Goodheart-Willcox Publisher Correlation of *Engineering Fundamentals* ©2018 to Tennessee Department of Education Standards
Course: Principles of Engineering and Technology (5924)

STANDARD		CORRELATING PAGES
Safety		
1	Accurately read and interpret safety rules, including but not limited to rules published by the National Science Teachers Association (NSTA), rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA) guidelines, and state and national code requirements. Be able to distinguish between the rules and explain why certain rules apply.	129–154, 214, 307, 342–344
2	Identify and explain the intended use of safety equipment available in the classroom. For example, demonstrate how to properly inspect, use, and maintain safe operating procedures with tools and equipment. Incorporate safety procedures and complete safety test with 100 percent accuracy.	207, 238–239, 264–265, 307, 342, 344, 347
Introduction to Engineering & Technology		
3	Research the definition of each term within STEM: Science, Technology, Engineering, and Mathematics. Use these definitions and additional print and electronic resources (such as textbooks, National Science Teacher Association’s STEM Classroom newsletters, or the websites of organizations like *STEM Connector*) to develop a written argument describing why science, mathematics, and technology are different than engineering, yet each influences engineering. Incorporate proper citation conventions used in STEM fields (MLA, APA, or other) to cite sources of information retrieved.	4, 6, 7, 27, 42, 45, 65, 116, 117, 121, 126
4	In teams, produce a timeline or infographic illustrating important events in history, in a given time period, that specifically involve engineering. Use a variety of sources to gather data, cite each source, and briefly describe why the chosen source is reliable.	16–19, 21, 85, 197, 260, 276

5	As a team, develop a written explanation of how society benefits from the contributions of engineers in at least three different engineering disciplines. Provide detailed descriptions of each discipline and describe the specific benefits derived from each. For example, describe how civil engineers improve the efficiency and safety of transportation networks through the construction of bridges, highways, and other public infrastructures. Documents should contain links to relevant websites to illustrate the ideas presented.	31–33, 53, 274, 276, 344
Engineering Design Process		
6	There are different versions of the engineering design process. For example, examine the following framework endorsed by the International Technology and Engineering Educators Association (ITEEA): a. Identify the problem b. Identify criteria and specify constraints c. Brainstorm possible solutions d. Research and generate ideas e. Explore alternative solutions f. Select an approach g. Write a design proposal h. Develop a model or prototype i. Test and evaluate j. Refine and improve k. Create or make a product l. Communicate results Citing this framework or other variations as approved by the instructor, compare and contrast what is involved at each step of the engineering design process. Explain why it is an iterative process and always involves refinement.	42–55, 57, 60–73, 75, 78–93, 95, 99–111, 113, 116–134, 135
7	In teams, evaluate an existing large-scale engineering design using the engineering design process. Produce a report on the chosen design, and assume the role of the engineering design team that produced the design. Document constraints that may have been faced by the design team, criteria for measuring the effectiveness of the design, and progress through each step of the	44–45, 47, 56, 66–68, 91–92, 126–130, 132–134

	engineering design process. Create and deliver a presentation appropriate for a career and technical student organization (CTSO) event.	
8	Complete a simple design activity and apply the engineering design process to produce a model that an engineer would test. Define criteria for determining an effective design, describe constraints on the design, and document each step in an engineering notebook. At the completion of the design process, present the model to the class and critique the design of other classmates.	54–55, 66–68, 82–93, 119–134
Fundamental Sketching and Engineering Drawing		
9	Define the differences in technique among freehand sketching, manual drafting, and computer-aided drafting (CAD), and describe the skills required for each. Create a two-dimensional orthographic (multiview) drawing incorporating labels, notes, and dimensions, using sketching/geometric construction techniques. Apply basic dimensioning rules and properly use different types of lines (e.g., object, hidden, center). The orthographic projections should include principle views of a simple object from top, front, and right sides.	47–48, 78–82, 99–111, 113, 120, 204, 262
10	Building on the knowledge of a two-dimensional drawing, create simple isometric (3-D pictorial) drawings, properly using lines (e.g., object, hidden, center), labels, and dimensioning techniques.	47–48, 80–82, 104–110
11	Use CAD software to create simple two-dimensional and three-dimensional drawings, accurately incorporating labels, notes, dimensioning, and line types to design drawings. Perform basic operations such as creating, saving files, opening files, storing files, and printing.	47–48, 50, 99–111, 120–125, 262–263, 307
Introduction to Measurement		
12	Use physical measurement devices typically employed in engineering to collect and build a dataset. For example, calipers may be used to measure the width of pens in the classroom, generating a dataset. Tools should include, but are not limited to, fractional rule, metric rule, dial caliper, and micrometer.	117, 144, 204, 232–233, 238

Class Project		
13	As a class, identify a problem in the school or community that can be solved by an engineer. Follow the design process to solve the problem. The class will collaboratively develop a paper following the format of a typical technical report (see components of the report below). Upon completion of the report, create and deliver a presentation for a CTSO event using appropriate citation conventions learned in the course. Refine the report as would a team of engineers by incorporating feedback from the presentation. The technical report should include, but is not limited to: a) Background b) Problem definition c) Design constraints d) Methodology e) Data analysis (e.g., charts, graphs, calculations) f) Results/Problem solution (including engineering drawings) g) Conclusions and recommendations for future research	42–55, 57, 60–73, 75, 78–93, 95, 99–111, 113, 116–134, 135