



# GEORGIA

PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

## ENGINEERING & TECHNOLOGY

**PATHWAY:** Engineering, Energy Systems

**COURSE:** Foundations in Engineering and Technology

**UNIT:** 3: Safety in Engineering



## INTRODUCTION

**Annotation:** Briefly describe the unit topics, tasks, methods, etc.

Safety is an important concern with students working in a laboratory environment. Students should be taught to respect and properly use the tools found in an engineering lab. This unit will build a strong foundation of safety for students in your lab.

**Grade(s):**

X	9 <sup>th</sup>
X	10 <sup>th</sup>
X	11 <sup>th</sup>
X	12 <sup>th</sup>

**Time:**

5 hours

**Author:**

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**Additional Author(s):**

**Students with Disabilities:**

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.



# FOCUS STANDARDS

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## **GPS Focus Standards:** Please list the standard and elements covered.

ENGR-EA-1 – Students will use selected discipline specific engineering tools, machines, materials, and processes.

ENGR-STEM-5 – Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.

CTAE-FS-1 – Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-7 – Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-9 – Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-11 – Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.

## **GPS Academic Standards:**

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

MM3P2. Students will reason and evaluate mathematical arguments.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

ELA10C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats.

## **National / Local Standards / Industry / ISTE:**



## UNDERSTANDINGS & GOALS

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**Enduring Understandings:** Enduring understandings are statements summarizing important ideas and have lasting value beyond the classroom. They synthesize what students should understand – not just know.

1. Student will be able to competently follow safety regulations in the laboratory.
2. Student will be able to identify safety rules on individual machinery and tools.
3. Student will understand the importance of following manufacturer's guidelines.

**Essential Questions:** Essential questions probe for deeper meaning and understanding while fostering the development of critical thinking and problem-solving skills. Example: Why is life-long learning important in the modern workplace?

1. Why is safety important?
2. What are general safety rules to follow?
3. What is the proper way to use the lab equipment?
4. Where is the safety equipment located?

**Knowledge from this Unit:** Factual information.

1. Students will possess the knowledge of general safety rules in the laboratory.
2. Students will have a basic knowledge of safety signs.
3. Students will describe prevention techniques for laboratory accidents.

**Skills from this Unit:** Performance.

1. Students will demonstrate the proper use of equipment in the laboratory.
2. Students will be able to acknowledge inappropriate behavior in the laboratory.
3. Students will be able to list appropriate safety protocol in an emergency situation.



# ASSESSMENT(S)

**Assessment Method Type:** Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

- ☐ Pre-test
- ☐ Objective assessment - multiple-choice, true- false, etc.
  - ☐ Quizzes/Tests
  - ☐ Unit test
- ☐ Group project
- ☐ Individual project
- ☐ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
  - ☐ Self-check rubrics
  - ☐ Self-check during writing/planning process
  - ☐ Journal reflections on concepts, personal experiences and impact on one's life
  - ☐ Reflect on evaluations of work from teachers, business partners, and competition judges
  - ☐ Academic prompts
  - ☐ Practice quizzes/tests
- ☐ Subjective assessment/Informal observations
  - ☐ Essay tests
  - ☐ Observe students working with partners
  - ☐ Observe students role playing
- ☐ Peer-assessment
  - ☐ Peer editing & commentary of products/projects/presentations using rubrics
  - ☐ Peer editing and/or critiquing
- ☒ Dialogue and Discussion
  - ☐ Student/teacher conferences
  - ☐ Partner and small group discussions
  - ☒ Whole group discussions
  - ☐ Interaction with/feedback from community members/speakers and business partners
- ☒ Constructed Responses
  - ☒ Chart good reading/writing/listening/speaking habits
  - ☒ Application of skills to real-life situations/scenarios
- ☒ Post-test

**Assessment(s) Title:**

Safety Test

**Assessment(s) Description/Directions:**

Students will pass the safety test at the end of this unit to be able to work in the lab. The test included has general safety rules. Each teacher should add specific questions about the equipment in their own lab.

**Attachments for Assessment(s):** Please list.

Safety Test  
Safety PowerPoint  
Safety Slogans



# LEARNING EXPERIENCES

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**Instructional planning:** Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

## Sequence of Instruction

### 1. Identify the Standards. Standards should be posted in the classroom for each lesson.

ENGR-EA-1 – Students will use selected discipline specific engineering tools, machines, materials, and processes.

ENGR-STEM-5 – Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.

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CTAE-FS-11 – Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.

### 2. Review Essential Questions.

1. Why is safety important?
2. What are general safety rules to follow?
3. What is the proper way to use the lab equipment?
4. Where is the safety equipment located?

### 3. Identify and review the unit vocabulary.

Prevention

Safety

Laboratory

Safety slogan

Accident

Safety poster

Safety features

### 4. Assessment Activity.

Day 1

- Ask students for stories of people being injured with power tools and/or lab equipment. The class should discuss the cause of each accident and precautions that could have prevented it.

- Present general lab safety PowerPoint presentation and discussion

#### Day 2

- Show Power Tool Institute online safety video “Power Tool Accidents — They Can Be Prevented”. (You may also fill out the online form here for the video on DVD for free.) Students should take notes during the video.
- Tour the lab with your students. Visit each piece of equipment in the laboratory and demonstrate how to properly use and maintain them. Emphasize safety features of each tool.

#### Day 3

- Continue the lab tour. Point out where the first aid kit(s), fire extinguishers, and other safety equipment is located and what to do in case of an accident.
- Students will create their own safety poster to hang in the laboratory. The students will pick one slogan from the list out of a hat/basket to illustrate. Drawings and/or graphics should be added for visual appeal.

#### Day 4

- Discuss the importance of a clean lab and workspace. Instruct students on proper clean up procedures.
- Review safety rules for test.

#### Day 5

- Safety Test (Note: The teacher should add questions about specific equipment in their lab.)

### **Attachments for Learning Experiences:** Please list.

Safety Test

**Notes & Reflections:** May include notes to the teacher, pre-requisite knowledge & skills, suggestions, etc. Students will pass the safety test at the end of this unit to be able to work in the lab. The test included has general safety rules. Each teacher should add specific questions about the equipment in their own lab.



## CULMINATING PERFORMANCE TASK (Optional)

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### **Culminating Unit Performance Task Title:**

1. Video Notes
2. Safety Poster

### **Culminating Unit Performance Task Description/Directions/Differentiated Instruction:**

1. Students should write 10 interesting facts and 3 questions they have from the safety video to ensure understanding and create discussion.
2. Students will create a safety poster to hang in the lab. It should have both text and graphics.

### **Attachments for Culminating Performance Task:** Please list.

1. Students will be graded on completion, thoughtfulness of questions, and correctness of facts.
2. Students will be graded on completion, visual appeal, and appropriateness for the classroom.



## UNIT RESOURCES

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### Web Resources:

<http://www.powertoolinstitute.com/education.html> (Safety Video)

**Attachment(s):** Supplemental files not listed in assessment, learning experiences, and performance task.

### Materials & Equipment:

PowerPoint screen, access to internet

### What 21st Century Technology was used in this unit:

<input checked="" type="checkbox"/>	Slide Show Software
<input type="checkbox"/>	Interactive Whiteboard
<input type="checkbox"/>	Student Response System
<input type="checkbox"/>	Web Design Software
<input type="checkbox"/>	Animation Software
<input type="checkbox"/>	Email

<input type="checkbox"/>	Graphing Software
<input type="checkbox"/>	Calculator
<input type="checkbox"/>	Desktop Publishing
<input type="checkbox"/>	Blog
<input type="checkbox"/>	Wiki
<input checked="" type="checkbox"/>	Website

<input type="checkbox"/>	Audio File(s)
<input checked="" type="checkbox"/>	Graphic Organizer
<input type="checkbox"/>	Image File(s)
<input type="checkbox"/>	Video
<input type="checkbox"/>	Electronic Game or Puzzle Maker