STRANDS AND STANDARDS; ENGINEERING PRINCIPLES 1	Introduction to Engineering
STRAND 1: Students will follow safety practices.	
Standard 1:Identify potential safety hazards and follow general laboratory safety practices.	
	pp. 53-55
-Assess workplace conditions regarding safety and health.	p. 317, p. 446
-Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite.	p. 54
-Locate and understand the use of shop safety equipment.	pp.54-55
-Select appropriate personal protective equipment.	pp.54-55
Standard 2: Use safe work practices.	
-Use personal protective equipment according to manufacturer rules and regulations.	p. 54
-Follow correct procedures when using any hand or power tools.	p. 72
Standard 3: Complete a basic safety test without errors (100%) before using any tools or shop equipment.	
	p. 55, p. 72
STRAND 2 Students will investigate career opportunities within the world of Engineering.	
Standard 1; Identify occupations related to Engineering.	
	pp. 50-51
Standard 2: Differentiate among various Engineering disciplines.	
-Bioengineering	p. 23, p. 40
-Chemical Engineering	p. 7, p. 11, p. 24
-Civil & Environmental Engineering	p. 7, pp. 10-12
-Computer Engineering	p. 7, p. 10
-Electrical Engineering	p. 7, pp.10-11
-Mechanical Engineering	p. 7, pp. 10-11
-Materials Science	p. 29, p. 71
Standard 3: Investigate different types of occupational training and educational opportunities.	
	p. 24
STRAND 3: Students will understand and develop positive work ethics, communication skills, and leadership skills.	
Standard 1:Demonstrate positive work ethics and leadership skills.	
-Responsibility	p. 44, p. 52
-Reliability	p. 44, p. 66, p.146
-Dependability	p. 44,p. 66
-Effective Communication	
-Delegation	p. 66
-Cooperation	p. 43, p. 66
-Teamwork	p. 44, p. 61
-Integrity	p. 44, p. 66
Standard 2: Employ the Technology Student Association (TSA) student organization's program as an integral element of the curriculum.	
	p. 50, p. 62
Standard 3: Participate in problem-solving, both individually and as part of a team.	p. 62
Standard 4: Understand the importance of inter-disciplinary teams	p. 62

Standard 5: Take minutes of a team meeting.	
	p. 61
Standard 6: Make accurately proportioned sketches using correct drawing conventions.	p. 157
-Notes are neat and legible	p. 285
-Objects should be drawn to correct proportions	p.157
-Dimensions are used appropriately	p. 156, p. 171, p. 408
-Views can be isometric, orthogonal, sections, or assemblies	p. 446
Standard 7: Create and utilize an engineering notebook per established conventions.	
-Sequential and chronological	pp. 111-112
-Accurate and complete reflection of the progress being recorded	p. 112
-Sketches or pictures are included where appropriate	p. 112
-No loose entries or pages	p. 112
-Each page is dated and witnessed	p. 112
-Unused spaces are identified and lined out	p. 112
-Errors are not erased or obliterated	p. 112
-Test data and calculations are included	p. 111-112
STRAND 4: Students will identify the qualities of successful engineering design, recognize its role in society, and develop projects using an engineering design process.	
Standard 1: Identify the qualities of good design and their relationship to the design's user.	
-Examine a design with respect to its quality and usability.	p. 110
-Understand that these qualities are the result of choices made and constraints applied during the design process.	p. 110
Standard 2: Recognize and identify the role of engineering and engineered products in society.	p. 25, p. 32, p. 68, p. 112
Standard 3: Identify the requirements for and role of intellectual property in design.	
	p. 135, 326
Standard 4: Recall education requirements for professional success as a designer/engineer.	
	p. 72
Standard 5: Identify and explain the elements of an engineering design process.	
-Identify & define the design problem	pp. 102-103, p. 108
-Brainstorm solutions	p. 130
-Create models & build a prototype	p. 108
-Test the prototype	p. 108
-Redesign and optimize	p. 118, 130
Standard 6: Understand the concept of a problem statement and design requirements.	p. 241-243
Standard 7: Create design specifications considering such factors as:	
-Performance	p. 106
-Time and financial constraints	p. 106
-Ergonomics	p. 9, pp. 137-139, 146
-Safety	pp. 137-139
-The state-of-of the art	p. 42
Standard 8: Translate design requirements into a design solution.	p. 242, 259, 312
Standard 9: Use brainstorming methods to identify solutions to a design problem.	p. 130

Standard 10: Recognize and demonstrate that there are many possible successful designs and that a design process does not always result in a single best design.	p. 446
Standard 11: Explain the role of and be able to utilize mathematical and functional modeling in the creation and assessment of a design.	p. 86, p. 428
Standard 12: Perform a design-of-experiments.	pp. 353-355
Standard 13: Build and test designs against design specifications, evaluate the results of those tests, and present their analyses.	pp. 353-355
Standard 14: Demonstrate that design is an iterative process, subject to continuous evolutionary improvement.	p. 9, pp. 101-102
STRAND 5: Students will understand ways in which Civil Engineering can enhance the health and well-being of individuals.	
Standard 1: Identify several different careers that support large scale civil or environmental projects.	
-Transportation Engineering	p. 40
-Structural Engineering	p. 25, p. 40
-Construction Engineering	p. 7, p. 25, p. 40
-Environmental Engineering	p. 7, p. 24, p. 27, p. 40
-Geotechnical Engineering	p. 25, p. 40
-Water Resources Engineering	p. 25, p. 40
Standard 2: Use idealized equations that are fundamental to Civil Engineering.	
-Hydrostatic pressure from density and height.	p. 249
-Flow velocity in an ideal (frictionless) system using Bernoulli's equation.	p. 77, p. 252
-Internal forces in a simple truss structure.	p. 208, p. 212
Standard 3: Describe how real-world factors change performance from the ideal to:	
-Water tower height affects pressure driving force.	p. 253, p. 261
-Pressure driving force affects flow rate from a pipe.	p. 82, p. 93
-Fittings, bends, pipe length, and pipe diameter affect flow rate in a pipe.	p. 254
Standard 4: Work in teams to design and build a project related to Civil Engineering.	
-Water distribution network	pp. 254-256
-Tower building	pp. 217-219
Standard 5: Write a reflection of the project.	
-What was the objective?	p. 219
-What worked?	p. 219
-What didn't work and why didn't it work?	p. 219
-How did the design compare with the best and worst performers?	p. 219
-What you would do differently?	p. 219
-Was the objective accomplished	p. 219
Standard 6: Give a brief presentation on an existing or an emerging Civil Engineering technology.	p. 40, p. 62
STRAND 6: Students will understand ways in which Computer Engineering can enhance health and well- being of individuals.	
Standard 1: Identify several different careers that support the computer industry.	
-Computer hardware design	p. 26
-Network design	p. 26

-Network management p. 26
-Programming p. 263, p. 446
-Systems support p. 26

Standard 2: Identify the main internal and external components of a computer.

-Memory p. 307-309, p. 322
-Processor p. 306-309, p. 322
-Video and Sound p. 324
-Input and Output Peripherals p. 309

Standard 3: Explain the basic components of a computer's programming design.

-Purpose of software p. 309, p. 322
-Difference between software and data p. 322
-Purpose of computer programming languages pp. 276-277

Standard 4: Understand various elements of coding structure.

-Explain the difference between a variable's name and its value. p. 276
-Predict the results of code snippets which use
-Variables p. 276
-Operators p. 276
-Branching structures pp. 338-339
-Lopping Structures pp. 338-339
-Function calls p. 339

Standard 5:Work in teams to design and build a project related to Computer Engineering.

-Pinball game p. 446
-Rehabilitation therapy game p. 310

Standard 6: Write a reflection of the project.

-What was the objective? p. 219
-What worked? p. 219
-What didn't work and why didn't it work? p. 219
-How did the design compare with the best and worst performers? p. 219
-What you would do differently? p. 219
-Was the objective accomplished? p. 219

Standard 7: Give a brief presentation on an existing or an emerging Computer Engineering technology.

p. 40, p. 62

STRAND 7: Students will understand ways in which Bioengineering can enhance the lives of individuals.

Standard 1: Identify several different careers that support bioengineering or Biomanufacturing.

Bioinstrumentation p. 24, p. 40
Biomechanics p. 24, p. 40
-Biomaterials p. 24, p. 40
-Medical Imaging pp. 24-29
-Rehabilitation Engineering p. 24
-Systems Physiology p. 24

Standard 2: Understand the role of specialists in solving bioengineering problems.

p. 23, p. 32

Standard 3: Work in teams to design and build a project related to Bioengineering.

p. 32

-Prosthetic arms for developing countries. p. 341

Standard 4: Write a reflection of the project.

-What was the objective? p. 219
-What worked? p. 219
-What didn't work and why didn't it work? p. 219
-How did the design compare with the best and worst performers? p. 219
-What you would do differently? p. 219
-Was the objective accomplished? p. 219

Standard 5: Give a brief presentation on an existing or an emerging Bioengineering technology.

p. 40,p. 62