

Energy & Power: Generation, Transmission, and Distribution

Course Description:

This course provides students with a comprehensive understanding of the energy industry, focusing on the infrastructure, generation, transmission, and distribution of energy. It covers various energy sources, their economic and environmental impacts, and future trends in the energy sector. Students will also develop a research project on an alternative energy system.

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

- **Communication:** Effective writing, speaking, listening, and interpersonal abilities.
- **Creativity:** Asking challenging questions and applying innovative procedures.
- **Critical Thinking:** Analyzing and applying information in career planning and employment situations.
- **Work Readiness:** Traits such as integrity, honesty, accountability, and time management.
- **Technological Adaptability:** Skills to be productive in a diverse workplace.
- **Professional Image:** Presenting a professional image through appearance, behavior, and language.

Standard 2: History of the Energy Industry

- **US Energy History:** Understanding the evolution of the US energy industry and infrastructures.
- **Laws and Regulations:** Identifying laws impacting the energy industry.
- **Regulatory Bodies:** The role of organizations regulating energy and power.
- **Clean Air Act:** Elements and regulations of the Clean Air Act of 1970 and 1990.

Standard 3: Generation and Distribution of Power

- **Flow of Power:** From generation to distribution.
- **Electric Power System:** Components and their interrelations.
- **Energy Generation:** Comparing mechanisms and advantages.
- **Energy Distribution:** Contrasting forms and benefits.

Standard 4: Energy Sources and Impact

- **Types of Energy:** Nonrenewable, renewable, and inexhaustible energy sources.
- **Energy Examples:** Specific examples and uses in geographical locations.
- **Environmental Impact:** Positive and negative effects on the global environment and society.

Standard 5: Alternative Power and Energy

- **Alternative Needs:** Necessity for alternatives to fossil fuels.
- **Energy Sources:** Wind, earth, oceans, and biomass.
- **Development and Comparison:** Development of alternative energies and their regional suitability.
- **Economic and Environmental Issues:** Spreadsheet detailing issues of at least five alternative energies.

Standard 6: Future Trends in Power and Energy

- **Trends:** Present and future trends in energy, power, and transportation systems.
- **Organizations:** Current entities focused on new energy sources.
- **Nanotechnology:** Implications for future energy technology.
- **Careers:** Jobs related to innovative energy technologies.

Standard 7: Research and Development of Alternative Energy Systems

- **Research Paper:** Listing innovative alternative energies.
- **System Design:** Computer model or prototype to produce power for a specific need.
- **Engineering Notebook:** Daily journal, spreadsheet, and development photos.
- **Community Need:** Documenting the necessity of the product.
- **Presentation:** Presenting data and prototype to peers or community members.

Standard 8: Exploration of Related Fields

- **Connections:** Exploring how energy connects with other fields and applications.

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

Companies That Power America

- Utilities and Agencies With Power
- Case Study: North Carolina
- Clearing the Air: Energy and Pollution

The Technologies that Generate Electricity

- Power Players: FERC, NERC, and the IEEE
- What is Deregulation?

The Future of Energy Companies

- The Business of Energy
- Business Case Studies: Constellation and Exelon
- Rebalancing the Carbon Cycle

The Power Transmission System

- The Lowdown on High-Voltage Transmission
- Power Transmission Lines, Towers and Transformers
- Electric Transmission System Challenges and Opportunities

The Power Distribution System

- Introduction to the Distribution System
- Distribution System Components
- Maintenance and Safety: Make It A Priority

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.

Student Printed Name

Student Signature and Date

Parent Printed Name

Parent Signature and Date

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