



***Department of Teaching & Learning***  
***Parent/Student Course Information***

***Engineering Technology I***

***(AT 8436)***

***Grades 10 - 11***

***Three Credits, One Year***

*Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.*

**COURSE DESCRIPTION**

The courses in engineering and technology provide opportunities for students to acquire skills and knowledge necessary for technological literacy, entry-level careers and lifelong learning. Students learn Virginia's 22 Workplace Readiness Skills within the content area. Those who are completing a two-year sequence have the opportunity to verify their knowledge of the workplace readiness skills through an industry assessment. Engineering Technology I is for students interested in a career in engineering, robotics, manufacturing or industrial design. From transportation to telephones, everything is designed, engineered and produced. This first course in a two-year sequence, provides a project-based approach emphasizing foundational skills in STEM fields such as: engineering technology, robotics, computer integrated manufacturing, materials science and physics. The U Teach engineering curriculum from the University of Texas, is the basis of engineering study.

**CERTIFICATION**

Students prepare for the National Occupational Competency Testing Institute (NOCTI) assessment in Pre-Engineering and Technology

**STUDENT ORGANIZATION**

Skills USA is a co-curricular organization for all students enrolled in the trade and industrial education program. Participation in this organization provides opportunities for leadership development and through competitive events at the local, regional and state levels. Students are highly encouraged to participate.

**PREREQUISITE**

None

**OPTIONS FOR NEXT COURSE**

Engineering Technology II

**REQUIRED STUDENT TEXTBOOK**

None

## COMPETENCIES FOR ENGINEERING TECHNOLOGY I

### **Demonstrating Workplace Readiness Skills: Personal Qualities and Abilities**

- 1 Demonstrate creativity and innovation.
- 2 Demonstrate critical thinking and problem solving.
- 3 Demonstrate initiative and self-direction.
- 4 Demonstrate integrity.
- 5 Demonstrate work ethic.

### **Demonstrating Workplace Readiness Skills: Interpersonal Skills**

- 6 Demonstrate conflict-resolution skills.
- 7 Demonstrate listening and speaking skills.
- 8 Demonstrate respect for diversity.
- 9 Demonstrate customer service skills.
- 10 Collaborate with team members.

### **Demonstrating Workplace Readiness Skills: Professional Competencies**

- 11 Demonstrate big-picture thinking.
- 12 Demonstrate career- and life-management skills.
- 13 Demonstrate continuous learning and adaptability.
- 14 Manage time and resources.
- 15 Demonstrate information-literacy skills.
- 16 Demonstrate an understanding of information security.
- 17 Maintain working knowledge of current information-technology (IT) systems.
- 18 Demonstrate proficiency with technologies, tools, and machines common to a specific occupation.
- 19 Apply mathematical skills to job-specific tasks.
- 20 Demonstrate professionalism.
- 21 Demonstrate reading and writing skills.
- 22 Demonstrate workplace safety

### **Examining All Aspects of an Industry**

- 23 Examine aspects of planning within an industry/organization.
- 24 Examine aspects of management within an industry/organization.
- 25 Examine aspects of financial responsibility within an industry/organization.
- 26 Examine technical and production skills required of workers within an industry/organization.
- 27 Examine principles of technology that underlie an industry/organization.
- 28 Examine labor issues related to an industry/organization.
- 29 Examine community issues related to an industry/organization.
- 30 Examine health, safety and environmental issues related to an industry/organization.

### **Addressing Elements of Student Life**

- 31 Identify the purposes and goals of the student organization.
- 32 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.
- 33 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs and projects.
- 34 Identify Internet safety issues and procedures for complying with acceptable use standards.

### **Exploring Work-Based Learning**

- 35 Identify the types of work-based learning (WBL) opportunities.
- 36 Reflect on lessons learned during the WBL experience.
- 37 Explore career opportunities related to the WBL experience.
- 38 Participate in a WBL experience, when appropriate.

### **Examining How Technology Affects Our World**

- 39 Explain the influence of technological systems.
- 40 Describe the characteristics and scope of technology.
- 41 Identify the core concepts of technology.
- 42 Identify historical technology milestones and advancements.
- 43 Examine technological systems.

### **Investigating How Engineering Affects Our World**

- 44 Define engineering.
- 45 Summarize the history of engineering.
- 46 Research an engineering achievement.
- 47 Present information pertaining to an engineering achievement.

### **Examining the Engineering Practice**

- 48 Describe the principal fields for specialization in engineering.
- 49 Summarize the traits of successful professional engineers.
- 50 Describe the education needed for specialty fields in engineering and technology.
- 51 Explain the importance of communication between engineers and their clients.
- 52 Explain the relevance of the National Society of Professional Engineers Code of Ethics.
- 53 Comply with safety rules in laboratory activities.

### **Practicing Engineering Fundamentals**

- 54 Identify the benefits of case study analysis.
- 55 Analyze a case study analysis.
- 56 Apply measuring skills using instrumentation.
- 57 Demonstrate conversion techniques for units of measurement.
- 58 Demonstrate the use of engineering design graphics and descriptive geometry.
- 59 Apply the techniques and benefits of sketching.
- 60 Draw orthographic and isometric projections, using basic technical drawing instruments.
- 61 Explain rapid prototyping to develop models.
- 62 Demonstrate research techniques/strategies used by engineers.
- 63 Define risk and safety.
- 64 Describe the three types of accidents.
- 65 Identify major precursors of accidents.
- 66 Evaluate the safety of designs.
- 67 Demonstrate knowledge of appropriate personal safety procedures.

### **Examining the Engineering Design Process**

- 68 Define an engineering design process.
- 69 Define an engineering design problem.
- 70 Identify the requirements and constraints of the design problem.
- 71 Research potential solutions to the design problem.
- 72 Generate multiple solutions to the design problem.

- 73 Sketch the solutions to a design problem.
- 74 Evaluate the requirements and constraints of each potential solution to the design problem.
- 75 Justify an optimal solution to the design problem.
- 76 Create a model or prototype for the chosen solution.
- 77 Test the solution to the design problem.
- 78 Evaluate the test results.
- 79 Modify the solution to the design problem, if needed.
- 80 Test the modification/alternate solution, if needed.
- 81 Document the final project report.
- 82 Present the final project report.

### **Identifying Real-world Problems**

- 83 Research local problems that could benefit from engineering solutions.
- 84 Design an engineering solution to a local problem, using the engineering design process.

### **U Teach Concepts**

85. Analyze user actions to determine required product functions, and then generate questions about the required functionality.
86. Develop quantitative design specifications.
87. Describe the viability of various types of solutions.
88. Maintain clear and concise documentation in their engineering notebooks.
89. Create clear and concise written documentation to communicate their design solution to the customer.
90. Data acquisition, analysis and representation to verify performance
91. Identifying and applying appropriate math and science knowledge
92. Deploying the aerial imaging system
93. System hierarchy and Systems thinking
94. Work in subsystems teams to develop and present a final presentation about their system designs.
95. Analyzing and interpreting requirements and constraints
96. Students understand the legal applications of reverse engineering.
97. Students understand the difference between a utility patent and a design patent.
98. Students benchmark or measure a product.
99. Students communicate an opinion about the existence of patent infringement

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For further information, please call (757) 263-1070.

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