

Foundations of Energy Technology

Course Description:

Foundations of Energy Technologies explores the relationship between force, work, energy, and power. Students study the characteristics, availability, conversion, control, transmission, and storage of energy and power. The course also examines and applies the principles of electrical, fluid, and mechanical power, as well as research renewable, non-renewable, and inexhaustible resources and conservation efforts. Students will gain an understanding of the various careers in energy and related technologies.

Classroom Expectations:

- Be on time and ready to learn.
- Respect is a two-way street; employ it with everyone and it will be reciprocated; be kind to one and other.
- Educational discourse is key, and you must actively listen; listen while others are talking.
- The classroom is always your place of business necessitating professionalism, no horseplay.

Classroom Procedures:

Entering the Classroom:

- Enter the classroom quietly take out your composition notebook and record the days Learning Target, Essential Question, and Agenda. ***(No food, drinks, or phones)***.
- Gather necessary materials for the days lesson and hang all bags on the back of the chair that you are occupying. ***(Specific materials will be highlighted on the Energy Systems White Board)***.
- Begin work on opening exercise quietly.

Exiting the Classroom:

- Secure all classroom equipment and place in assigned area.
- Ensure that your area is clean and clear before leaving. ***(This includes computer workstations that you were utilizing or other assigned spaces)***.
- Turn-in classroom assignments to appropriate physical or digital drop box.
- Return to your assigned seat until the bell rings and you are dismissed by the instructor.

Disciplinary Actions: *The order and type of consequences depend on the nature and severity of the infraction.*

- Verbal Warning
- Lunch Detention and phone call home. (*Minor Infractions*).
- Counselor Referral.
- Discipline Referral. (*Major and Chronic Disciplinary Infractions*).

Course Standards:

Standard 1: Employability Skills

- Communicate effectively through various means.
- Demonstrate creativity and problem-solving skills.
- Exhibit critical thinking in career planning.
- Model work readiness traits (integrity, honesty, accountability).
- Apply teamwork skills and demonstrate productivity.
- Present a professional image.

Standard 2: Energy, Work, Power, and Force

- Define terms related to energy use and measurement.
- Explain Newton's Laws.
- Measure energy and determine work accomplished.
- Differentiate between energy and power.
- Identify common forms of power.

Standard 3: Simple Machines

- Identify and explain six simple machines.
- Understand mechanical advantage.
- Solve problems involving simple machines.

Standard 4: Fluid Power Systems

- Apply Boyle's Law, Charles Law, and Archimedes' Principle.
- Explain fluid power and its applications.
- Solve mathematical problems in fluid power systems.

Standard 5: Electrical Circuits

- Differentiate between AC and DC circuits.
- Apply Ohm's Law to various circuits.
- Discuss Kirchoff's Law.

Standard 6: Small Engines

- Describe the operation of four-stroke and two-stroke engines.
- Explain valve timing and lubrication systems.
- Disassemble and reassemble a basic small engine.

Academic Standards Integration:

- **Science:** Understanding energy forms, Newtonian physics, quantum mechanics, and relativity.
- **Mathematics:** Computation and estimation skills, problem-solving, mathematical connections.
- **ELA/Literacy:** Reading, writing, and discussion skills relevant to technical subjects.

Topics Breakdown:

Career and Technology Student Organizations (CTSOs)

- Goals and mission of CTSOs
- Opportunities through participation in TSA
- Promotion of community service and professional development
- Teamwork and project management skills

Get Up to Speed on Energy Careers and Concepts

- Course overview
- Find your exceptional career in energy
- What exactly is energy anyway?
- Here's why energy is important
- Energy efficiency everywhere
- Energy systems are ecosystems
- Getting real about workplace safety
- Organizations that prioritize safety
- Good regulations do great things

Fueling Our Energy Future

- What Are the Facts on Fuels?
- Where Generation Meets Demand

The Technologies that Generate Electricity

- Steam-Electric Power Basics
- Natural Gas
- Coal

- Nuclear
- Wind
- Hydroelectric
- Solar Photovoltaics (PV)
- Biomass and Biogas
- Geothermal

Our Generation's Energy Trends

- Changes in power generation
- Emerging Fuel: Hydrogen
- Emerging Fuel: Marine Energy
- Energy Storage Systems (ESS)

The Past, Present, and Future of Energy

- Electric Revolution: From Lightning to Current War
- The First Energy Companies
- Rapid Expansion of Electricity Service

Assessment Methods:

Major Grades= 40% Minor Grades= 60% Total= 100%

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|-----------------------------------|---|-------|
| • Classwork/Homework | = | Minor |
| • Quizzes | = | Minor |
| • Exams | = | Major |
| • Papers/Presentations/Debates | = | Major |
| • Projects & Engineering Notebook | = | Major |

Late Assignments: Late work/assignments are defined as, “assignments that are submitted after the specific deadline”.

- Late assignments may result in scores being reduced by 5% per school day for a 25% maximum reduction (five school days).
- Late work submitted after the fifth school day will **NOT** be accepted.
- Repeated incidents of late work may result in a teacher-student-parent conference to examine and correct the student's work habits through an academic contract.

Resources:

- Center for Electronic Workforce Development Energy Industry Fundamentals Certificate Course 2.0
- Scientific journals and articles

- Online databases and tools
- Guest speakers from the energy industry

Materials:

- 5 Composition Notebooks
- Pens or Pencils
- Wired Headphones with 3.5mm jack
- 2-3” Binder (Engineering Notebook)
- Loose Leaf Paper (College Rule OK)

This syllabus provides a structured framework for the course, ensuring a comprehensive understanding of energy and power generation, transmission, and distribution while aligning with academic standards and fostering essential employability skills.

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