

Energy Career Cluster
Appropriate and Alternative Energy Technologies
Course Number 21.45700

Course Description:

As the third course in the Energy Systems Pathway, students will develop an understanding of the differences between nonrenewable and renewable energy sources and how these energy sources affect their world. Alternative energy sources will be researched to include the regional implications and economic, environmental, and sustainability issues. Students will evaluate the positive and negative impacts of nuclear power and its relevancy to various situations in today's society. Students will explore future trends of energy, power, and transportation. Students will develop, through research, an alternative energy system that will demonstrate their understanding of a unique, as well as appropriate, approach to energy generation. The prerequisite for this course is Energy and Power Technology.

Course Standard 1

ENRG-AAET-1

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.

The following elements should be integrated throughout the content of this course.

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies
Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening
	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback
				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter

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Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads
	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship
				Staying Motivated to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss

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Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture
Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates
Behavior at Conventions			Accepting Criticism
International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:

Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

Course Standard 2

ENRG-AAET-2

Analyze current and potential careers in energy.

- 2.1 Analyze careers related to the development of innovative power, energy, and transportation technologies.
- 2.2 Predict which careers will be required in fifty years.
- 2.3 Identify education requirements for energy occupations and locations where programs of study are available.
- 2.4 Participate in activities related to energy occupations.
- 2.5 Explain how energy occupations relate to a green environment and sustainability.

Course Standard 3

ENRG-AAET-3

Understand the differences between nonrenewable and renewable types of energy sources and how each affects their world.

- 3.1 Research and create a project presenting non-renewable and renewable energy sources.
- 3.2 Categorize in a chart examples of nonrenewable and renewable energy sources.
- 3.3 Propose appropriate uses of each of these forms of energy in specific geographical locations through a written artifact.
- 3.4 Differentiate the positive and negative impacts of non-renewable and renewable energy sources on the global environment, society, and the individual through an oral presentation.

Course Standard 4

ENRG-AAET-4

Define alternative energy and list several alternative sources and discuss the regional implications of each, including, but not limited to, economic, environmental, and sustainability issues.

- 4.1 Explain the existing and future need to develop alternatives to fossil fuels as our primary source of energy.
- 4.2 State how renewable energy sources (wind, earth, oceans, biomass and waste) can be used to supply energy.
- 4.3 Discuss how alternative energies that utilize wind, earth, oceans, biomass, and waste were developed.
- 4.4 Compare and contrast various locations throughout the world which would be best suited for utilization of renewable energies as alternative energy sources.
- 4.5 Develop a spreadsheet that details the economic, environmental, and sustainability issues of at least five alternative energies in Georgia.

Course Standard 5

ENRG-AAET-5

Define nuclear power and discuss it in terms of its positive and negative impacts and explain its relevancy to various situations in today's society.

- 5.1 Define terms relating to nuclear energy, including but not limited to, the following: fission, fusion, reactor, Kyoto Protocol, control rod, half-life, uranium 235 and uranium 238, nucleus, proton, neutron, and radioactivity, hydrogen isotope deuterium.
- 5.2 Create and explain a flow chart that details the U.S. Nuclear Fuel Cycle.

- 5.3 Construct an outline that provides information regarding present and future uses of nuclear power in the world.
- 5.4 Conduct a research review and record data in a chart or table that compares the positive and negative impacts of nuclear power.
- 5.5 Create a letter that either supports or refutes the need for nuclear power in the student's community.

Course Standard 6

ENRG-AAET-6

Discuss and provide research support for the future trends of energy and power and their impact on modes of transportation in developed and underdeveloped economies.

- 6.1 Cite evidence on how power and transportation systems will be impacted by alternative energy sources.
- 6.2 Outline the relationship between present and future trends in terms of energy, power, and transportation systems and their environmental impact.
- 6.3 Research the impact of organizations committed to the development of new sources of energy, power, and transportation.
- 6.4 Explain future land, water, air, and space transportation technologies with a project.
- 6.5 Define nanotechnology and summarize its implications in relationship to the future of energy, power, and transportation technology.

Course Standard 7

ENRG-AAET-7

Create a culminating project that demonstrates an understanding of alternative energy systems by incorporating a unique, as well as appropriate, approach to energy generation.

- 7.1 Develop through research, an original paper that lists innovative alternative energies.
- 7.2 Design a system, either via computer model or prototype, which will produce power for a specific need.
- 7.3 Apply concepts and submit engineering documentation such as but not limited to, daily journal, spreadsheet, images, and calculations that show the development of this product.
- 7.4 Document the need for this product within the community.
- 7.5 Synthesize data and computer model or prototype to a group of peers and/or school staff/community members.