

**POWER, ENERGY, AND TRANSPORTATION TECHNOLOGY II**  
**DEPARTMENT OF TECHNOLOGICAL STUDIES**  
**HIGH POINT REGIONAL HIGH SCHOOL**

**COURSE OUTLINE/PROFECIENCIES**

***Introduction:***

This second Power, Energy, and Transportation Technology course will to continue to provide our students with the hands on practical knowledge of how these critical systems within our society are constructed and operate. Studying modes of transportation and then applying these concepts in order to solve real life problems will provide students with a better understanding of how real world situations are addressed. Furthermore, with different forms of energy and power emerging here in the 21<sup>st</sup> Century, our students will be introduced to both the advantages and disadvantages of these new systems and how they differ from the traditional forms while concurrently completing activities which pertain to them.

***Purpose:***

This course concentrates on a wide range of technological areas related to power, energy, and transportation, specifically air and space transportation. The emphasis will continue to be on hands on, problem solving activities in which students work together in lab activities designed to reinforce the content presented. (Activities present information on alternate energy and power systems including solar, hydroelectric, wind, mechanical, electrical, and fluid power.) After having studied in depth land and marine transportation during the first year of the course, a strong emphasis will now be placed on a variety of modes of air and aerospace transportation.

***Method of Instruction:***

This course will be taught through a variety of instructional methods. Formal instruction will occur in order to present to the students the knowledge necessary to successfully complete the assigned supplemental activities. This knowledge will be applied through comprehensive design and problem solving projects that will require the following:

- Extensive research and development
- The generation of multiple solutions to the real life situation presented
- Detailed drawings and prototype development
- Portfolio development
- Cooperative and effective teamwork
- Active class participation through a variety of presentation techniques

Students will be strongly encouraged to actively participate in class discussions with the instructor and each other. Students will be expected to conduct themselves in a manner that will only enhance the cooperative work environment that will be present in this class.

There will be little homework assigned and ample time will be provided during class for all related assignments. Students will be encouraged to stay after school at certain times throughout the year to enhance or in some cases complete the assigned projects.

***Evaluation:***

## POWER, ENERGY, AND TRANSPORTATION TECHNOLOGY II – COURSE OUTLINE/PROFICIENCIES

The following are the items included in the evaluation of student achievement with approximate percentage constituted by each in the computation of the grade received by the student.

Classwork/Homework	10%
Quizzes	10%
Tests	15%
Projects/Labs	35%
Class Participation	30%

As noted, class participation plays a critical role in a student's success in this course. Each student will receive a weekly class participation grade in class largely based upon classroom conduct, citizenship, following safety guidelines, arriving prepared for class, teamwork, and effort. Grading criteria in terms of class participation on any given week will be based on the nature of the class, as it will change multiple times throughout the year.

### ***Course Proficiencies and Approximate Sequence***

At the conclusion of the course, the student should demonstrate minimum competency in the skills and knowledge described in the unit goals listed below.

#### **Unit 1 Classroom Safety and Course Introduction**

**3 Days**

The student will:

1. Identify the various safety measures that must be considered on a daily basis within the classroom.
2. List several regulations and rules associated with safety glasses in terms of usage and maintenance.
3. Describe the important notes associated with power tool safety
4. Discuss ways in which we can maximize safety within our classroom

#### **Unit 2 Review - Introduction to Technology**

**3 Weeks**

The student will:

1. Review the concepts and stereotypes associated with technology.
2. Identify the practical differences between science and technology.
3. Review technology as a system, and list and explain the components of these systems.
4. Review and apply the design loop and its impact on technological problem solving.
5. Review the principles and elements of design to develop a portfolio.

#### **Unit 3 Introduction to Power, Energy, and Transportation**

**1 Week**

The student will:

1. Review the importance of power, energy, and transportation in today's society and technology's impact on transportation systems.
2. Discuss changes in the transportation sector over the course of the year.
3. Review the major components, routes, and sub-systems found within all modes of transportation.

**Unit 4 Review – Land and Marine Transportation**

**1 Week**

The student will:

1. Review the major concepts identified in land transportation systems.
2. Review the six vehicular systems.
3. Analyze the potential for alternative energy in land and marine transportation systems.
4. Troubleshoot how past experiences may facilitate the design and development of new transportation systems.

**Unit 5 Introduction to Air Transportation**

**2 Weeks**

The student will:

1. Define the components necessary to designate a vehicle an “aircraft”.
2. Identify the three basic movements of an aircraft: roll, pitch, and yaw
3. Examine the history of air transportation, with a specific focus on the Wright Brothers and the evolution of aeronautic transportation.
4. Discuss the natural forces and vehicular systems required for flight.
5. Discuss potential careers and the future of air transportation.

**Unit 6 Introduction to Orthographic Projection**

**2 Weeks**

The student will:

1. Define the concepts involved with orthographic projection, dimensioning, line weight, and line types.
2. Recognize the different commands that represent the interface of the computer design software.

**Unit 7 Design and Development: Air Transportation**

**6 Weeks**

The student will:

1. Implement the steps of the design process
2. Apply acquired knowledge into the design and development of a working prototype.
3. Introduce a variety of different materials for usage and processing.
4. Utilize a variety of forms of presentation techniques.

**Unit 8 Review: Alternative Energy**

**2 Weeks**

The student will:

1. Review renewable energy resources.
2. Explain how energy technology can make our lives better, and how energy technology can cause damage based upon the knowledge acquired in Power, Energy, and Transportation.
3. Review the prominent forms of alternative energy, their uses, and technology’s impact on their function and the environment especially as they relate to the different forms of air and space transportation.

**Unit 9 Design and Development: Powered Air Transportation**

**8 Weeks**

The student will:

1. Test and evaluate a previous design in order to improve and expand upon what has already been done.
2. Identify the basic sources of propulsion as they relate to flight.
3. Apply the forces of lift, drag, thrust, and gravity.
4. Utilize a variety of different materials, processing tools, and presentation techniques to meet the specifications, requirements, and limitations.

**Unit 10 Introduction to Space Transportation**

**3 Weeks**

The student will:

1. Describe the modes of space transportation.
2. Describe the space environment and its acceptance of transportation.
3. Identify the different space vehicles.
4. Describe what makes spacecraft fly.
5. Introduce the concept of orbiting and its importance to aeronautical transportation.
6. Introduce the different routes, modes, and sub-systems found in space transportation systems.

**Unit 11 Design and Development: Space Transportation**

**8 Weeks**

The student will:

1. List, describe, and implement the steps of the design process in order to develop a comprehensive documentation portfolio.
2. Apply the importance of guidance, control, propulsion, and structural systems to the effectiveness of the aerospace transportation vehicle.
3. Apply various concepts within energy and power to the structural design of this prototype.
4. Utilize a variety of presentation techniques.

**NOTE: All times listed are approximate.**

***Materials for Instruction:***

1. Johnson, Stephen R. Exploring Transportation. (Goodheart-Wilcox Company, Tinley Park, Illinois). 2000. ISBN 1-56637-675-0.
2. Smith, Howard. Understanding Technology. (Goodheart-Wilcox Company, Tinley Park, Illinois). 1998. ISBN 1-56637-374-3.
3. Wright, Thomas. Technology Systems. (Goodheart-Wilcox Company, Tinley Park, Illinois). 1966. ISBN1-56637-263-1.
4. SmartBoard technology
5. Overheads
6. Models and demonstration tools.
7. NASA CD-Rom Technology, word processing, computer design software
8. Centennial of Flight materials and resources
9. Handouts and worksheets
10. Variety of different materials for usage and processing
11. Videos describing technology, transportation, small engines, and alternate energy
12. Several Internet websites.



