
- *identify, understand, and use different types of woodwork*
- *apply the design process to a woodworking project*
- *create and/or interpret working drawings, cutting diagrams, and material lists*
- *learn and utilize a variety of woodworking processes including cutting, gluing, clamping, and finishing*
- *develop an appreciation for and practice of quality craftsmanship*

WOODWORKING HIGH SCHOOL

Learner Objectives The learner will...

- exhibit proper safety practices and attitudes
- demonstrate basic woodworking machine and hand tool usage
- identify a variety of wood species and their uses
- read and interpret a project plan or blueprint
- develop a plan or procedure for a given project
- compute the cost of materials for a given project
- understand measurement and mathematical concepts as related to woodworking layout
- build a woodworking project according to a set of project plans
- design and build a woodworking project
- make rip cuts, crosscuts, dados, rabbets, and grooves using the correct machine and process
- incorporate a variety of fastening systems
- demonstrate advanced woodworking machine processes
- explore the use of alternative materials in woodworking projects
- use proper methods and materials for assembly
- prepare material surfaces for finishing
- understand and use basic furniture making processes
- demonstrate understanding and use of wood finishing types and techniques

TECHNOLOGY STUDIES HIGH SCHOOL

Essential Learning

- *understand, apply and evaluate the design process*
- *locate, follow and interpret instructional materials*
- *understand and apply technological skills as related to industry*
- *identify, demonstrate and evaluate effective problem solving and critical thinking skills*
- *develop, manage and apply technical reading skills*
- *relate and expand expectations for growth*

TECHNOLOGY STUDIES HIGH SCHOOL

Animation 1

Learner Objectives

The learner will...

- understand the basics of animation history
- develop and apply three major components of animation: reusable actions, communication and personality
- develop and apply the animation interactions, kinematic constraints, compensation and sound effects
- create animation of dialog and use of secondary actions
- create modeling of an animated object or character

TECHNOLOGY STUDIES HIGH SCHOOL

Animation 2

Learner Objectives

The learner will...

- model a mechanical object so it can be modified
- model an organic object with multiple parts
- model a human-like character
- create reusable poses through the addition of skeleton and control points
- understand and apply materials, attributes, particle systems and secondary actions in an animation
- understand the use of dynamic effects

TECHNOLOGY STUDIES HIGH SCHOOL

Architecture 1

Learner Objectives The learner will...

- use and apply basic drawing tools
- design a basic floor plan layout of a single family home
- use fixtures, cabinets, symbols and labeling for effective floor plan designs
- use dimension drawings
- develop a foundation drawing
- create and understand various roof designs, styles, framing and multiple floor roofs
- create elevations for various roof designs
- identify and compare exterior surfaces for the different elevations

TECHNOLOGY STUDIES HIGH SCHOOL

Architecture 2

Learner Objectives The learner will...

- draw a wall section detail drawing
- understand the construction process and the use of construction materials
- understand the basic concepts of architectural scaling and foundation construction
- understand the basic concepts of floor construction, door and window framing and exterior materials
- understand the basic concepts of roof construction and materials
- construct an architectural model
- recognize and illustrate the sections of architectural model

TECHNOLOGY STUDIES HIGH SCHOOL

Computer Aided Design and Drafting 1

Learner Objectives The learner will...

- understand sketching of orthographic projections and proper use of title blocks
- understand and apply drawing tools for computer sketches and dimensioning
- use and apply drawing features
- compare patterns and surfaces
- apply equations to design
- determine form, fit and function of a design through the use of rapid prototyping

TECHNOLOGY STUDIES HIGH SCHOOL

Computer Aided Design and Drafting 2

Learner Objectives

The learner will...

- compare casting and forging
- understand and create designs using symmetry, thin features and mirroring
- demonstrate shelling, drafts, ribs and how they apply to injection molding
- illustrate reference planes, offset entities and convert entities
- perform stress analysis on designs

TECHNOLOGY STUDIES HIGH SCHOOL

Communications 1

Learner Objectives The learner will...

- identify copyright issues
- manage video clips
- organize and plan a video sequence through the use of storyboarding
- create and film an original sequence of a production
- identify audience, purpose and goals
- identify shot techniques
- understand the digital video workflow
- assemble music to enhance a story
- analyze, evaluate and re-develop an original production

TECHNOLOGY STUDIES HIGH SCHOOL

Communications 2

Learner Objectives The learner will...

- create a project plan, with milestones and roles
- indentify client needs and goals
- consider the technical and design impact of the project
- gather content and synthesize ideas for the project
- review and revise production
- conduct a peer review
- experiment and apply technical skills related to editing software
- develop a DVD portfolio and presentation for a higher education program or potential employer

TECHNOLOGY STUDIES HIGH SCHOOL

Graphic Design 1

Learner Objectives The learner will...

- understand and identify copyright issues
- select and demonstrate basic drawing tools
- understand the difference between bitmap and vector images
- select and manipulate graphics
- demonstrate how to crop an image using shapes or text
- illustrate how to fill and add effects to objects
- demonstrate the application of composition, contrast and balance
- construct and modify existing artwork
- understand the use and application of typography

TECHNOLOGY STUDIES HIGH SCHOOL

Graphic Design 2

Learner Objectives

The learner will...

- understand various graphic types:
 - displays
 - packaging
 - signage
 - print mediums
- understand and apply the processes of sublimation, laser engraving and vinyl printing
- review and redesign graphic images
- plan and edit graphics based on the needs of the audience
- apply the rule of thirds to create visual impact
- apply existing knowledge to generate new ideas and products and create original works

TECHNOLOGY STUDIES HIGH SCHOOL

Manufacturing 1

Learner Objectives

The learner will...

- design a product for manufacture on the CNC Lathe
- create a prototype using the rapid prototyping machine
- manufacture the designed product using the CNC Lathe
- design a product for manufacture on the CNC Mill
- manufacture the designed product using the CNC Mill
- create a die mold using the CNC Mill
- understand the basics of the injection molding process
- safely operate CNC machines and Injection molding equipment

TECHNOLOGY STUDIES HIGH SCHOOL

Manufacturing 2

Learner Objectives

The learner will...

- describe the structure of the CNC programming language and CNC program
- explain the function and operation of G and M codes
- understand the main factors that influence tool size selection
- understand and be able to work with tooling offsets and the PRZ (zero)
- employ the three different techniques for locating the edge of a part
- interpret the function and operation of the circular interpolation
- differentiate the function and operation of direct radius specification
- design a CNC mill program using circular and linear interpolation
- properly execute the mirroring command to create subprograms

TECHNOLOGY STUDIES HIGH SCHOOL

Robotics 1 (Robo 1)

Learner Objectives The learner will...

- examine the fundamentals of robotics
- program a robot
- understand industrial applications of manufacturing cells
- classify the role of robots in manufacturing

TECHNOLOGY STUDIES HIGH SCHOOL

Robotics 2

Learner Objectives

The learner will...

- understand the basic operation of an industrial robot
- demonstrate pendant programming
- demonstrate PC software programming for robots
- apply a program for a manufacturing setting
- design and assemble flexible manufacturing cells
- evaluate quality and production control

TECHNOLOGY STUDIES HIGH SCHOOL

Web Design 1

Learner Objectives

The learner will...

- understand the graphical user interface, define site, format web page template and add text to web pages
- insert and manage graphics, buttons and animations
- construct web pages using tracing images and table layouts
- import, sort, export and modify tabular data
- explain the purpose and use of a site panel and site management
- develop an original website for a client given specific criteria

TECHNOLOGY STUDIES HIGH SCHOOL

Web Design 2

Learner Objectives The learner will...

- construct and modify a web page form
- reproduce and prepare a web page template
- illustrate and create style sheets
- define and compose absolute positioning layouts
- create interactive image maps
- design and compare navigation bars