Agricultural Education Comprehensive Endorsement

Specifications, Competencies & Requirements

PURPOSE

This endorsement is meant for certified teachers interested in teaching **Agricultural Education Comprehensive** courses. It attaches to a current Utah Educator License with a license area of concentration in **Secondary** Education.

Upon attachment of this endorsement to a Utah educator license, educators will be approved to teach the following USBE courses:

- **Agricultural Mechanics, Advanced**
- **Agriculture-Introduction**
- **Agricultural Machinery Technology**
- **Agricultural Mechanics and Technology 1**
- **Agricultural Mechanics and Technology 2**
- **Animal Science 1**
- **Animal Science 2**
- **Aquaculture**
- **Biology-Agricultural Science**
- **Agricultural Science 1**
- **Agricultural Science 2**
- **Equine Science 1**
- **Equine Science 2**
- **Natural Resource Science 1**
- **Natural Resource Science 2**
- **Plant and Soil Science 1**
- **Floriculture**
- **Floriculture, Advanced**
- **Floriculture and Greenhouse Management**
- **Intro to Landscape Architecture**
- **Landscape Management**
- **Nursery Operation**
- **Plant and Soil Science 2**
- **Sustainable Urban Agriculture**
- **Greenhouse Management**
- **Guide Dog Training**
- **Small & Companion Animal Science**
- **Veterinary Assistant 1**
- **Veterinary Assistant 2**
- **College and Career Awareness**
- **Business Leadership 1**
- **Business Communication 1**
- **Business Communication 2**

ENDORSEMENT TYPES

Prerequisite

Demonstrate an understanding of Career and Technical Education (CTE) basics.

- CTE Knowledge

Associate Level Requirements

Applicants must complete **FIVE** of the following competency requirements. The associate level endorsement is valid for up to three school years before it expires. Associate-level endorsements are non-renewable.

- Agribusiness
- Ag Technology & Automation
- Animal Systems
- Plant Systems
- Water Systems
- Clean & Alternative Energy
- Conservation & Land Management
- Ecological Research & Development
- Environmental Protection
- Resource Extraction
- The National FFA Organization & Supervised Agricultural Experience (SAE)
- Agricultural Literacy
- Lab-Based Methods

Learning that works for Utah CTE®

Utah State Board of Education

Professional Level Requirements

The applicant must meet **ALL** the competency areas listed above.

COMPETENCY DETAILS & DESCRIPTIONS

Prerequisite

1. CTE Knowledge

Demonstrate an understanding of CTE basics:

- Explain how CTE links learning to specific Utah industries and what its main goals are.
- Know the licenses and endorsements needed to teach specific CTE courses.
- Describe how CTE is organized into clusters and pathways at the state, district (LEA), and school levels, and how this helps students succeed after graduation.
- Locate and use the state's strands and standards in lesson plans.
- Explore CTE student organizations (CTSOs) and professional groups and explain how they support students and teachers.
- Explain how advisory boards, with industry members, make sure programs meet job market needs and maintain safe learning environments.
- Understand the basics of securing funding, planning for the future of the program, and participating in the state Program of Quality Review (PQR) to ensure program excellence.

Select one of the following options:

- **USBE Course:** CTE Orientation
- **Complete THREE years of full-time CTE Teaching in Utah**
- **Currently hold a professional-level CTE endorsement**

Endorsement Competencies

2. Agribusiness

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Personal Finance Management
   - Demonstrate the ability to create and manage a personal budget, including income, expenses, savings, and debt.
   - Identify and explain the purpose of financial tools such as checking accounts, savings accounts, credit cards, and loans.
   - Interpret a pay stub, including deductions for taxes, insurance, and retirement.
2. Business Structures and Management
   - Compare and contrast common business structures, including sole proprietorship, partnership, LLC, and corporation.
   - Explain the roles and responsibilities of business owners and managers in agricultural enterprises.
   - Develop a basic business plan that includes mission, goals, structure, and staffing.
3. Record Keeping

- Maintain accurate records of income, expenses, inventory, and production using paper or digital tools.
- Explain the importance of record keeping for taxes, decision-making, and business improvement.
- Demonstrate how to organize and store records for easy access and compliance.

4. Cash-Flow Statements, Planning, and Analysis
   - Create a simple cash-flow statement showing projected income and expenses over time.
   - Analyze a cash-flow scenario to identify potential shortfalls or surpluses.
   - Use cash-flow data to make informed financial decisions for agribusiness.
5. Marketing, Sales, and Purchasing
   - Identify target markets and describe strategies for reaching them.
   - Develop a basic marketing plan including product, price, place, and promotion (4 Ps).
   - Demonstrate how to compare vendors and make purchasing decisions based on quality, price, and service.
6. Communication Skills
   - Demonstrate professional communication in written, verbal, and digital formats (e.g., emails, presentations, customer service).
   - Participate in role-play scenarios involving conflict resolution, teamwork, and customer interaction.
   - Create promotional materials such as flyers, social media posts, or business cards.
7. Employment Skills
   - Complete a job application and resume tailored to an agribusiness position.
   - Demonstrate interview skills through mock interviews or video submissions.
   - Explain workplace expectations, including punctuality, dress code, teamwork, and ethics.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Agribusiness** or a degree in Agricultural Education, Agricultural Technology and Automation, Interdisciplinary Studies (Ag), Agricultural Systems Technology (Agricultural Operations Emphasis), or General Studies (Agriculture)
- **Pass the Praxis: Agriculture (5701) Exam**
- **USU Extension Course:** Evaluating Profitable Agricultural Enterprises
- **CASE Institute -** Ag Business Foundations
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
  - APEC 1600 - Natural Resources and American Economic Institutions
  - BUSN 2320 - Small Business Management
  - FCSE 1350 - Financial Literacy
  - BUSN 1021 - Personal Finance

3. Ag Technology & Automation

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Safety Practices

- Identify and demonstrate proper use of personal protective equipment (PPE) for various agricultural tasks.
- Follow safety protocols for tools, machinery, and hazardous materials.
- Recognize and respond to emergency situations, including fire, electrical hazards, and first aid.

2. Agricultural Structures
   - Interpret basic construction plans and blueprints for agricultural buildings.
   - Demonstrate skills in measuring, cutting, and assembling materials used in ag structures (e.g., wood, metal, fasteners).
   - Explain the purpose and function of common agricultural structures, such as barns, greenhouses, and storage facilities.
3. Plumbing
   - Identify plumbing tools and materials, including pipes, fittings, and valves.
   - Demonstrate how to assemble and repair basic plumbing systems, such as water lines or irrigation systems.
   - Explain how water pressure, flow, and drainage affect agricultural operations.
4. Internal Combustion Engines
   - Identify parts and functions of small gas or diesel engines used in agriculture.
   - Perform basic maintenance tasks, such as oil changes, air filter replacement, and spark plug inspection.
   - Diagnose and troubleshoot common engine problems using observation and basic tools.
5. Operation of Power Units
   - Safely operate tractors, mowers, and other power equipment following manufacturer guidelines.
   - Demonstrate pre-operation checks, including fluid levels, tire pressure, and safety features.
   - Explain the importance of power take-off (PTO) safety and proper hitching techniques.
6. Concrete and Electrical Systems
   - Mix and pour concrete for small-scale agricultural applications (e.g., fence posts, pads).
   - Identify basic electrical components, such as switches, outlets, breakers, and wiring.
   - Demonstrate how to safely wire a simple circuit and explain electrical load and grounding.
7. Metal Fabrication
   - Identify and use metalworking tools, including welders, grinders, and cutting torches.
   - Demonstrate basic welding techniques, such as tack welds and bead welds (MIG, stick, or oxy-acetylene).
   - Follow safety procedures for hot work, including ventilation and fire prevention.
8. Autonomous Systems
   - Describe the role of automation and robotics in modern agriculture (e.g., drones, GPS-guided tractors).
   - Demonstrate basic programming or operation of an autonomous system, such as a sensor or robotic arm.
   - Explain how data from autonomous systems can improve efficiency and decision-making in ag operations.
9. Repair and Maintenance
   - Perform routine maintenance on tools, equipment, and facilities to ensure safe operation.

- Identify worn or damaged parts and explain how to repair or replace them.
- Keep maintenance records to track service intervals and repairs.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Agricultural Technology and Automation** or in Agricultural Education, Agricultural Technology and Automation, Interdisciplinary Studies (Ag), Agricultural Systems Technology (Agricultural Operations Emphasis), or General Studies (Agriculture)
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute -** Ag Power and Technology
- **Precision Agriculture Technology:** Institutional Certificate of Proficiency
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
    - GEOG 2800 - Intro to GIS
    - UAS 3010 - Intro to Remote Pilot Certification
    - ASTE 5999 - Precision Agriculture Practicum
    - ASTE 2200 - AC Electrical Applications
    - ASTE 3720 - DC Electrical Systems

4. Animal Systems

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Genetics
    - Explain basic genetic concepts, including traits, heredity, and DNA.
    - Interpret Punnett squares to predict genetic outcomes in livestock breeding.
    - Identify desirable traits in animals and explain how selective breeding is used in agriculture.
2. Animal Nutrition
    - Identify the six basic nutrients and their functions in animal health.
    - Formulate a balanced ration for a specific species based on age, purpose, and production goals.
    - Evaluate feed labels and explain how to meet nutritional requirements.
3. Reproductive Systems
    - Label and describe the reproductive anatomy of male and female livestock species.
    - Explain the reproductive cycle, including estrus, gestation, and parturition.
    - Compare natural and artificial breeding methods, such as AI and embryo transfer.
4. Animal Diseases and Health
    - Identify common diseases by species, symptoms, and causes (bacterial, viral, parasitic).
    - Explain methods of disease prevention, including vaccination, biosecurity, and sanitation.
    - Demonstrate how to monitor animal health through observation and record keeping.
5. Medical Terminology
    - Define and use common veterinary terms, including prefixes, suffixes, and root words.
    - Interpret medical records and prescriptions using appropriate terminology.
    - Communicate animal health information using correct veterinary language.

6. Anatomy and Physiology
    - Identify major body systems (skeletal, muscular, digestive, circulatory, etc.) and their functions.
    - Label anatomical structures on diagrams or models of common livestock species.
    - Explain how body systems work together to maintain animal health.
7. Animal Behavior and Handling
    - Recognize normal and abnormal animal behavior in various species.
    - Demonstrate safe and humane animal handling techniques, including restraint and movement.
    - Explain how stress and environment affect animal behavior and productivity.
8. Veterinary Medicine Principles
    - Describe the role of veterinary professionals in animal care and public health.
    - Explain the steps of a veterinary exam, including history, observation, and diagnostics.
    - Understand legal and ethical responsibilities in veterinary practice.
9. Medication Administration
    - Identify routes of administration, including oral, topical, subcutaneous, and intramuscular.
    - Calculate correct dosages based on weight and prescription.
    - Demonstrate safe handling, storage, and disposal of veterinary medications.
10. Surgical Procedures
    - Describe common surgical procedures (e.g., spay/neuter, dehorning, castration).
    - Understand the role of sterile technique and surgical preparation.
    - Assist with or simulate basic surgical support tasks, such as instrument handling or monitoring.
11. Anesthesia
    - Explain the purpose and types of anesthesia, including local and general.
    - Identify signs of proper sedation and recovery in animals.
    - Understand safety protocols for administering and monitoring anesthesia.
12. Radiology and Imaging
    - Describe the use of diagnostic imaging (X-ray, ultrasound) in veterinary care.
    - Identify basic anatomical features on radiographic images.
    - Follow safety procedures for radiation exposure and equipment use.
13. Fluid Therapy
    - Explain the purpose of fluid therapy in treating dehydration and illness.
    - Identify types of fluids and methods of administration (IV, subcutaneous).
    - Monitor fluid levels and animal response during treatment.
14. Critical Care Nursing
    - Recognize signs of distress or emergency in animals.
    - Provide supportive care, including temperature regulation, wound care, and monitoring vitals.
    - Assist in stabilizing animals until veterinary intervention is available.
15. Facilities and Equipment
    - Identify and maintain veterinary tools and equipment, such as syringes, stethoscopes, and clippers.
    - Design or evaluate animal care facilities for safety, sanitation, and efficiency.
    - Demonstrate proper cleaning and disinfection procedures for equipment and spaces.

16. Horse Evaluation and Selection
    - Evaluate conformation and movement in horses using industry standards.
    - Identify desirable traits for specific disciplines (e.g., racing, ranch work, show).
    - Use judging terminology to justify selection decisions in oral or written formats.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Animal Science** or a degree in Agricultural Education, Agricultural Technology and Automation, Interdisciplinary Studies (Ag), Agricultural Systems Technology (Agricultural Operations Emphasis), or General Studies (Agriculture)
- **CASE Institute -** Principles of Ag Science - Animal
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
    - ADVS 1110 - Introduction to Animal Science
    - ADVS 1100 - Small-scale and Specialty Animal Production
    - ADVS 2000 - Introduction to Veterinary Technology

5. Plant Systems

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Plant Anatomy and Physiology
    - Identify major plant structures (roots, stems, leaves, flowers, seeds) and their functions.
    - Explain how plant systems (vascular, reproductive, photosynthetic) support growth and survival.
    - Describe the processes of photosynthesis, respiration, and transpiration in plant development.
2. Environmental Factors on Plant Growth
    - Analyze how light, temperature, water, and soil affect plant health and productivity.
    - Design experiments to test environmental variables on plant growth.
    - Interpret data to recommend optimal growing conditions for specific crops.
3. Plant Reproduction
    - Compare sexual and asexual reproduction in plants.
    - Demonstrate propagation techniques, such as seed starting, cuttings, grafting, and layering.
    - Explain pollination and fertilization processes in flowering plants.
4. Control of Plant Growth and Development
    - Identify plant hormones and their effects on growth (e.g., auxins, gibberellins).
    - Use pruning, pinching, and training techniques to influence plant form and productivity.
    - Apply growth regulators and explain their agricultural uses.
5. Agronomy Practices
    - Describe crop rotation, soil preparation, and planting methods for field crops.
    - Evaluate pest, weed, and disease management strategies in crop production.
    - Interpret soil tests and recommend amendments for optimal crop yield.
6. Floral Design Techniques
    - Identify floral tools, materials, and flower types used in design.
    - Create basic floral arrangements using principles of design (balance, proportion, color).

- Explain care and handling of cut flowers to extend vase life.

7. Greenhouse Crop Production Techniques
   - Operate greenhouse systems, including temperature, humidity, and irrigation controls.
   - Select and manage crops suited for greenhouse production.
   - Monitor plant health and growth in a controlled environment.
8. Landscape Design Components
   - Interpret and create basic landscape plans, including symbols and scale.
   - Apply design principles (unity, balance, focalization) to landscape layouts.
   - Select appropriate plants and materials for specific landscape functions and climates.
9. Plant Installation and Maintenance
   - Demonstrate proper planting techniques for trees, shrubs, and bedding plants.
   - Perform routine maintenance tasks, such as mulching, watering, fertilizing, and pruning.
   - Identify and correct common planting and maintenance errors.
10. Nursery Practices
    - Propagate and grow plants in a nursery setting using containers or field methods.
    - Maintain nursery stock through watering, fertilization, and pest control.
    - Prepare plants for sale or transplant, including labeling and packaging.
11. Sustainability in Agriculture
    - Explain sustainable farming practices, such as conservation tillage, cover cropping, and integrated pest management.
    - Evaluate the environmental impact of different agricultural systems.
    - Design a sustainable growing plan for a specific crop or garden.
12. Field Crop Production
    - Identify major field crops and their uses (e.g., corn, wheat, soybeans).
    - Describe planting, growing, and harvesting practices for field crops.
    - Analyze yield data and factors affecting crop performance.
13. Horticulture
    - Differentiate between ornamental, food, and medicinal plants in horticulture.
    - Demonstrate care techniques for fruits, vegetables, and landscape plants.
    - Explain the economic and environmental value of horticulture industries.
14. Organic Farming Practices
    - Define organic certification standards and prohibited substances.
    - Implement organic pest and nutrient management strategies.
    - Compare organic and conventional systems in terms of yield, cost, and sustainability.
15. Plant Physiology
    - Describe how plants respond to stimuli, such as light (phototropism) and gravity (gravitropism).
    - Explain nutrient uptake and transport within plant systems.
    - Analyze plant stress responses to drought, disease, or nutrient deficiency.
16. Range Management
    - Identify native and invasive plant species in rangeland ecosystems.
    - Evaluate grazing systems and their impact on plant health and soil conservation.
    - Develop a basic range management plan for livestock or wildlife use.

17. Forestry Management
    - Identify tree species and their ecological or commercial uses.
    - Explain forest management practices, including thinning, harvesting, and reforestation.
    - Assess forest health and recommend conservation strategies.
18. Agronomics
    - Interpret economic data related to crop production (e.g., input costs, market prices).
    - Calculate yield, input efficiency, and profitability of crop systems.
    - Make data-driven decisions to improve crop performance and sustainability.
19. Plant Selection and Installation
    - Select plants based on site conditions, such as soil, light, and climate.
    - Demonstrate proper installation techniques for landscape and garden plants.
    - Create a planting plan that meets aesthetic, functional, and environmental goals.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Plant and Soil Science** or a degree in Agricultural Education, Agricultural Technology and Automation, Interdisciplinary Studies (Ag), Agricultural Systems Technology (Agricultural Operations Emphasis), or General Studies (Agriculture)
- **Pass the Praxis: Agriculture (5701) Exam**
- **USU Extension Course:** Botany Essentials
- **CASE Institute:** Principles of Ag Science - Plant
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
    - PSC 1800 - Introduction to Horticulture
    - PSC 2620 - Wood Plant Materials: Trees and Shrubs for Landscapes
    - PSC 2650 - Native Plants
    - WILD 3600 - Advanced Plant Identification and Terminology
    - WILD 3800 - Wildland Plants and Ecosystems

6. Water Systems

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Hydrology Principles
    - Explain the water cycle and its relevance to agriculture and ecosystems.
    - Identify sources of surface and groundwater and their use in agriculture.
    - Analyze how land use and climate affect water availability and quality.
2. Environmental Factors on Plant Growth
    - Evaluate how light, temperature, water, and soil influence plant development.
    - Design experiments to test environmental variables on plant health.
    - Interpret data to recommend environmental adjustments for optimal plant growth.
3. Sustainability in Agriculture
    - Define sustainable agriculture and its environmental, economic, and social components.
    - Compare conventional and sustainable practices, such as crop rotation, cover cropping, and reduced chemical use.
    - Develop a sustainability plan for a farm, garden, or greenhouse operation.

4. Plant Installation and Maintenance
    - Demonstrate proper planting techniques for various plant types and site conditions.
    - Perform routine maintenance, including watering, fertilizing, pruning, and mulching.
    - Identify and correct common plant care issues, such as pests, diseases, or nutrient deficiencies.
5. Nursery Practices
    - Propagate plants using seeds, cuttings, and division in a nursery setting.
    - Maintain nursery stock through proper watering, fertilization, and pest control.
    - Prepare plants for sale or transplant, including labeling and packaging.
6. Soil Science Principles
    - Identify soil components (sand, silt, clay, organic matter) and their properties.
    - Interpret soil tests to determine pH, nutrient levels, and texture.
    - Recommend soil amendments to improve fertility and structure.
7. Range Management
    - Identify native and invasive plant species in rangeland ecosystems.
    - Evaluate grazing systems and their impact on plant health and soil conservation.
    - Develop a basic range management plan for livestock or wildlife use.
8. Forestry Management
    - Identify tree species and their ecological or commercial uses.
    - Explain forest management practices, including thinning, harvesting, and reforestation.
    - Assess forest health and recommend conservation strategies.
9. Irrigation Systems
    - Compare types of irrigation systems, such as drip, sprinkler, and flood.
    - Design or maintain a basic irrigation system for a garden, greenhouse, or field.
    - Calculate water needs based on crop type, soil, and climate.
10. Aquaponics
    - Explain the principles of aquaponics, including the nitrogen cycle and symbiotic relationships.
    - Design or maintain a small-scale aquaponics system, balancing fish and plant needs.
    - Monitor water quality and system health using appropriate tools and techniques.
11. Water Monitoring
    - Use tools to measure water quality indicators, such as pH, turbidity, and dissolved oxygen.
    - Interpret water test results to assess environmental or agricultural impacts.
    - Develop a water monitoring plan for a farm, greenhouse, or natural area.
12. Greenhouse Crop Production Techniques
    - Operate greenhouse systems, including temperature, humidity, and irrigation controls.
    - Select and manage crops suited for greenhouse production.
    - Monitor plant health and growth in a controlled environment.
13. Safety Practices
    - Identify and use personal protective equipment (PPE) for agricultural and environmental tasks.
    - Follow safety protocols for tools, chemicals, and equipment.
    - Recognize and respond to environmental hazards, such as heat stress, chemical exposure, or water contamination.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Natural Resources** or a degree in Agricultural Education, Agricultural Technology and Automation, Interdisciplinary Studies (Ag), Agricultural Systems Technology (Agricultural Operations Emphasis), or General Studies (Agriculture)
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
    - PSC 2010 - Soils, Waters, and the Environment
    - PSC 5090 - Sustainable Low Water Landscaping
    - TEE 2200 - Aquaponic Systems
    - WATS 3100 - Fish Ecology, Conservation, and Management

7. Clean & Alternative Energy

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Environmental Factors on Plant Growth
    - Analyze how light, temperature, water, and soil composition affect plant development.
    - Design and conduct experiments to test environmental variables on plant health.
    - Interpret data to recommend adjustments for optimal plant growth in various settings.
2. Sustainability in Agriculture
    - Define sustainable agriculture and its environmental, economic, and social dimensions.
    - Compare sustainable and conventional practices, such as crop rotation, cover cropping, and integrated pest management.
    - Develop a sustainability plan for a farm, garden, or greenhouse operation.
3. Soil Science Principles
    - Identify soil components (sand, silt, clay, organic matter) and their properties.
    - Interpret soil test results to determine pH, nutrient levels, and texture.
    - Recommend soil amendments to improve fertility, structure, and water retention.
4. Aquaponics
    - Explain the principles of aquaponics, including the nitrogen cycle and symbiotic relationships.
    - Design or maintain a small-scale aquaponics system, balancing fish and plant needs.
    - Monitor water quality and system health using appropriate tools and techniques.
5. Water Monitoring
    - Use tools to measure water quality indicators, such as pH, turbidity, and dissolved oxygen.
    - Interpret water test results to assess environmental or agricultural impacts.
    - Develop a water monitoring plan for a farm, greenhouse, or natural area.
6. Greenhouse Crop Production Techniques
    - Operate greenhouse systems, including temperature, humidity, and irrigation controls.
    - Select and manage crops suited for greenhouse production.
    - Monitor plant health and growth in a controlled environment.
7. Safety Practices
    - Identify and use personal protective equipment (PPE) for agricultural and environmental tasks.

- Follow safety protocols for tools, chemicals, and equipment.
- Recognize and respond to environmental hazards, such as heat stress, chemical exposure, or water contamination.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Energy**
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
  - GEO 3150 - Energy in the Twenty-First Century
  - PHYS 3150 - Energy in the Twenty-First Century
  - ETEC 3020 - Energy System
  - MAE 5450 - Hybrid Energy

8. Conservation & Land Management

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Range Management
   - Identify native and invasive plant species in rangeland ecosystems.
   - Evaluate grazing systems and their impact on plant health and soil conservation.
   - Develop a basic range management plan for livestock or wildlife use.
2. Forestry Management
   - Identify tree species and their ecological or commercial uses.
   - Explain forest management practices, including thinning, harvesting, and reforestation.
   - Assess forest health and recommend conservation strategies.
3. Nursery Practices
   - Propagate plants using seeds, cuttings, and division in a nursery setting.
   - Maintain nursery stock through proper watering, fertilization, and pest control.
   - Prepare plants for sale or transplant, including labeling, packaging, and customer education.
4. Plant Selection and Installation
   - Select plants based on site conditions, such as soil type, sunlight, and climate.
   - Design a planting plan that meets aesthetic, functional, and environmental goals.
   - Demonstrate proper installation techniques to ensure plant health and landscape success.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Natural Resources**
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
  - WILD 3500 - Introduction to Rangeland Management
  - WILD 4000 - Principles of Rangeland Management

9. Ecological Research & Development

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Scientific Method
    - Define and apply the steps of the scientific method, including observation, hypothesis, experimentation, data collection, and conclusion.
    - Design and conduct agricultural experiments using controlled variables and replicable procedures.
    - Analyze and interpret data to draw evidence-based conclusions and communicate findings.
2. Role of Research, Development, and Technology in Agriculture
    - Explain how scientific research and innovation have advanced agricultural productivity and sustainability.
    - Identify examples of agricultural technologies, such as precision farming, biotechnology, and automation.
    - Evaluate the impact of research and development on food systems, environmental health, and global agriculture.
3. Examples of Scientific Work
    - Explore real-world case studies of agricultural research and innovation.
    - Identify careers in agricultural science, including plant pathology, soil science, and ag engineering.
    - Summarize the contributions of scientists and researchers to solving agricultural challenges.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Natural Resources**
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course similar to (choose one):
    - WILD 2200 - Ecology of our Changing World
    - WILD 3810 - Wildlife Population Ecology

10. Environmental Protection

Demonstrate basic understanding, terminology, and procedures for ALL of the following:

1. Natural Resources
    - Classify natural resources as renewable, nonrenewable, or inexhaustible.
    - Explain the role of natural resources in agriculture, energy, and environmental systems.
    - Evaluate the impact of human activity on resource availability and ecosystem health.
2. Plant Installation and Maintenance
    - Demonstrate proper planting techniques for trees, shrubs, and herbaceous plants.
    - Perform routine maintenance tasks, such as watering, fertilizing, pruning, and mulching.
    - Identify and correct common plant care issues, including pests, diseases, and nutrient deficiencies.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Natural Resources**
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course similar to WILD 2400 - Wildland Resource Techniques

11. Resource Extraction

Demonstrate basic understanding, terminology, and procedures for ALL the following:

- Understand major extraction industries: mining (coal, minerals), oil and gas, forestry, and water.
- Explain extraction methods (e.g., surface mining, hydraulic fracturing, clear-cutting, aquifer pumping).

2. Geological and Ecological Foundations
   - Identify the natural formations and ecosystems where resources are located.
   - Understand how geology, soil composition, and hydrology influence extraction feasibility.
3. Environmental Impact
   - Analyze the effects of extraction on soil, water, air, and biodiversity.
   - Understand reclamation, erosion control, and pollution mitigation strategies.
4. Regulations and Compliance
   - Be familiar with local, state, and federal regulations (e.g., EPA, BLM, USFS).
   - Understand permitting processes, environmental impact assessments (EIAs), and compliance reporting.
5. Economic and Social Considerations
   - Explain the role of extraction in local and global economies.
   - Evaluate the social impacts on communities, including Indigenous lands, rural economies, and labor markets.
6. Sustainability and Resource Management
   - Understand the principles of sustainable extraction and resource conservation.
   - Evaluate renewable vs. nonrenewable resource use and long-term availability.
7. Technology and Innovation
   - Stay current with emerging technologies in extraction (e.g., remote sensing, automation, carbon capture).
   - Understand how innovation can reduce environmental impact and improve efficiency.
8. Ethics and Stewardship
   - Recognize ethical considerations in land use, environmental justice, and community impact.
   - Promote responsible decision-making and long-term thinking in resource management.
9. Safety and Risk Awareness
   - Understand the physical risks associated with extraction (e.g., cave-ins, chemical exposure, equipment hazards).
   - Be familiar with industry-standard safety protocols and emergency response procedures.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in Natural Resources**
- **Pass the Praxis: Agriculture (5701) Exam**
- **CASE Institute:** Natural Resources and Ecology
- **College Course:** Transcripts showing a passing grade of a relevant course like APEC 3012 - Introduction to Natural Resource Economics

12. The National FFA Organization & Supervised Agricultural Experience (SAE)

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Role of FFA in Agricultural Education
   - Explain the three-component model of agricultural education: classroom/laboratory instruction, supervised agricultural experience (SAE), and FFA.
   - Describe the mission and vision of the National FFA Organization and its connection to student success.
   - Identify how FFA supports leadership, personal growth, and career success through agricultural education.
2. Opportunities in FFA
   - Explore local, state, and national FFA programs, including leadership conferences, conventions, and service projects.
   - Identify opportunities for involvement in chapter activities, committees, and officer roles.
   - Set personal goals for participation in FFA events that align with career interests and leadership development.
3. FFA Degrees, Awards, and Career Development Events (CDEs)
   - List and describe the five FFA degrees (Discovery, Greenhand, Chapter, State, American) and their requirements.
   - Identify available CDEs and LDEs and explain how they relate to agricultural career pathways.
   - Track progress toward awards and degrees using record books and goal-setting tools.
4. Personal, Leadership, and Career Skills through FFA Participation
   - Demonstrate leadership skills through public speaking, teamwork, and decision-making in FFA activities.
   - Develop a personal growth plan that includes FFA participation, SAE goals, and career exploration.
   - Reflect on how FFA experiences contribute to employability skills, such as communication, responsibility, and initiative.
5. Personal and Leadership Development through FFA
   - Participate in leadership development events (LDEs) such as Creed Speaking, Parliamentary Procedure, or Job Interview.
   - Create and deliver presentations that demonstrate confidence, clarity, and purpose.
   - Engage in service-learning or community outreach projects that build empathy, citizenship, and leadership capacity.

6. Role of SAE in Agricultural Education
    - Explain the purpose of SAE as one of the three components of agricultural education (classroom, FFA, SAE).
    - Describe how SAE supports career exploration, skill development, and real-world application of classroom learning.
    - Identify how SAE connects to FFA awards, degrees, and career pathways.
7. Types of SAE Programs
    - Differentiate between the types of SAE programs, including:
    - Foundational
    - Placement/Internship
    - Ownership/Entrepreneurship
    - Research (Experimental or Analytical)
    - School-Based Enterprise
    - Service Learning
    - Select an SAE type that aligns with personal interests, career goals, and available resources.
8. Planning an SAE Program
    - Develop an SAE plan that includes goals, a timeline, a budget, and expected outcomes.
    - Identify resources and support systems, such as mentors, facilities, and materials.
    - Set measurable goals for skill development, income, hours worked, or knowledge gained.
9. Maintaining and Using SAE Records
    - Use an approved record-keeping system (e.g., AET or paper-based) to track hours, income, expenses, and learning reflections.
    - Update records regularly to reflect progress and changes in the SAE.
    - Use SAE records to complete applications for FFA degrees, awards, and scholarships.
10. Maintenance and Expansion of SAE Programs
    - Evaluate SAE progress using records, feedback, and self-reflection.
    - Identify opportunities to expand or improve the SAE, such as increasing scope, adding responsibilities, or diversifying experiences.
    - Revise goals and plans based on challenges, successes, and new interests.
11. Work-Based Learning Activities through SAE
    - Participate in real-world agricultural experiences that develop technical and employability skills.
    - Demonstrate workplace readiness skills, such as punctuality, communication, and problem-solving.
    - Reflect on how SAE experiences contribute to career exploration and decision-making.

Select <u>one</u> of the following options:

- **Pass the Praxis: Agriculture (5701) Exam**
- **College Course:** Transcripts showing passing grade of a relevant course similar to ASTE 3620 - Managing the FFA and SAE Programs

13. Agricultural Literacy

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Agriculture in Daily Life
    - Identify agricultural products used in everyday life, including food, clothing, shelter, and fuel.
    - Explain the connection between agriculture and community well-being, including jobs, economy, and environment.
    - Recognize how personal choices impact agriculture, such as food purchasing, waste, and sustainability.
2. Agriculture Curriculum
    - Describe the purpose of agricultural education in developing career, leadership, and life skills.
    - Identify key areas of study within agriculture, such as animal science, plant science, agribusiness, and environmental systems.
    - Connect classroom learning to real-world agricultural applications through projects, labs, and community involvement.
3. Historical and Global Perspectives of Food Systems and Their Global Variations
    - Compare historical food systems and how they have evolved over time.
    - Identify global variations in food production and consumption, including cultural, economic, and environmental influences.
    - Analyze how global trade, technology, and policy affect food availability and security.
4. Fundamental Components of Food and Balanced Diets, Food Transformation Processes, and Food Safety Concerns
    - Identify the components of a balanced diet, including macronutrients and micronutrients.
    - Explain how raw agricultural products are transformed into food, including processing, packaging, and distribution.
    - Recognize food safety practices from farm to table, including sanitation, labeling, and storage.
5. Plant Growth, Major Crops, and Production Practices
    - Describe the stages of plant growth and the environmental factors that influence development.
    - Identify major crops grown locally, nationally, and globally, and their uses.
    - Demonstrate knowledge of production practices, such as planting, irrigation, pest control, and harvesting.
6. Animal Products in Agriculture
    - Identify animal products used for food (meat, dairy, eggs), fiber (wool, leather), and byproducts (gelatin, pharmaceuticals).
    - Explain how animals are raised and processed for agricultural use.
    - Evaluate the role of animal agriculture in food systems, sustainability, and global trade.

Select <u>one</u> of the following options:

- **A bachelor's or higher degree in General Agriculture**
- **Pass the Praxis: Agriculture (5701) Exam**
- **Agricultural Literacy Certification:** NCAL Certification

- **College Course:** Transcripts showing passing grade of a relevant course similar to (choose one):
    - ASTE 2900 - Food Matters: Ethics, Economics, and the Environment
    - ASTE 2910 - Sustainability through Global Citizenship

14. Lab-Based Methods

Demonstrate basic understanding, terminology, and procedures for ALL the following:

1. Instructional Excellence in Secondary Agricultural Education
    - Integrate FFA and SAE into classroom instruction to enhance student learning and career readiness.
2. Laboratory Management in Ag Education
    - Establish and maintain a positive, respectful learning environment in lab settings.
    - Implement routines and procedures that promote safety, efficiency, and student responsibility.
    - Manage materials, equipment, and student behavior to maximize instructional time.
3. Safety and Risk Management in Agricultural Laboratories
    - Develop and enforce safety protocols for all lab and shop activities.
    - Conduct safety training and maintain documentation for students and staff.
    - Identify and mitigate potential hazards in agricultural labs, greenhouses, and outdoor learning spaces.
4. Instructional Strategies for CTE Labs and Cross-Curricular Integration
    - Design and implement lab-based instruction that reinforces academic and technical skills.
    - Integrate core subjects (math, science, literacy) into agricultural lessons and projects.

Collaborate with other educators to create interdisciplinary learning experiences

Select <u>one</u> of the following options:

- **Microcredential Coming 2026**
- **College Course:** Transcripts showing a passing grade of a relevant course like ASTE 3240 - Teaching in Laboratory Settings