PUBLIC SCHOOLS OF EDISON TOWNSHIP

OFFICE OF CURRICULUM AND INSTRUCTION

Technology Education

Length of Course:	Term
Elective/Required:	Elective
Schools:	Middle School
Eligibility:	Tech Ed 6 - Grade 6 Tech Ed 7 - Grade 7 Tech Ed 8 - Grade 8
Credit Value:	5 Credits
Date Approved:	August 17, 2021

TABLE OF CONTENTS

Course Description

Technology Education is a subject that provides students with a critical lens for interpreting the world around them. This course provides students with an opportunity for creative problem solving and an experience that will be useful in making informed and meaningful decisions. Students will use a variety of digital and physical tools to assist them in the creation of their designs. Program goals include understanding systems, building critical thinking skills, embracing failure as part of the design process, and developing and communicating solutions with others.

Units Of Study

Unit	Focus
1: Technology Literacy	Computing, problem solving, design process
2: Static Systems	Shop/classroom safety, structural design
3: Transportation Systems	Vehicles, product impact
4: Manufacturing Systems	Product development, optimization, innovation

Unit 1: TECHNOLOGY LITERACY

Targeted Standards	9.4.8.CI.4, 9.4.8.IML.3, 9.4.8.IML.12, 9.4.8.TL.3 8.2.8.ED.2, 8.2.8.ED.5, 8.2.8.ED.6, 8.2.8.ITH.1, 8.2.8.ITH.5, 8.2.8.ETW.2, 8.2.8.EC.1, 8.2.8.EC.2
Unit Objectives/ Conceptual Understandings	*Students will be able to...* ● Analyze system resources and components. ● Use relevant tools to share information, including drafting. ● Identify the steps of the design process. ● Discuss the potential for technology to help or to harm.
Essential Questions	● How do you choose the best tool for the task at hand? ● Why is the design process useful? ● Is technology always a “good thing”? ● Will technology ever stop advancing?
Unit Assessment	Students publish a document with a given focus. Students demonstrate understanding with a summative assessment.

Core Content Objectives		**Instructional Action**	
Concepts What students will know	**Skills** What students will be able to do	**Activities/Strategies** Technology Implementation Interdisciplinary Connections	**Assessment Check Points**
Understanding systems Relevance of content tools The Design Process Ethical Technology	Identify input, process, and output within a given system. Select and use appropriate tools effectively Identify the steps of the Design Process. Create technical drawings.	Label system components (ie computer hardware) Desktop publishing project(s) (typing, online searching, file management, word processing, slideshow, data processing/analysis, drawing/drafting/modeling) Design Process discussion / guided activity (ie PB&J procedure videos) Ethics discussion / guided activity (intellectual property, sustainability, cultural impact, health impact, etc.) Visual perception and drawing exercises (can be combined with other activities)	Class discussions Check-ins (mc, sa) Project rubrics Engineer Notebook

Resources *Essential materials, supplementary materials, links to best practice*	**Instructional Adjustments** *Modifications, student difficulties, possible misunderstandings*
TypingClub.com G-Suite (Search, Drive, Docs, Slides, Sheets, Drawings…) 3D modeling software (Onshape, Vectary, Sketchup, etc) Graph paper (various types) Audio/Video tools (Screencastify, Loom, FlipGrid, etc.) Exact Instructions Challenge videos	Appropriate accommodations and/or modifications as determined by 504s and IEPs: shortened assignments, extended time, copy of class notes or access to notes on Chromebook, preferential seating, oral reminders, etc. Ask students to restate information, directions, and assignments. Desktop computers have at least two power buttons - one for the monitor and one for the “computer” itself. Both must be powered on for the system to function properly. Asking full sentence questions is not an effective search strategy. Software is designed to work best for a certain purpose. Spreadsheets are not a good tool for writing essays.

Unit 2: STATIC SYSTEMS

Targeted Standards	8.2.8 ED.1, 8.2.8 ED.2, 8.2.8 ED.3, 8.2.8.ED.5, 8.2.8.ED.7, 8.2.8.ITH.3, 8.2.8.NT.1, 8.2.8.NT.3, 8.2.8.ETW.2
Unit Objectives/ Conceptual Understandings	*Students will be able to...* ● Demonstrate the proper use and maintenance of tools. ● Identify civil engineering terms, concepts, and techniques. ● Design a product to address a real-world problem and document the process, including constraints and trade-offs. ● Analyze the impact of modifying resources in a product or system.
Essential Questions	● How do you choose the best physical tool? ● Why is safety important? ● What role does optimization play in engineering?
Unit Assessment	Students design and document the construction of a stationary object. Students demonstrate understanding with a summative assessment.

Core Content Objectives		**Instructional Action**	
Concepts What students will know	**Skills** What students will be able to do	**Activities/Strategies** Technology Implementation Interdisciplinary Connections	**Assessment Check Points**
Understanding tools Civil Engineering concepts The Design Process Structural Systems	Select and use appropriate tools effectively and safely Read a ruler to the 1/16” of an inch Analyze the impact of modifying resources in a system. Use structural systems to solve real world problems Define, utilize, and evaluate structural systems	Label tool components Demonstrate the correct use of tools (including ruler) Structural systems design and construction projects (see appendix for suggestions)	Safety Assessment(s) (shop, machine, etc) Class discussions Check-ins (mc, sa) Project rubrics Engineer Notebook
Resources *Essential materials, supplementary materials, links to best practice* Ruler Use Handbook Graph paper (various types) Balsa wood (various sizes) Wood glue (and other adhesives) Fasteners (nails and screws, various sizes)		**Instructional Adjustments** *Modifications, student difficulties, possible misunderstandings* Appropriate accommodations and/or modifications as determined by 504s and IEPs: shortened assignments, extended time, copy of class notes or access to notes on Chromebook, preferential seating, oral reminders, etc. Ask students to restate information, directions, and assignments.	

Hand tools (hand saws, hammers, drivers, etc.) Power tools (drivers, drill press, belt sander, etc as available and needed) 3D modeling software	When is and is not appropriate to wear gloves. Safety goggles are always required when working with tools. Not all saws function the same. A static structure can experience dynamic load.

Unit 3: TRANSPORTATION SYSTEMS

Targeted Standards	8.2.8.ED.3, 8.2.8.ED.7, 8.2.8.ITH.1, 8.2.8.ITH.2, 8.2.8.ITH.4, 8.2.8.ITH.5, 8.2.8.NT.2, 8.2.8.NT.4, 8.2.8.ETW.3, 8.2.8.ETW.4
Unit Objectives/ Conceptual Understandings	*Students will be able to...* ● Identify transportation terms, concepts, and techniques. ● Design a product to address a real-world problem and document the process, including constraints and trade-offs. ● Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.
Essential Questions	● How has transportation impacted global culture(s)? ● How has transportation become more (or less) sustainable over time? ● What is the relationship between climate change and technology?
Unit Assessment	Students design and document the construction of a vehicle. Students demonstrate understanding with a summative assessment.

Core Content Objectives		**Instructional Action**	
Concepts What students will know	**Skills** What students will be able to do	**Activities/Strategies** Technology Implementation Interdisciplinary Connections	**Assessment Check Points**
Transportation concepts The Design Process Sustainability	Select and use appropriate tools effectively and safely Define, utilize, and evaluate transportation systems Use transportation systems to solve real-world problems Analyze the impact of products on their surroundings	Demonstrate the correct use of tools Label transportation system components Vehicle design and construction projects (see appendix for suggestions) Climate Change project (see appendix for suggestions)	Safety Assessment(s) (shop, machine, etc) Class discussions Check-ins (mc, sa) Project rubrics Engineer Notebook
Resources *Essential materials, supplementary materials, links to best practice* Graph paper (various types) Balsa wood (various sizes) Hand tools, Power tools Adhesives, Fasteners 3D modeling software Wheels, axles, motors (and other propulsion sources)		**Instructional Adjustments** *Modifications, student difficulties, possible misunderstandings* Appropriate accommodations and/or modifications as determined by 504s and IEPs: shortened assignments, extended time, copy of class notes or access to notes on Chromebook, preferential seating, oral reminders, etc. Ask students to restate information, directions, and assignments. Climate change is a human phenomenon.	

Unit 4: MANUFACTURING SYSTEMS

Targeted Standards	8.2.8.ED.1, 8.2.8.ED.2, 8.2.8.ED.3, 8.2.8.ED.4, 8.2.8.ED.7, 8.2.8.NT.2, 8.2.8.NT.3, 8.2.8.ETW.1, 8.2.8.ETW.2
Unit Objectives/ Conceptual Understandings	*Students will be able to...* • Identify manufacturing terms, concepts, and techniques. • Design a product to address a real-world problem and document the process, including constraints and trade-offs. • Present a model, prototype, or finished product of student design and manufacture.
Essential Questions	• Does intellectual property protection help or harm invention and innovation? • What role does problem solving have when designing products?
Unit Assessment	Students design and document the construction of a product. Students demonstrate understanding with a summative assessment.

Core Content Objectives		**Instructional Action**	
Concepts What students will know	**Skills** What students will be able to do	**Activities/Strategies** Technology Implementation Interdisciplinary Connections	**Assessment Check Points**
Manufacturing concepts The Design Process Presentation best practice	Select and use appropriate tools effectively and safely Define, utilize, and evaluate manufacturing systems Use manufacturing systems to solve real-world problems Present a self-designed product	Demonstrate the correct use of tools Label manufacturing system components Product design and construction projects (see appendix for suggestions) Presentation of product development process and final result	Safety Assessment(s) (shop, machine, etc) Class discussions Check-ins (mc, sa) Project rubrics Engineer Notebook
Resources *Essential materials, supplementary materials, links to best practice* Balsa wood (various sizes) Hand tools, Power tools Adhesives, Fasteners 3D modeling software Other materials dependent on student project focus		**Instructional Adjustments** *Modifications, student difficulties, possible misunderstandings* Appropriate accommodations and/or modifications as determined by 504s and IEPs: shortened assignments, extended time, copy of class notes or access to notes on Chromebook, preferential seating, oral reminders, etc. Ask students to restate information, directions, and assignments. Reverse engineering helps innovation and competition. Many methods of manufacturing exist.	

APPENDIX

Definitions and Skills

The Design Process is an iterative method of problem-solving, especially well-suited to engineering design projects. The steps are listed below in suggested order, but the process is non-linear. The steps can be completed in any order, multiple times.

- Define the Problem
- Conduct Research
- Brainstorm Ideas
- Evaluate Solutions
- Final Product
- Document the Process

Workshop Safety and Efficiency encompasses appropriate tool choices, efficient use of materials, application of simulations and other research + development tools, the Design Process, and correct and safe use of tools and materials.

An **Engineer Notebook** is a living document of someone's progress on one or several design projects. Each entry is dated. Entries can take the form of brainstorming, sketches, technical drawings, testing results, reflections, or any other aspect of the Design Process and product development.

Computer applications and the internet are resources that support and amplify development, communication and collaboration. The selection of appropriate digital tools is just as important as the selection of appropriate physical tools.

Collaboration is an important life-long skill. Individuals need to be able to function as part of a team. (*noun* - The action of working with someone to produce or create something. *Oxford English Dictionary*)

Project Library

Projects will vary by grade level. They can be differentiated by providing more Design Process Steps completed for the student, requiring more iterations, and so on. The list below is non-exhaustive.

Technology Literacy Projects

- “Get to know you” report (slideshow and/or video)
- Career research report
- Engineering failure report
- Optical illusion report
- Technical Drawing (standalone or component of other project)

Static Projects

- Tower Build
- Bridge Build (several variations)
- House Build
- Drafting/Architectural Design

Transportation Projects

- PK Car
- Mousetrap Car
- CO2 Dragster
- Paper Airplane
- Transportation Systems report
- Rubber band-powered Glider
- Rollercoaster
- Paper Rocket
- Solid fuel Rocket (with and without payload)
- Solar power vehicle
- Climate Change report
- Hydrogen power vehicle

Manufacturing Projects

- Robotic Arm
- 3D Printed Model
- Educational Comic Book
- Circuit Design
- Lego Mindstorms