

**Professional Technical Studies: Science, Technology, Engineering, & Math Cluster**  
**Engineering & Technology Pathway**

Strand:

**PT-ENG1**

**Academics**

Students apply English language arts, mathematics, science, and social studies content area skills.

Standard:

**PT-ENG1a:** The student will apply concepts and processes as defined by the National Council of Teachers of Mathematics in *Principles and Standards for School Mathematics* so as to:

Components:

**PT-ENG1a.1:** choose and/or create models that can be used to solve problems;

**PT-ENG1a.2:** select and use appropriate statistical methods to analyze data to help make decisions; and

**PT-ENG1a.3:** apply appropriate data collection and analysis methods and means of displaying data.

Standard:

**PT-ENG1b:** The student will apply concepts and processes as defined by the National Research Council in the National Science *Education Standards* and by the American Association for the Advancement of Science in *Benchmarks for Science Literacy* so as to:

Components:

**PT-ENG1b.1:** use systems of measurement to solve problems;

**PT-ENG1b.2:** convert units of measure between systems;

**PT-ENG1b.3:** differentiate between scalar and vector quantities including UCS coordinates;

**PT-ENG1b.4:** apply fundamental laws and principles relevant to engineering and technology; and

**PT-ENG1b.5:** use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems.

Standard:

**PT-ENG1c:** The student will apply concepts and processes as defined in the *Standards for Technological Literacy: Content for the Study of Technology* so as to:

Components:

**PT-ENG1c.1:** use mathematics, science, and technology concepts and processes to solve problems quantitatively in engineering projects involving design, development, or production in various technologies; and

**PT-ENG1c.2:** apply the core concepts of technology and recognize their relationships with engineering, science, and math, and other subjects.

Strand:

**PT-ENG2**

**Information Technology Applications**

Students use computers, networks, and communication technology to access, organize, process, transmit, and communicate information.

Standard:

**PT-ENG2a:** The student will use information technology applications so as to:

Components:	<b>PT-ENG2a.1:</b> use computer applications to solve problems; <b>PT-ENG2a.2:</b> select and use different forms of communications technology; and <b>PT-ENG2a.3:</b> collect, manage, and display data.
Strand:	
<b>PT-ENG3</b>	<b>Technical Skills</b> Students select and use technology tools to provide customer service.
Standard:	<b>PT-ENG3a:</b> The student will apply technological content concepts and principles so as to:
Components:	<b>PT-ENG3a.1:</b> discover how things work; <b>PT-ENG3a.2:</b> use appropriate “tools of the trade”; and <b>PT-ENG3a.3:</b> differentiate between related elements of engineering and technology.
Standard:	<b>PT-ENG3b:</b> The student will model technical competence so as to:
Components:	<b>PT-ENG3b.1:</b> use effective project and system management; <b>PT-ENG3b.2:</b> use precision measuring methods and instruments; <b>PT-ENG3b.3:</b> safely operate and use a variety of tools, machines, equipment, and materials; and <b>PT-ENG3b.4:</b> apply elements of engineering and technology.
Strand:	
<b>PT-ENG4</b>	<b>Design</b> Students convert resources into processes or systems to meet needs and solve problems.
Standard:	<b>PT-ENG4a:</b> The student will examine elements of the design process so as to:
Component:	<b>PT-ENG4a.1:</b> examine the history of innovation and invention; and <b>PT-ENG4a.2:</b> apply concepts of design.
Standard:	<b>PT-ENG4b:</b> The student will demonstrate and apply the design process so as to:
Components:	<b>PT-ENG4b.1:</b> design a system, product, or service; and <b>PT-ENG4b.2:</b> access, test, record, organize, and evaluate information needed to alter the design of a product, system, or service.
Standard:	<b>PT-ENG4c:</b> The student will use scientific and mathematical problem-solving skills to produce viable solutions to problems so as to:
Components:	<b>PT-ENG4c.1:</b> demonstrate effective problem-solving techniques; <b>PT-ENG4c.2:</b> apply appropriate scientific methodology; <b>PT-ENG4c.3:</b> use effective critical-thinking skills; and <b>PT-ENG4c.4:</b> use analytical tools and techniques to solve problems, construct tests, and evaluate data.

Strand:

**PT-ENG5**

**Safety, Health, and Environment**

Students understand the importance of safety and regulatory compliance in the workplace.

Standard:

**PT-ENG5a:** The student will apply safety practices in the laboratory so as to:

Components:

**PT-ENG5a.1:** develop and implement a safety checklist;

**PT-ENG5a.2:** use safety equipment in the laboratory; and

**PT-ENG5a.3:** encourage others to employ safety practices.

Strand:

**PT-ENG6**

**History of Electricity and Electronics**

Students understand the foundations of electricity and electronics.

Standard:

**PT-ENG6a:** The student will examine the historical developments in electricity and electronics so as to:

Components:

**PT-ENG6a.1:** define innovation and invention related to electronics;

**PT-ENG6a.2:** research history of invention in electronics; and

**PT-ENG6a.3:** make a presentation based upon historical research.

Strand:

**PT-ENG7**

**Mathematics for Electronics**

Students apply mathematical concepts to the study of electronics.

Standard:

**PT-ENG7a:** The student will apply the mathematical processes and applications that lead to solutions of electronic problems so as to:

Components:

**PT-ENG7a.1:** solve direct current (DC) circuit analysis problems using Ohm's Law;

**PT-ENG7a.2:** calculate fundamental alternating current (AC) parameters;

**PT-ENG7a.3:** manipulate scientific notation in problem solutions;

**PT-ENG7a.4:** manipulate engineering notation in problem solutions and use in unit conversion;

**PT-ENG7a.5:** derive algebraic equations to determine unknown values in circuits;

**PT-ENG7a.6:** use Boolean algebra for design and analysis of digital circuits;

**PT-ENG7a.7:** use a scientific calculator as a tool for problem solving; and

**PT-ENG7a.8:** convert units of measurement from one system to another.

Strand:

**PT-ENG8**

**Testing Digital Circuits**

Students demonstrate the use of appropriate diagnostic equipment.

Standard:

**PT-ENG8a:** The student will demonstrate the use of appropriate diagnostic equipment so as to:

Components:

**PT-ENG8a.1:** select and apply appropriate test equipment or tools; and

**PT-ENG8a.2:** analyze and apply observed logic states.

Strand:

**PT-ENG9**

**Digital Applications**

Students understand digital electronics.

Standard:

**PT-ENG9a:** The student will apply concepts of digital electronics so as to:

Components:	<b>PT-ENG9a.1:</b> draw and label the seven basic logic gates;
	<b>PT-ENG9a.2:</b> derive the truth tables of the seven basic logic gates; and
	<b>PT-ENG9a.3:</b> construct logic circuits using discrete components to emulate the seven basic gates.
Standard:	<b>PT-ENG9b:</b> The student will investigate how logic circuits and logic gates are used to perform digital operations so as to:
Component:	<b>PT-ENG9b.1:</b> investigate integrated circuits, electronic logic circuits, clocks, timers and flip-flops, digital counting circuits, advanced timers, and computer circuits; and
	<b>PT-ENG9b.2:</b> assemble a digital trainer.