

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

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