

Agriculture, Food & Natural Resources Career Cluster
Introduction to Renewable Energies
Course Number: 03.47100

Course Description:

This course is designed as a component of one of the pathways in the Environmental Systems Pathway. The course introduces the student to current technology related to renewable energy sources and explores possible alternatives to meeting the United States and the world’s future energy needs. The role of agriculture in the production of renewable energy is a primary component of the class. Classroom and laboratory activities are supplemented through supervised agricultural experiences and leadership programs and activities.

Course Standard 1

AFNR-IRE-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
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

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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
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

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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

AFNR-IRE-2

Relate the role of the FFA in his/her personal development.

- 2.1 Illustrate the relationship of the FFA within the Agricultural Education model and describe the role and function of the organizational structure from the chapter to national level.
- 2.2 Demonstrate communication skills individually and within group situations by using public speaking skills and parliamentary procedure abilities.
- 2.3 Design personal leadership plan that includes opportunities for personal development through student, chapter, and community related activities.

Course Standard 3

AFNR-IRE-3

Explore, develop, and implement Supervised Agricultural Experience (SAE) program by exploring careers in agriculture and agribusiness.

- 3.1 Design, implement, and document SAE by recording steps, skills acquired, and financial information.
- 3.2 Demonstrate employability skills, such as work ethic, timeliness, communication, and self-direction.
- 3.3 Explain the role of the different types of agribusiness in society and identify agribusinesses in the local community.
- 3.4 Define agribusiness terminology and discuss the role of marketing in agricultural production.
- 3.5 Analyze skills, education requirements, income, and advantages and disadvantages of careers in the agriculture industry.

Course Standard 4

AFNR-IRE-4

Define energy systems and resources and determine the possibilities of providing the country with alternative and renewable energy with the goal of becoming energy independent in the future.

- 4.1 Research energy systems to determine the impact of energy systems on daily lives.
- 4.2 Identify and predict current and future energy systems.
- 4.3 Develop a resource inventory to determine what agriculture resources could be used to produce energy.

Course Standard 5

AFNR-IRE-5

Determine energy needs, sustainability, and how the environment is impacted through energy use.

- 5.1 Conduct an energy inventory to determine the current energy consumption.
- 5.2 Calculate energy needs of the future.
- 5.3 Determine how much energy could be gained from renewable resources such as row crops, grasses, and timber.
- 5.4 Examine the impact of energy development and usage on the environment.

Course Standard 6

AFNR-IRE-6

Analyze basic electrical principles

- 6.1 Identify and describe the units used in electricity – volts, ohms, and amperage.
- 6.2 Solve electrical problems using Ohm's Law.
- 6.3 Determine the energy usage in the home, farm, and/or ranch.

Course Standard 7

AFNR-IRE-7

Describe the current and potential future uses of Combined Heat and Power (CHP)/Cogeneration systems.

- 7.1 Identify and describe a CHP/Cogeneration system.
- 7.2 List and summarize uses for CHP/Cogeneration systems.
- 7.3 Determine the potential use of CHP/Cogeneration systems in the future.
- 7.4 Build a small-scale CHP/Cogeneration system.

Course Standard 8

AFNR-IRE-8

Classify types of solar energy systems and describe potential future uses.

- 8.1 Identify and describe different types of solar energy systems.
- 8.2 Determine the use of solar energy in thermal systems.
- 8.3 Examine photovoltaic solar energy systems.
- 8.4 Build a solar energy system that is useful around the home, farm, and/or ranch.

Course Standard 9

AFNR-IRE-9

Identify biomass and biofuels products and determine the potential to decrease reliance on traditional petroleum-based fuels.

- 9.1 Identify biomass products and determine how these products can be used in energy systems.
- 9.2 Identify biofuels in use today and describe the use in energy systems.
- 9.3 Produce a measure of biodiesel that will pass a standardized quality test.

Course Standard 10

AFNR-IRE-10

Identify and describe how biogas is produced using anaerobic digesters

- 10.1 Identify and describe biogas.
- 10.2 Construct an anaerobic digester and produce and capture a measure of biogas.
- 10.3 Analyze the economic potential of anaerobic digesters and determine the feasibility of taking waste and producing biogas used on a farm or ranch.

Course Standard 11

AFNR-IRE-11

Investigate the cellulosic ethanol production procedure and how ethanol can be used in energy systems.

- 11.1 Determine what products can be used to produce ethanol.
- 11.2 Devise a procedure to produce a measure of ethanol.
- 11.3 Use the ethanol produced in an internal combustion engine.