

CHSCTAA - Engineering & Technology Pathway

Curriculum Mapping/Pacing Guide

Engineering Concepts

WEEK	UNIT CONTENT	LEARNING TARGET	STANDARDS	LESSONS/SKILLS	STEM ACTIVITIES	VOCABULARY	ASSESSMENTS
1,2	Unit 1 – Engineering Design	Students will develop an understanding of engineering design process as an iterative problem-solving method that produces solutions to meet human needs and wants.	STEM-EC-3.1 STEM-EC-3.2 STEM-EC-3.3 STEM-EC-3.4 STEM-EC-3.5 STEM-EC-3.6 STEM-EC-3.7	- Engineering Notebooks - Engineering Design Process - Define Problem - Brainstorm Solutions - Research Possibilities - Select Approach/Plan - Create Model - Test Model - Improve Model - Communicate Results	- STEM Activity – Team Building - Hula Hoop Tower - Yurt Circle - STEM Activity – FlipGrid All About Me_Video https://flip.com/35603b03	- Engineering - ABET - Design Process - Criteria - Constraints - Prototype - Critical Thinking	Engineering Design Challenges and Problem-Solving Project /Presentation (TSA)
3,4	Unit 2 – Mechanical Engineering	Students will learn how to design and build a Randomizer Rocket using common household items	STEM-EC-5.1 STEM-EC-5.2 STEM-EC-5.3 STEM-EC-5.4 STEM-EC-5.5 STEM-EC-5.6	- Design/Build Body of Rocket - Design/Install Parachute - Launch using engines for propulsion - Estimate height of rocket using Clinometer	STEM Activity – Estimating the Height of the School's Flag Pole using Law of Reflection and Clinometer	- Law of Reflection - Sine - Cosine - Tangent - Clinometer	Randomizer Rocket Project
5,6	Unit 3 – Core Technologies	Students will learn that Core Technologies are the building blocks of all technological systems.	STEM-EC-6.1 STEM-EC-6.2 STEM-EC-6.3 STEM-EC-6.4 STEM-EC-6.5 STEM-EC-6.6 STEM-EC-6.7 STEM-EC-6.8 STEM-EC-6.9 STEM-EC-6.10 STEM-EC-6.11	- Newton's Laws of Motion - Review Simple Machines - Ideal Mechanical Advantage - Actual Mechanical Advantage - Core Technologies - Mechanical - Structural - Electrical - Fluid - Optical - Thermal - Biotechnology		- Mechanical Technology - Structural Technology - Electrical Technology - Electronic Technology - Fluid Technology - Optical Technology	- Rube Goldberg Project - Employ <u>ALL</u> six simple machines into one project (at least 2 energy transfers) - Unit 3 Test – Core Technologies

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				Materials		7. Thermal Technology 8. Biotechnology 9. Materials Technology	
7,8,9	Unit 4 – Reverse Engineering	Students will analyze an existing product to determine its function so that a similar product can be developed or the original product can be improved.	STEM-EC-7.1 STEM-EC-7.2 STEM-EC-7.3 STEM-EC-7.4 STEM-EC-7.5 STEM-EC-7.6 STEM-EC-7.7 STEM-EC-7.8 STEM-EC-11.5 STEM-EC-11.6 STEM-EC-11.7 STEM-EC-11.8 STEM-EC-11.9 STEM-EC-11.10	- Review Universal Systems Model - Input, Process, Output Feedback - Simple vs Complex Systems - Optimization - What is Reverse Engineering? - Reverse Engineering Proposal - Select product with 3 or more subsystems - Conduct research about its intended purpose	STEM Activity – Reverse Engineer a simple machine	1. System 2. Subsystem 3. Reverse Engineering	Reverse Engineering Project
10	Unit 5 –Safety in the Workplace	Students will demonstrate and follow safety, health, and environmental standards related to the Science, Technology, Engineering, and Math (STEM) workplaces.	STEM-EC-2.1 STEM-EC-2.2 STEM-EC-2.3 STEM-EC-2.4	- General Safety in the Workplace - Proper Lifting/Back Safety - Ladder Safety - Fall Protection - Ergonomics - Personal Protective Equipment - Driving Policies - Tool Safety (Using, Maintaining, and Storing)	- STEM Activity – Safety Posters - STEM Activity – Safety Training Videos: https://www.safemt.com/safety-tools/safety-videos/	1. Accident 2. Eye Protection 3. Power Tools 4. OSHA 5. Ergonomics	Unit 5 Test – Safety in the Workplace

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11,12	Unit 6 – Pneumatics	The student will understand the principles of hydraulic and pneumatic systems in a manufacturing process.	STEM-EC-9.1 STEM-EC-9.2 STEM-EC-9.3 STEM-EC-9.4	- Purpose of hydraulic and pneumatic systems. - Operational principles of typical hydraulic and pneumatic systems schematics. - Basic principle of Pascal's law. - List three similarities between hydraulic and pneumatic systems. - Identify two advantages pneumatic systems have over hydraulic systems. - List an advantage of hydraulic systems over pneumatic systems.		- Actuators - Pump - Compressor - Gauges - Pressure relief valves - Poppet or Check Valve - Control valve - Filter - Reservoir - Hydraulic fluid - Tubes / hoses - Fittings / connections	- Hydraulic Lift Project/Presentation - Unit 6 Test – Pneumatic and Hydraulic Systems
13	Unit 7 – Software & Coding	Students will explore the use of social media and other 21st century technologies and their impact(s) on the fields of engineering and technology.	STEM-EC-10.1 STEM-EC-10.2 STEM-EC-10.3 STEM-EC-10.4 STEM-EC-10.5	- CodeCademy - HTML (design webpage) - CSS - SpheroBots - Block Coding with Spheros - Design obstacle course - Edit sounds, speech and colors	- STEM Activity – CodeCademy Modules: https://www.codecademy.com/ - STEM Activity – Using SpheroBots to Complete Obstacle Course	- Software - Software Engineer - Programmer - Block Coding - Java Code - HTML Code - CSS Code	Unit 7 Test – Software Engineering & Coding
14,15	Unit 8 – Advanced Engineering Drawing	Students will learn how to apply mathematical methods in digitally sketching three dimensions objects using Engineering software (CAD).	STEM-EC-7.1 STEM-EC-7.2 STEM-EC-7.3 STEM-EC-7.4 STEM-EC-7.5 STEM-EC-7.6 STEM-EC-7.7	- Multiview Sketching - Orthographic Projection - Isometric Projection & Sketching - Coded Plans - Angled Projections - CAD Drawings / 3D Printer	STEM Activity – TinkerCAD https://www.tinkercad.com/	- Multiview Sketching - Isometric Projection - Orthographic Projection - Coded Plans - Projection Plane	- TinkerCAD Design for 3D Printer - Unit 8 – Advanced Engineering Drawing

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			STEM-EC-7.8			6. Projection Lines 7. Visible Edges 8. Visible lines 9. Hidden Lines 10. Glass Box Approach 11. Third Angled Projection 12. First Angled Projection	
16	Unit 9 – Technology & Society	Students will evaluate real world engineering problems and present possible solutions and how it impacts society.	STEM-EC-8.1 STEM-EC-8.2 STEM-EC-8.3 STEM-EC-8.5 STEM-EC-8.6 STEM-EC-8.7 STEM-EC-9.1 STEM-EC-9.2 STEM-EC-9.3 STEM-EC-9.4	• Downtown Mall • Power Generation • Trade-offs • Entrepreneurship	STEM Activity – Use recycled materials to build model	1. Reduce 2. Reuse 3. Recycle	• Unit 9 Test – Technology & Society
17,18	Unit 10 – Employability Skills	Students will develop leadership, interpersonal, and problem-solving skills needed as in building a successful career.	STEM-EC-1.1 STEM-EC-1.2 STEM-EC-1.3 STEM-EC-1.4 STEM-EC-1.5 STEM-EC-1.6	• What Do Employers Expect? ○ Professionalism ○ Good Communication (Written & Verbal) ○ Productivity ○ Punctuality ○ Networking • Resume Writing Skills ○ Highlighting your skills ○ Cover Letter		1. Ability 2. Attitude 3. Effort 4. Goals Setting 5. Study Time 6. Verbal 7. Nonverbal 8. Time Management 9. Teamwork 10. Networking 11. Sarcasm	• Improve Resume Writing • Cover Letter • Mock Interview Questions

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