

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.