Technology II

Grades: 9-12

Prerequisite: Introduction to Technology

Credits: 2.5

ABSTRACT

Technology II is a half-year course open to students in grades 9-12. Throughout this course the students will acquire and put to use technological knowledge to solve technological problems using the engineering design process. This course will prepare the students to become problem solvers, technological thinkers and innovators through practical applications of math, science, technology and construction. It will provide students with essential core strategies for acquiring and using technology to find and develop their own solutions to solve technological problems.

BOE approved: 06/13/2017
## MONTVILLE TOWNSHIP PUBLIC SCHOOLS

### Technology II

<table>
<thead>
<tr>
<th>Unit of Study: Unit # 1</th>
<th>Unit # 2</th>
<th>Unit # 3</th>
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<tbody>
<tr>
<td>(Timeframe) Safety &amp; Measurement, Drafting, Structure &amp; Counter weight (Weeks 1-4)</td>
<td>Hydraulics &amp; Pneumatics (Weeks 5-9)</td>
<td>Magnetism &amp; Electronics (Weeks 10-14)</td>
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### STAGE 1: Desired Results

#### Established Goals:

**NJSLS:** Standards that are only applicable to the unit; include technology and 21st century standards

- **Technology**
  - 21st Century Life and Careers
    - 9.3.12.AC.1, 9.3.12.AC.2, 9.3.12.AC.6, 9.3.12.AC.7
  - Visual and Performing Arts
    - 1.3.12.D.1, 1.4.12.B.1

- **Technology**
  - 21st Century Life and Careers
    - 9.3.12.AC-CST.8, 9.3.12.AC-CST.6
  - Visual and Performing Arts
    - 1.3.12.D.1, 1.4.12.B.1

- **Technology**
  - 1.3.12.D.1, 1.4.12.B.1
  - 21st Century Life and Careers
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    - 9.3.12.AC-CST.8, 9.3.12.AC-CST.6
  - Visual and Performing Arts
    - 1.3.12.D.1, 1.4.12.B.1

#### Enduring Understandings:

(What big ideas will students know?)

- Following safety procedures and using personal protection equipment will reduce the risk of injury.
- Working with others is an important skill for life and the workplace.
- Technology has strong connections to all subject areas, especially science, math and the arts.
- The design process is a series of steps taken in order to create a product or solve a problem.
- Understanding the definition of

- Both pneumatics and hydraulics are applications of fluid power.
- Pneumatics is a branch of engineering that makes use of gas or pressurized air while hydraulics is a technology and applied science using engineering, chemistry, and other sciences involving the mechanical properties and use of liquids.
- Magnetism is a class of physical phenomena that are mediated by magnetic fields.
- Electronics is the science dealing with the development and application of devices and systems involving the flow of electrons in a vacuum, in gaseous media, and in semiconductors.
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structure and the math, science and technology behind counterbalance are essential in designing and constructing a lifting device.

### Essential Questions:
(What questions are open-ended, debatable, global and spark critical thinking?)

1. What is the purpose of structure in the modern world?
2. Is equal distribution of load necessary?
3. How does a prototype demonstrate the ideas of structure and counterbalance?

1. How are hydraulics and pneumatics used in the world today?
2. How will your prototype demonstrate hydraulics and pneumatics in use?

1. What uses does magnetism have in the world today?
2. Do electronics and magnetism work together to better our world?
3. How will your prototype demonstrate the learned knowledge about magnetism and electronics?

### STAGE 2: Evidence

**Assessment & Evidence:**
(Through what authentic performance tasks will students demonstrate the desired understandings?)
(By what criteria will performances of understanding be judged?)

- Through the engineering design process the student will create a working prototype of a crane that will be tested on how much weight it can lift and hold while suspended in the air.
- The assessment of this project will be judged by a designed rubric that will look at all of the aspects of the design loop as well as a written journal and final self assessment of the groups work.

- Through the engineering design process the student will create a working prototype of a Robotic Arm that will be tested on how much weight it can lift and hold while suspended in air.
- The assessment of this project will be by a designed rubric that will look at all of the aspects of the design loop as well as a written journal and final self assessment of the groups work.

- Through the engineering design process the student will create a working prototype of a Maglev Vehicle that will be tested on how fast it can move down a track.
- The assessment of this project will be by a designed rubric that will look at all of the aspects of the design loop as well as a written journal and final self assessment of the groups work.

### STAGE 3: Learning Plan

**Activities/Content:**
(What is the core content of this unit? What performance tasks/activities will students do? What skills will students know?)

- Follow safety procedures and use personal protection equipment.
- Introduce how load and structure are interdependent in cranes.
- Introduce balance and counterbalance in structures.
- **Project #1 (Crane Project)** Design a lifting device from research and collaboration with a group.
- Introduce hydraulics and pneumatics. Study various examples and uses.
- **Project #2 (Robotic Arm)** Design a grabbing and lifting device from research and collaboration with a group.
- Create a working

- Follow safety procedures and use personal protection equipment.
- Introduce magnetism and its uses. Study various examples and uses.
- Introduce electronics and how they are used in vehicles today.
- **Project #3 (Maglev Vehicles)** Design a magnetic levitating vehicle from research and collaboration with their group.
- Create a working
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- Create a working prototype from their collaborative design.

### Resources:
- Classroom supplies for technological learning activities (TLA)
- Current textbook and resource binder
- PowerPoint/SMART Notebook Presentation
- Internet

### Interdisciplinary Connections:
**Mathematics**
- Measuring, arithmetic, and geometry.

**English Language Arts**
- Writing/journaling and research.

**21st Century Life and Careers**
- 9.3.12.AC- CST.5 Apply practices and procedures required to maintain jobsite safety.
- 9.3.12.AC- DES.1 Justify design solutions through the use of research documentation and analysis of data.
- 9.3.12.AC- DES.2 Use effective communication skills and strategies

**Visual and Performing Arts**
- 1.3 Performance:
  - Synthesize the elements of art and principles of design in an original portfolio of two- and three-dimensional artworks that reflects personal style and a high degree of technical proficiency and expressivity.
  - 1.4 Aesthetic Responses & Critique Methodologies:
    - Formulate criteria for arts evaluation using the principles of positive critique and observation of the elements of art and

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Differentiation: (What type of differentiated instruction will be used for ELL, SP.ED. and G&T students?)

- A hands-on approach to assignments and projects is recommended as the most effective method of learning. Teacher should always adjust learning environment based on or special education needs.
- Students with individual learning styles can be assisted through adjustments in assessment standards, one-to-one teacher
- Support, additional testing time, and use of visual and auditory teaching methods.
- A wide variety of assessments and strategies complement the individual learning experience.

Established Goals: NJSLS:
(Standards that are only applicable to the unit; include technology and 21st century standards)

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<tr>
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<td>8.2D.12.5, 8.2D.12.1, 8.2C.12.6,</td>
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<td>8.2C.12.5,</td>
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### Enduring Understandings:
(What big ideas will students know?)
- In order to build a rocket, a person must understand the math, science, and engineering principles behind structure, balance, weight distribution, aerodynamics and thrust.
- The ability to present and demonstrate a working prototype of their solution to the project challenge.

### Essential Questions:
(What questions are open-ended, debatable, global and spark critical thinking?)
1. Is it important for us to know how to build a rocket?
2. Why might an individual want to know how to build a rocket?
3. How do we apply this information and knowledge to our prototype projects?

### STAGE 2: Evidence

- Through the engineering design process the student will create a working prototype of a Rock that will be tested on it’s ability to properly launch.
- The assessment of this project will be by a designed rubric that will...
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### STAGE 3: Learning Plan

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| ● Follow safety procedures and use personal protection equipment to reduce the risk of injury in the shop.  
● **Project #4 (Build your own Rocket)** Design and build a rocket from research and collaboration with their group.  
● Students will create a working prototype from their collaborated design. |  |

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Current textbook and resource binder  
PowerPoint/SMART Notebook Presentation  
Internet |  |

| Interdisciplinary Connections: (e.g. writing, literacy, math, science, history, 21st century life and careers, technology) | Mathematics  
Measuring, arithmetic, and geometry.  
English Language Arts  
Writing/journaling and research.  
**21st Century Life and Careers**  
9.3.12.AC- CST.5 Apply practices and procedures required to maintain jobsite safety.  
9.3.12.AC- DES.1 Justify design solutions through the use of research documentation and analysis of data.  
9.3.12.AC- DES.2 Use effective communication skills and strategies |  |
**Visual and Performing Arts**

1.3 Performance:
Synthesize the elements of art and principles of design in an original portfolio of two- and three-dimensional artworks that reflects personal style and a high degree of technical proficiency and expressivity.

1.4 Aesthetic Responses & Critique Methodologies:
Formulate criteria for arts evaluation using the principles of positive critique and observation of the elements of art and principles of design, and use the criteria to evaluate works of dance, music, theatre, visual, and multimedia artwork from diverse cultural contexts and historical eras.

**Differentiation:** (What type of differentiated instruction will be used for ELL, SP.ED. and G&T students?)

- A hands-on approach to assignments and projects is recommended as the most effective method of learning. Teacher should always adjust learning environment based on or special education needs.

- Students with individual learning styles can be assisted through adjustments in assessment standards, one-to-one teacher support, additional testing time, and use of visual and auditory teaching methods.

- A wide variety of assessments and strategies complement the individual learning experience.