East Penn School District
Secondary Curriculum

A Planned Course Statement
for

# Engineering Technology I

Course # **906** Grade(s) 9,10,11,12

Department: Technology Education

Length of Period (mins.) 42 Total Clock Hours: 63

Periods per Cycle: 6 Length of Course (yrs.) 0.5

Type of Offering: _____ required ___√___ elective

Credit: 0.5

Adopted: 4/23/07

Developed by:

Scott Ramson

**Description of Course #906**

**Course Title: Engineering Technology I**

**Description:** The Engineering Technology I elective will challenge students' creativity with a variety of problem solving activities while introducing students to the field of Engineering. Areas of study may include electricity/electronics, structures, materials testing, and robotics.

**Goals:**

- To acquire an understanding and appreciation for the technologies of the past, present and future.
- To develop an awareness of the broad spectrum of technologies that are needed to maintain and improve our quality of life.
- To acquire insight into the interrelationships of technology and how advancements in one area create possibilities and limitations in other areas.
- To develop an awareness of the interrelationship between science and technology and job opportunities in multifaceted area of engineering.
- To develop safe working habits.
- To be creative in problem solving techniques.

**Requirements:**

- None

**Text:**

Teacher created materials

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**Key to Levels of Achievement (Listed with each learning objective)**

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| Awareness (A): | Students are introduced to concepts, forms, and patterns. |
| Learning (L): | Students are involved in a sequence of steps and practice activities which involved further development and allow evaluation of process. |
| Understanding (U): | Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level. |
| Reinforcement (R): | Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication. |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| **I. Safety** | 1 | Students will learn about personal safety in the Engineering technology lab. | U | • Protective eyewear<br>• Proper dress<br>• Appropriate footwear<br>• Long hair<br>• Jewelry | • Safety quiz<br>• Teacher observation | 3.7A |
| | 2 | Students will learn about the safe operation of the tools and machines in the Engineering technology lab. | U | • Safety rules specific to each tool and machine used in the Engineering technology lab | • Ongoing teacher observation | 3.7A |
| | 3 | Students will learn how to safely handle hazardous materials. | U | • Lecture and discussion of MSDS designations and product labels. | • Ongoing teacher observation | 3.7A |
| | 4 | Students will learn how to safely handle hazardous and flammable liquids/chemicals. | U | • Lecture and discussion of MSDS designations and product labels | • Ongoing teacher observation | 3.7A |
| | 5 | Students will learn how to safely work with and around electricity. | U | • Lecture and discussion pertaining to electric shock, burns, fire, and electrocution | • Ongoing teacher observation | 3.7A |
| **II. Electron Theory** | 6 | Students will learn about matter and energy. | L | • Lecture and text reading on<br>Molecules<br>Elements<br>Compounds | • Quizzes<br>• Worksheets<br>• Lab work | 3.6 |
| | 7 | Students will learn about the structure of the atom. | L | • Lecture and text reading on<br>Electrons<br>Protons<br>Neutrons | • Quizzes<br>• Worksheets | 3.6 |
| | 8 | Students will learn about electric charges. | L | • Lecture and text reading on<br>Electrons<br>Protons<br>Neutrons<br>Free electron<br>Ions<br>Static electricity | • Quizzes<br>• Worksheets | 3.6 |
| | 9 | Students will learn how electrostatic energy is used in industry. | L | • Air clearers<br>• Abrasive paper/cloth manufacturing<br>• Electrostatic spray painting | • Worksheets<br>• Lab work | 3.6 |

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| **III. Electricity/ Electronics** | 10 | Students will learn how electricity is measured. | U | • Volts<br>• Amperes<br>• Coulomb<br>• Ohms<br>• Factors of resistance (size, type, length and temperature of conductor) | • Quizzes/tests<br>• Worksheets<br>• Lab work | 3.6 |
| | 11 | Students will learn how to identify basic electrical circuits. | L | • Serries circuits<br>• Parallel circuits<br>• Polarity<br>• Ground fault breakers<br>• Building/using a circuit tester | • Quizzes/tests<br>• Worksheets<br>• Lab work | 3.6 |
| | 12 | Students will learn the basics of electrical wiring. | L | • Electric service/meters<br>• Wire size<br>• Switches/outlets<br>• Electrical codes<br>• Hands on electrical<br>• Wiring exercises | • Quizzes/tests<br>• Worksheets<br>• Lab work | 3.6 |
| | 13 | Students will gain an understanding of basic electronic principles and components. | U | • Inductance<br>• Transformers<br>• Capacitance<br>• Semi-conductors<br>• Integrated circuits | • Quizzes/tests<br>• Worksheets<br>• Project work | 3.6 |
| | 14 | Students will select and build a Level I electronics project. | L | • Component identification<br>• Printed circuit boards<br>• Schematic diagrams<br>• Assembly diagrams<br>• Soldering<br>• Sheet metal fabrication | • Quizzes/tests<br>• Worksheets<br>• Project work | 3.6 |
| **IV. Structures/Bridges Material Testing** | 15 | Students will learn about the different types of loads that act upon a structure. | L | • Live loads<br>• Dead loads<br>• Dynamic loads<br>• Wind loads<br>• Earth quake<br>• Thermal and settlement loads | • Quizzes/tests<br>• Worksheets<br>• Lab work | 3.6 |
| | 16 | Students will learn about different materials used to | L | • Tension and compression<br>• Elasticity and plasticity | • Quizzes/tests<br>• Worksheets | 3.6 |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
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| | | construct structures. | | • Safety factors<br>• Wood<br>• Steel<br>• Concrete/reinforced concrete/pre-stressed concrete<br>• Plastics | • Lab project work | |
| | 17 | Students will design, build and test a bridge of their own design. | L | • Arch, beam, suspension and truss bridge designs<br>• The planning process<br>• Materials for model bridge building<br>• Material processing/model bridge building techniques<br>• The destructive testing process | • Quizzes/tests<br>• Worksheets<br>• Lab/project work | 3.6 |
| **V. Robotics** | 18 | Students will explore a brief history of robotics. | L | • Karel capek<br>• Rossum's Universal Robots<br>• Origin – forced labor<br>• Definition<br>• Characteristics<br>• Properties<br>• Structure | • Quizzes<br>• Worksheets<br>• Lab work | 3.6 |
| | 19 | Students will learn the different classifications. | L | • Manual handling devices<br>• Fixed sequence robot<br>• Variable sequence robot<br>• Playback robot<br>• Numerical control robot<br>• Intelligent robot | • Quizzes<br>• Worksheets<br>• Lab work | 3.6 |
| | 20 | Students will explore the different uses for robots. | L | • Exploration<br>• Industry<br>• Hazardous duty<br>• Maintenance<br>• Fire fighting<br>• Medical | • Quizzes<br>• Worksheets<br>• Lab work | 3.6 |
| | 21 | Students will design and build their own Wheel Driver robot | U | • Planning/Design<br>• Sheet metal<br>• Fasteners<br>• Soldering | • Lab work | 3.6 |

| Unit | Num | Objective | Level | Content | Evaluation | Standard |
|---|---|---|---|---|---|---|
| | | | | • Wiring<br>• Gear drives | | |