

Agriscience Education

An Introduction

Agriscience Education places a new emphasis on the integration of academics into existing agriculture/agriscience curricula, especially in the areas of science and mathematics. As a result of this emphasis, new programs are included in the Agriscience Education curriculum. This new direction serves two major purposes: (1) to provide students with the knowledge and skills needed to enter and advance in agricultural careers and (2) to enable students to function as informed citizens in today's society.

The objectives of Agriscience Education are:

- To provide education in and about agriculture from the perspective of science and technology
- To prepare students for employment in an agricultural career
- To prepare students for entry into postsecondary programs in agriscience fields
- To provide education about the role of agriscience in the conservation of the Earth's natural resources
- To develop life and employability skills essential for successful employment
- To develop skills needed to fulfill occupational, social, and civic responsibilities

The Agriscience Education program is a comprehensive program providing students appropriate classroom and laboratory instruction, supervised agricultural experiences, and personal development experiences through both classroom instruction and related organizational FFA activities. These components are integrated to complement each other, providing an effective program for students and effectively utilizing instructional time.

The classroom is the primary setting for instruction in agriscience theory and related academics, although laboratory experiences are a significant part of the program. Greenhouse, aquatic, mechanic, and computer laboratory settings enhance classroom instruction.

The Supervised Agricultural Experience Program (SAEP) is designed as part of classroom instruction. Students utilize knowledge gained to plan an SAEP; identify experiences available; select activities for individual SAEPs; and make appropriate arrangements with parents, teachers, and employers involved in the program. Students conduct the SAEP with the supervision of a teacher who provides instruction on necessary topics. The SAEP may be conducted at home, in the workplace, and/or in the school laboratory. Some examples are fruit and/or vegetable gardening, animal projects, greenhouse projects, aquaculture projects, or business work experiences such as after-school work in a feed and seed store.

The SAEP may be coordinated with FFA activities that further motivate student SAEP participation by providing career events, awards and other recognitions for SAEP achievement, and travel experiences that greatly enrich student learning. The FFA student organization provides hands-on opportunities for students in the areas of leadership, citizenship, and agriscience skill development through a laboratory setting that focuses on future career success.

The curriculum creates a new model for Agriscience Education. Not only does the content exceed business and industry standards, it sets high expectations, provides clear objectives, and supports the concept that education involves more than simply teaching. The twenty-first century will bring with it a vast transformation, making many of today's jobs non-existent. Although a variety of courses are offered to meet the individual needs of students, it may be necessary for local school systems to develop courses expanding the required Agriscience Education curriculum to meet future demands for new jobs and new technologies. The Agriscience Education curriculum provides a model for the design of locally developed courses, which must be approved by the State Department of Education prior to implementation.

Agriscience Education

The Conceptual Framework

The graphic on the following page represents the Conceptual Framework for the Grades 7-12 Agriscience Education curriculum. This model represents a wheel building from the center (axle) outward. This graphic design defines the five major areas of the Agriscience Education curriculum: Plant Biosystems, Animal Biosystems, AgriEngineering, AgriCommerce and Communications, and Environmental and Natural Resources.

The first dotted ring is the Career/Technical Education Curriculum Core. This area represents the knowledge and skills common to all Career/Technical Education courses and may be taught as a separate one-half credit (70 clock hour) course or may be integrated into the Agriscience Education courses.

The second dotted ring represents the Grade 7 Pre-Agriscience course. This course provides an introduction to all five major areas. It is not a prerequisite to other courses.

The third dotted ring represents the Grade 8 Agriscience Exploration course. Encompassing all five majors, it is exploratory in nature and is not a prerequisite to any other course.

Students completing the Pre-Agriscience and/or Agriscience Exploration course acquire the foundational knowledge and skills that provide them with a smooth transition into the specific courses offered in each of the five major areas. By having a foundation in all five major areas, students are able to make more informed career path decisions.

The fourth dotted ring represents the Agriscience course. This course covers topics from all five major areas in greater depth than the Grade 7 or Grade 8 courses and may be offered to students in Grades 9-12. The Agriscience course provides an introduction to the diverse field of agriscience. It is not a prerequisite to any other course.

The fifth dotted ring defines the five career majors previously mentioned.

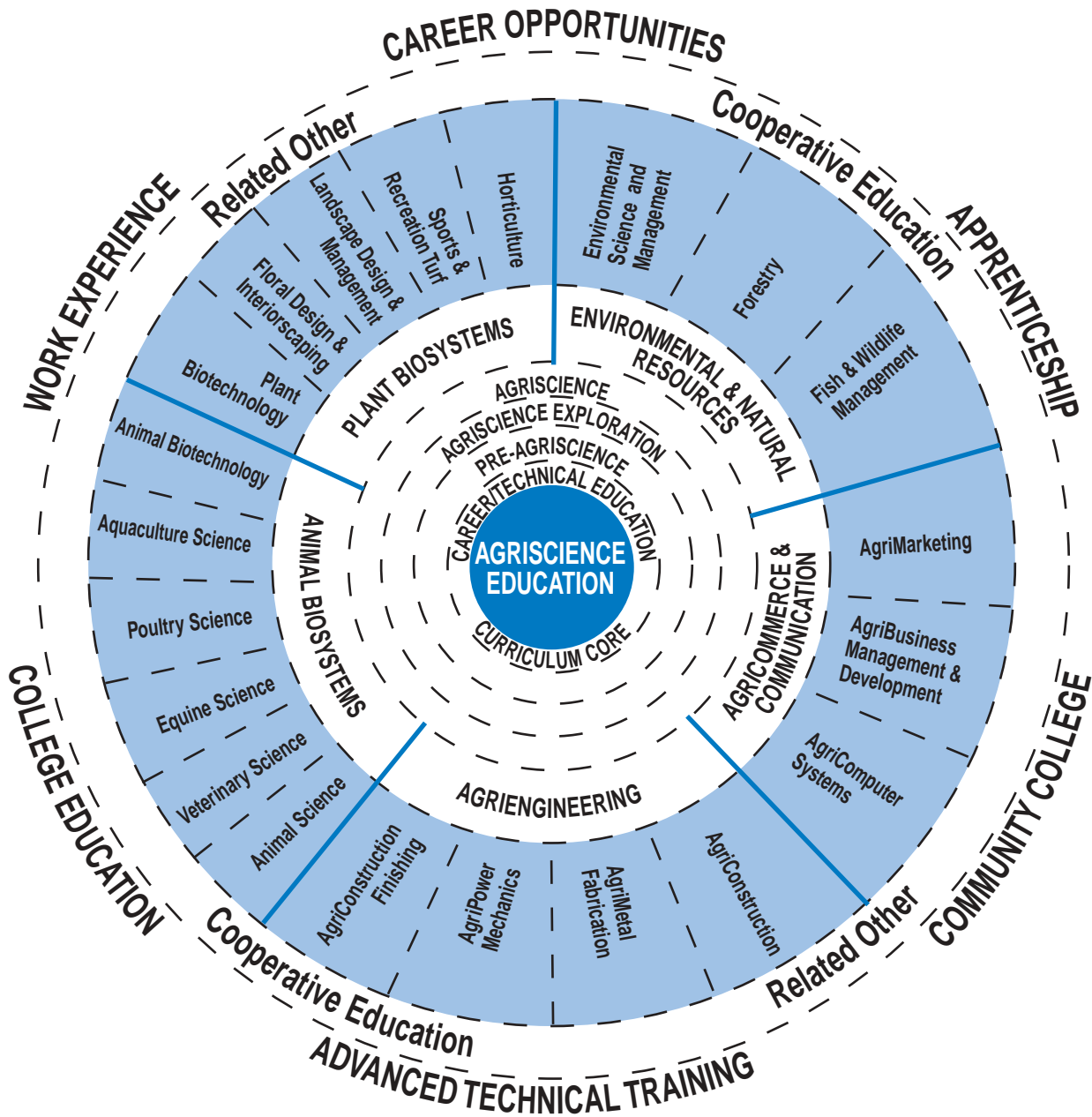
The sixth dotted ring provides Grade 9-12 course selections in the Agriscience Education curriculum. Students may choose from these courses for which there are no prerequisites. These courses are specific to each major area. The definitions of concentrators and completers addressed in Appendix A apply.

All courses offered in Grades 9-12 are one-credit (140 clock hour) courses. Horticulture, AgriConstruction, and Forestry are three specialized programs that may be offered only in career/technical centers or comprehensive high schools. These programs consist of appropriate courses selected from the sixth ring. The specialized Horticulture program consists of appropriate courses from the Plant Biosystems and AgriCommerce and Communication majors. The specialized Forestry program consists of appropriate courses from the Environmental and Natural Resources and AgriCommerce and Communication majors. The specialized AgriConstruction program consists of appropriate courses from the AgriEngineering and AgriCommerce and Communication majors.

The seventh ring represents Related Other courses and Cooperative Education opportunities that may be used to augment the educational experience of each individual student.

The area outside the seventh ring represents opportunities available to students beyond the high school environment.

Agriscience Education



PRE-AGRISCIENCE

Pre-Agriscience is an exploratory course that provides Grade 7 students with an overview of the agriscience/agriculture industry. Students gain knowledge and develop skills through classroom instruction and laboratory experiences in the areas of environmental science, animal and plant science, drafting, woodworking, communications, and agriscience careers. Students utilize knowledge and skills acquired in the classroom to develop the Supervised Agricultural Experience Program (SAEP). This course may be taught as a 23, 35, 70, or 140 clock-hour course. Specific content standards to be included in each of the courses are indicated in the following charts.

As an example of the implementation of the clock-hour options, the 140 clock-hour option equates to a one-hour class for thirty-six weeks, an eighteen-week class on a block schedule system, or a twenty-four week class on a trimester system.

Pre-Agriscience

23 clock-hours	35 clock-hours
Content Standards: 1, 4, 5, 6, 8, 11, 17, 19, 28, 31, 37	Content Standards: 1, 2, 4, 5, 6, 8, 11, 15, 17, 19, 26, 28, 29, 30, 31, 34, 37
70 clock-hours	140 clock-hours
Content Standards: 1, 2, 4, 5, 6, 8, 9, 11, 14, 15, 16, 17, 18, 19, 20, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 37	Content Standards: 1-39

Content standards identified in this course of study identify the minimum required content of the Pre-Agriscience course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical-thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

FFA, the career technical student organization for Agriscience, is an integral component of Agriscience Education. Students develop leadership skills through FFA educational activities that are integrated into classroom instruction. These activities enhance classroom instruction by encouraging student interest in the area of agriscience.

Students will:

Agriscience Technology Careers

1. Describe agriscience and technology careers.
2. Evaluate the major sectors of the agriscience industry.
 - Number of persons employed in each sector
 - Career opportunities in each sector
 - Importance in state, nation, and world
3. Illustrate the impact of technology on agriscience careers.

Impact of Agriculture

4. Identify the impact of agriculture on the United States and world economies.
5. Describe the results of an abundant, inexpensive, and safe food supply produced by United States farmers for the American population.
 - Less disposable income spent on food
 - Better overall health of population
 - More opportunity to pursue non-agricultural careers in cities
 - Independence from foreign food imports

Supervised Agricultural Experience Program (SAEP)

6. Identify the characteristics of an SAEP.
 - Manageability
 - Availability of facilities
 - Financing
 - Record keeping
7. Discuss the criteria for selecting an appropriate SAEP.
 - Years in program
 - Career interests

Health and Safety

8. Identify laboratory safety rules and procedures.
 - Clothing safety
 - Tool and equipment safety
 - Materials safety
 - Chemical safety
 - Workplace behavioral safety
 - Fire safety
 - First aid procedures

Environmental Science

9. Explain the role of fertilizers and pesticides in the agrisciences.
10. Describe the importance of conserving and managing water in the agrisciences.
11. Identify natural resources closely associated with agriculture and land use.
 - Renewable
 - Nonrenewable
12. Illustrate applications of technology in the agrisciences that have had positive and negative effects on the environment.
13. Explain techniques of preventing loss of soil by water and wind erosion.
Examples: cover cropping, wind breaks, no-till farming, terracing
14. Identify sources of agricultural and nonagricultural pollution in water supplies.
15. Describe benefits of forests and woodlands.
Examples: aesthetics, recreation, building materials, wildlife, water and air purification
16. Evaluate methods used in wildlife conservation.
 - Wildlife regulation
 - Restocking
 - Education

Animal Science

17. Describe the importance of domesticated animals in the agrisciences.
18. Identify characteristics and related benefits of breeds of domesticated animals.
 - Physical appearance
 - Structure
 - Size and scale

Plant Science

19. Relate plants to food chains and the transfer of energy through the environment.
20. Describe the structure, production, and function of seeds in plants.
21. Describe reproduction in various plants.
 - Seeds
 - Cuttings
 - Divisions
 - Tissue cultures
22. Identify requirements and techniques in seed germination.
23. Distinguish among fruits and vegetables.

Biotechnology

24. Describe the benefits resulting from applications of technology in plant and animal systems.
 - Increased productivity
 - Medical advancements
 - Environmental benefits

Drafting

25. Select appropriate drafting tools for specific tasks.
Examples: scale, T-square, triangle, drafting pencils, computers
26. Identify whole number and fractional English and metric unit designations on a standard ruler.
27. Differentiate two types of lines used in drafting plans.
 - Dimension
 - Extension

Woodworking

28. Describe the functions of basic woodworking tools.
29. Relate size and type of screw and nail to a specific function.
30. Illustrate the selection and proper use of wood glue.
31. Demonstrate the proper technique for sanding wood.
32. Describe the function(s) of various wood finishes.
Examples: sealing, durability, appearance
33. Illustrate techniques for applying wood finishes.

Communications

34. Identify methods of communication used to transfer information and data in agricultural systems.
Examples: computers, satellites, lasers, sensors

Computers in Agriscience

35. Describe applications of the computer in agriscience/agriculture.
 - Remote sensing
 - Equipment control
 - Robotics
36. Demonstrate the use of computer skills in agriscience/agriculture.
Examples: electronic reference sources; data management and analysis; preparation, presentation, and communication of information and data

Leadership Development

37. Identify qualities of leadership, cooperation, and good citizenship.

AgriBusiness/AgriMarketing

38. Communicate orally and in writing in an agribusiness/agrimarketing setting.
39. Explain the importance of marketing skills in sales of products and services.
 - Salesmanship
 - Customer service
 - Advertising

AGRISCIENCE EXPLORATION

Agriscience Exploration is an exploratory course that provides Grade 8 students the opportunity to gain knowledge and acquire skills in the areas of animal science, plant science, ecology, conservation, and agriscience careers. Instruction also focuses on agriscience technologies in the areas of woodworking, electricity, metal fabrication, and power mechanics. Students utilize knowledge and skills acquired in the classroom to develop the Supervised Agricultural Experience Program (SAEP). This course may be taught as a 23, 35, 70, or 140 clock-hour course. Specific content standards to be included in each of the courses are indicated on the following charts.

As an example of the implementation of the various clock-hour options, the 140 clock-hour option equates to a one-hour class for thirty-six weeks, an eighteen-week class on a block schedule system, or a twenty-four week class on a trimester system.

Agriscience Exploration

23 clock-hours	35 clock-hours
Content Standards: 1, 4, 5, 6, 8, 9, 12, 16, 24, 25, 44	Content Standards: 1, 4, 5, 6, 8, 9, 12, 13, 16, 17, 19, 24, 25, 26, 31, 32, 41, 44
70 clock-hours	140 clock-hours
Content Standards: 1, 2, 4, 5, 6, 8, 9, 12, 13, 14, 16, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 41, 42, 43, 44, 45	Content Standards: 1-46

Content standards identified in this course of study identify the minimum required content of the Agriscience Exploration course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical-thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

FFA, the career technical student organization for Agriscience, is an integral component of Agriscience Education. Students develop leadership skills through FFA educational activities that are integrated into classroom instruction. These activities enhance classroom instruction by encouraging student interest in the area of agriscience.

Students will:

Agriscience Technology Careers

1. Describe the impact of various technologies on agriscience/agriculture careers.
2. Evaluate factors important in selecting a career.
 - Personal interest and abilities
 - Preparation
 - Salary
 - Career opportunities
3. Illustrate good work habits.
 - Being on time
 - Wearing proper clothing
 - Following directions
 - Getting along with co-workers

Impact of Agriculture

4. Identify the impact of agriculture on United States and world economies.
5. Describe the results of an abundant, inexpensive, and safe food supply produced by United States farmers for the American population.
 - Less disposable income spent on food
 - Better overall health of population
 - More opportunity to pursue nonagricultural careers in cities
 - Independence from foreign food imports

Supervised Agricultural Experience Program (SAEP)

6. Identify the characteristics of an SAEP.
 - Manageability
 - Availability of facilities
 - Financing
 - Record keeping
7. Discuss the criteria for selecting an appropriate SAEP.
 - Years in program
 - Career interests

Health and Safety

8. Identify laboratory safety rules and procedures.
 - Clothing safety
 - Tool and equipment safety
 - Materials safety
 - Chemical safety
 - Workplace behavioral safety
 - Fire safety
 - First-aid procedures

Animal Science

9. Identify major parts of beef animals, swine, sheep, horses, and poultry.
10. Describe the real or potential impact of selective breeding, natural selection, and cloning on the development of livestock breeds.
11. Evaluate selected groups of animals using established criteria.
Examples: confirmation, frame size, muscling grade, breed characteristics

Aquaculture

12. Discuss the production of aquatic plants and animals.

Plant Science

13. Describe structures and functions of the major systems and organs of a plant.
14. Compare photosynthesis and respiration in plants.
15. Identify sexual and asexual methods of reproduction in plants.
16. Illustrate important techniques of asexual propagation in plants.
 - Cuttings
 - Division
 - Grafting
 - Layering
 - Tissue culture

Soil Science

17. Identify the major components and importance of soil.
18. Compare soil horizons.
19. Relate soil characteristics to uses.
 - Texture
 - Drainage
 - Permeability
 - Organic composition
 - Class capabilities

Ecology and Conservation

20. Relate populations within a habitat to communities, ecosystems, and biomes.
21. Describe the major components of an ecological system.
 - Biotic components
 - Abiotic components
22. Identify limiting factors that affect plant and animal population size in an ecosystem.
Examples: food, shelter, water, climate, nutrients, physical space, other populations, disease, pollution, natural disasters
23. Evaluate agriculture and nonagriculture sources of pollution and effective methods of reduction/prevention.
24. Describe the potential impact of global climate changes on plants, animals, and property.
Example: natural and introduced phenomena

Woodworking

25. Implement appropriate laboratory safety rules and techniques for woodworking.
26. Use woodworking tools safely and appropriately.
 - Marking and measuring tools
 - Saws
 - Drilling and boring tools
 - Screwdrivers and wrenches
 - Hammers and mallets
 - Pliers and cutters
27. Select the appropriate type and size of nail or screw.
28. Demonstrate safe and appropriate use of power tools.
Examples: jig saw, drill, sander

29. Demonstrate proper application of stationary power tools.
Examples: drill press, scroll saw
30. Calculate the number of board feet required for a particular job.
31. Develop a bill of materials and plan for a particular job.

Electricity

32. Implement appropriate laboratory electrical safety rules and techniques.
33. Discuss the electron theory and its relevance to electrical circuitry.
34. Explain the relationship between electricity and magnetism.
35. Describe electrical terms, units, and symbols.
36. Identify sources of electrical energy.
37. Apply techniques for electrical splices.

Metal Fabrication

38. Implement laboratory safety rules and techniques for metal fabrication.
39. Demonstrate proper procedures for striking an arc.
 - Electrode selection
 - Amperage
 - Metal preparation
 - Proper electrode angle
 - Arc striking

Power Mechanics

40. Implement laboratory safety rules and techniques that apply to small engine repair.
41. Perform routine care and maintenance on small gas engines.

Computers in Agriscience/Agriculture

42. Demonstrate the use of computer skills in agriscience/agriculture.
Examples: electronic reference sources; data management and analysis; preparation, presentation, and communication of information and data
43. Describe applications for Global Information Systems (GIS)/Global Positioning Systems (GPS) as they relate to agriscience/agriculture.

AgriBusiness/AgriMarketing

44. Explain the importance of marketing skills in sales of products and services.
 - Salesmanship
 - Customer service
 - Advertising

Leadership Development

45. Demonstrate leadership, cooperation, and good citizenship.
46. Communicate orally and in writing within an agribusiness/agrimarketing setting.
47. Demonstrate proper use of parliamentary procedure.

AGRISCIENCE

Agriscience is a one-credit course that provides students with a general overview of the five major career areas in Agriscience Education: Plant Biosystems, Animal Biosystems, Agri-Engineering, Agri-Commerce and Communication, and Environmental and Natural Resources. Students are involved in classroom and laboratory activities in each of the five major career areas. Application of agriculture-related case studies is used to demonstrate and reinforce skills taught in this course.

Content standards in this course of study identify the minimum required content of the Agriscience course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical-thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Student will:

Importance of Agriculture

1. Identify major agricultural commodities for the local area, state, nation, and world.
2. Describe the history of agriculture for the local area, state, nation, and world.
3. Explore various careers in the agriscience industry.

Technology Applications

4. Identify technological advancements that enhance the agriscience industry.
Examples: Internet, biotechnology

Agricultural Economics/Business Management

5. Describe the fundamental principles of economics that affect the management of a business.
 - Supply
 - Demand
 - Price
6. Explain the eight steps in the decision-making process.
7. Identify sources and types of credit.
8. Describe the principles of entrepreneurship in agriscience.

9. Identify the characteristics of an SAEP.
 - Manageability
 - Record keeping
 - Availability of facilities
 - Financing
10. Prepare a sales presentation for a business product.
Example: advertisements

Environmental Science

11. Analyze the effects of agriculture on the environment.
 - Water
Example: nonpoint source pollution
 - Soil
Example: erosion
 - Air
Example: odor control

Soil Science

12. Identify the major soil areas in Alabama.
13. Identify the layers of soil in a soil profile.
14. Determine the texture of different soil samples.
15. Determine the land capability class for a given plot of land.
16. Discuss how to adjust soil pH.
Examples: collecting and interpreting results from soil samples, determining liming rates

Plant Science

17. Analyze the importance of plants in the balance of the ecological system.
18. Determine the characteristics, functions, and structures of plants.
19. Explain plant processes.
 - Photosynthesis
 - Respiration
 - Transpiration
20. Identify the sixteen essential elements plants need for proper growth and health.
21. Identify the requirements needed to produce a successful vegetable garden.

22. Identify characteristics for the different areas of horticulture.
- Greenhouse
 - Nursery
 - Landscaping
 - Turf
 - Pomology
 - Floriculture
 - Olericulture
23. Demonstrate the ability to propagate plants.
Examples: sexual–plant seeds; asexual–stem cuttings

Forestry

24. Identify important forest trees for the local area, state, nation, and world.
25. Determine proper forest management practices for a stand of trees.

Aquaculture

26. Identify methods used to grow and/or produce aquatic species.
Examples: catfish, crawfish, aquatic plants

Animal Science

27. Identify common names and terms used in livestock operations.
Examples: stallion, gelding, steer, barrow, gilt
28. Identify common breeds of livestock and their characteristics.
- Beef cattle
 - Dairy cattle
 - Swine
 - Sheep
 - Horses
 - Poultry
29. Determine the nutrition requirements for livestock.
- Beef cattle
 - Dairy cattle
 - Swine
 - Sheep
 - Horses
 - Poultry
30. Determine characteristics, functions, and structures of animals.
31. Explain practices used to manage livestock properly.
Examples: vaccination, castration

32. Explain ways to select and grade livestock.
 - Yield grades
 - Quality grades

Wildlife Science

33. Determine management practices used to enhance wildlife habitats.
34. Identify state hunting laws and regulations concerning wildlife.
35. Identify hunting safety practices.

Pest Management

36. Categorize common pests.
 - Household
 - Plant
 - Animal
37. Distinguish characteristics, functions, and structures of common pests.
38. Describe types of pesticides and ways they control pests.
 - Insecticides
 - Herbicides
 - Nematicides
 - Fungicides
 - Bacteriacides
 - Rodenticides

AgriEngineering Applications

39. Identify safety procedures used in agriengineering applications.
 - Woodworking
 - Welding
 - Electrical
 - Small engines
 - Plumbing
 - Masonry
40. Demonstrate proper procedures for constructing a woodworking project.
 - Completing bill of materials
 - Identifying proper tools
 - Calculating board feet
 - Applying measurements
 - Cutting out project
 - Constructing project
 - Finishing project

41. Demonstrate proper procedures for arc welding.
42. Explain the theory of operation for small engines.
 - Two-cycle
 - Four-cycle
43. Perform routine care and maintenance of small engines.
44. Demonstrate procedures used in wiring applications.
 - Duplex receptacle
 - Single pole switch with light
45. Demonstrate procedures used in plumbing applications.
 - Cleaning and gluing PVC or CPVC
 - Soldering fittings to copper pipe

AGRIBUSINESS MANAGEMENT AND DEVELOPMENT

This one-credit course provides students with a basis for making effective decisions, setting goals, assessing and solving problems, valuing financial progress and success, evaluating the management of resources, and gaining skills useful in everyday life. Students also evaluate national and international policies, regulations, and values that affect the production and trade of agricultural commodities.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Employability Characteristics

1. Identify career development and entrepreneurship opportunities in agribusiness management.
2. Demonstrate knowledge of personal and occupational safety practices in the workplace.
3. Identify employers' expectations, appropriate work habits, and interpersonal skills.

Principles of AgriBusiness and Economics

4. Describe the roles and functions of management.
Examples: planning, organizing, directing, coordinating, controlling
5. Specify the major components of the free enterprise system.
6. Apply the Law of Supply and Demand to agriculture production.
7. Evaluate the effects of monetary, fiscal, and international policy on the agriculture industry.
8. Identify common characteristics of organizational structures for businesses.
Examples: cooperative, partnership, corporation

Financial Management

9. Differentiate methods of depreciating capital goods.
 - Straight line
 - Sum of the year's digits
10. Evaluate types of accounting systems used in agribusiness.
 - Cash
11. Compare terms associated with cash flow, income, and balance sheet statements.
12. Identify sources and procedures for obtaining agribusiness loans.
 - Federal land bank
 - Production credit associations
 - Commodity credit corporation
 - Farm Service Agency
 - Small Business Administration
 - Banks
 - Credit unions

Marketing Agricultural Products

13. Describe the purpose and importance of marketing.
14. Summarize terms associated with marketing and marketing trends.
Examples: supply, demand, consumer demographics, capital, amortization
15. Compare different market channels for agricultural products.
16. Evaluate how the Law of Comparative Advantage affects agricultural production.
17. Evaluate how the values of different cultures affect the production and marketing of agricultural products.
18. Identify sources of information from the Internet used in marketing research.

Business Regulations and Compliance

19. Describe different techniques for measuring the performance of a business.
20. Explain the impact of government policies and regulations on making management decisions.
21. Describe factors concerning cultural diversity that influence management of human resources.
22. Identify laws pertaining to land/property ownership and uses, taxes, wills, and liabilities.
23. Evaluate the benefits and costs of allocating public resources for agricultural production.
24. Examine the importance of using government programs to supplement agricultural production.

Key Factors for Entrepreneurship

25. Explain the impact of various business-related laws on the operation and management of a business.
Examples: laws related to labor, safety, child-labor, health and sanitation, environment, financial system, tax
26. Evaluate product/service promotion strategies.
27. Demonstrate business records management.
28. Identify human resource management skills.

Planning for Entrepreneurship

29. Prepare a financial management plan.
30. Prepare a marketing plan.
31. Prepare a business management plan.
Examples: staffing, training procedure, benefits, performance evaluation
32. Present a business plan.

AGRICOMPUTER SYSTEMS

AgriComputer Systems is a one-credit course designed to facilitate students' success in careers in agribusiness marketing and management systems. This course provides students with opportunities to acquire knowledge and skills related to agribusiness marketing and management and the workplace and to develop knowledge and skills regarding career opportunities, job entry requirements, and industry expectations. Students engage in learning opportunities that allow them to reinforce, apply, and transfer knowledge and skills and technology competencies to a variety of settings.

Content standards identified in this course of study identify the minimum required content of the AgriComputer Systems course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical-thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Employability Characteristics

1. Identify career development and entrepreneurship opportunities in the field of agriscience computer systems.
 - Sales and marketing
 - Production agriculture
 - Research and development
 - Agricultural processing and equipment
 - Management
2. Apply competencies related to resources, information, interpersonal skills, and systems of operation in agriscience computer systems.
3. Demonstrate knowledge of personal and occupational safety practices in the workplace.
4. Identify employers' expectations, appropriate work habits, and good citizenship skills.

Utilization of Electronic Information and Data Technology

5. Analyze computer operating systems and technologies.

6. Identify appropriate software for performing various agribusiness tasks.
 - Accounting
 - Production management
 - Communications
 - Marketing
7. Apply word processing technology to agriscience documents.
 - Business letters
 - Invoices
 - Charts
 - Reports
 - Research papers

Spreadsheet Technology

8. Use spreadsheets to perform mathematical computations.
 - Basic mathematical computations
 - Complex formulas
 - Percentages
9. Generate documentation required to obtain financing for operational and capital resources.
10. Produce business reports from spreadsheets.
 - Budget
 - Payroll
 - Cash flow statement
 - Profit and loss analysis
 - Balance sheet
 - Inventory
 - Tax document
 - Currency conversions
 - Production records

Database Technology

11. Explain the relationships among data fields, records, and files.
12. Develop a database to organize agricultural data using information from various sources.
Examples: production records, budget records, market data
13. Search database to retrieve information.
14. Demonstrate the ability to export and import data.

Distance Education Technology

15. Describe the use and limitations of distance education technology in agriscience applications.
16. Use E-mail, on-line services, two-way audio/video, bulletin boards, and emerging technologies to send and receive information.

Desktop Publishing Technology

17. Identify appropriate technologies, standards, and styles to produce various agriscience publications.
 - Brochures
 - Reports
 - Newsletters
 - Web pages
18. Import text and graphics into a publication.
19. Prepare an instruction manual or other appropriate document.

Presentation Management Technology

20. Identify guidelines for fonts, graphics, and special effects.
21. Analyze the effectiveness of various types of presentations.
Examples: video, lecture

Performance Concepts

22. Describe the components of a computer network.
Examples: server, software, workstation
23. Compare factors concerning network utilization.
Examples: modem speed, bandwidth, load factors
24. Analyze emerging technologies in information utilization.
Examples: distance learning, satellite-based information systems, video conferencing

Global Positioning Systems (GPS)/Geographical Information Systems (GIS)

25. Describe how GPS information is obtained.

26. Identify significant uses of GPS information in the agriscience industry.
 - Identification of property boundaries
 - Location of equipment, structures, and other points of interest
 - Mapping applications
 - Automated control of equipment
 - Examples: cultivation, irrigation, fertilizer application
27. Identify GIS technologies for managing GPS data.
28. Integrate GIS/GPS data with business, management, and productivity statistics related to the agriscience industry to produce maps, reports, and production records.

Electronic Control Systems

29. Discuss major uses of electronic control systems in the agriscience industry.
 - Equipment monitors
 - Examples: hay bale monitors, water level monitors
 - Equipment controls
 - Examples: laser-leveling systems, conveyor controls, layer house HVACR controls
 - Sensors
 - Examples: fire and smoke detectors, hay moisture meters, soil moisture sensors for irrigation system
 - Robotic systems
 - Examples: automated transplanter systems, driverless tillage systems, automated packaging systems
30. Describe processes by which data and information from electronic control systems are collected, evaluated, stored, and used for decision making.
 - Manual and visual systems
 - Example: direct readout and observation
 - Computerized systems
 - Examples: automated data acquisition, storage and processing
 - Mechanical systems
 - Example: strip chart recorder
31. Describe how data from electronic control systems may be incorporated into databases, spreadsheets, and presentations to aid in the management of agriscience-related business and industry.

Precision Agriscience

32. Investigate uses of precision technologies in agriscience.
 - Examples: precision tillage, precision agriculture, precision horticulture, precision fisheries, precision forestry, precision poultry

AGRICONSTRUCTION

Agriconstruction is a one-credit course designed to facilitate student understanding of construction as it relates to agriculture. Students become familiar with types of agriculture structures and their uses. In addition, students are provided opportunities to develop skills in the areas of planning, safety, and construction of various agriculture structures.

The minimum content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Introduction to Agricultural Structures

1. Identify types of agricultural structures.
Examples: fences, storage sheds, poultry houses

Career Opportunities

2. Recognize professionals associated with agriconstruction.
 - Draftsman
 - Engineer
 - Construction foreman
 - Carpenter
 - Concrete finisher
 - Plumber
 - Electrician

Planning Structures

3. Illustrate techniques to develop drawings for a structure.
 - Symbols
 - Scales
 - Drawing tools
4. Apply local building codes in the design process.
5. Explain how space requirements for agriconstruction structures are determined.
Examples: size of equipment, number of animals

6. Identify factors in selecting building materials used in agriconstruction.
Examples: cost, availability, suitability
7. Estimate quantities of building materials needed for a specific building plan.
 - Concrete
 - Lumber
 - Fasteners
 - Roofing material
 - Hardware
 - Electrical supplies
 - Plumbing
8. Evaluate factors in design and material choice that affect energy consumption.
 - Insulation type
 - Orientation
Examples: site orientation, building orientation
 - R-values
9. Identify positive characteristics of a building site.
Examples: proper drainage, location, orientation
10. Demonstrate building layout procedures for a specific job.
Examples: batter boards, staking and squaring procedures
11. Explain selection of appropriate tools for a specific application in agriconstruction.
Examples: trowel for masonry, circular saw for carpentry

Safety

12. Identify different types of safety training required to work in agriconstruction.
 - Personal protection equipment
 - Hand tool safety
 - Power tool safety
 - Electrical safety
 - Job site safety

Masonry

13. Identify tools used in masonry construction.
Examples: hand float, trowel
14. Explain the selection of specific materials used in masonry construction.
Examples: cement, sand, gravel, reinforcements

15. Describe procedures used in masonry construction.
- Formulating concrete
 - Constructing concrete forms
 - Estimating amount of concrete needed for a job
 - Finishing concrete
 - Mixing mortar
 - Laying block/brick

Framing

16. Identify tools used in layout and framing.
Examples: plumb bob, square, chalk line
17. Demonstrate procedures used in framing.
Examples: wall framing, rafter layout, floor framing, roof framing

Roofing

18. Identify tools used in roofing.
19. Explain the selection of types of roofing material.
- Decking
 - Felt
 - Shingles
 - Metal roofing
20. Describe procedures used in roofing.

Exterior and Interior Finishes

21. Differentiate uses of types of exterior finishes.
- Wood
 - Vinyl
 - Masonry
 - Metal
22. Differentiate characteristics of types of interior finishes.
- Wood
 - Sheet rock
23. Explain procedures used in installation of exterior and interior finishes.

Paints, Stains, and Preservatives

24. Identify criteria for selecting tools and methods used in the application of paint, stains, and preservatives.
25. Recognize factors affecting choice of paints, stains, and preservatives.
 - Interior/exterior
 - Type of material to be treated
 - Oil-based/water-based
 - Satin/gloss/dull
 - Opaque/translucent
26. Explain steps for preparing surfaces to be painted or stained.
Example: sanding

Insulation

27. Identify criteria for selecting appropriate insulation materials for agriscience structures.
 - R-value
 - Cost
 - Durability
28. Describe appropriate procedures for installing different insulation materials.

Plumbing

29. Identify tools used in plumbing.
Examples: pipe cutter, pipe wrench
30. Explain the selection of specific types of pipe used in plumbing.
 - Steel
 - Copper
 - Cast iron
 - PVC
31. Explain the selection of specific types of fittings used in plumbing.
Examples: bushings, couplings
32. Demonstrate methods of joining various kinds of pipe.
Examples: plastic, copper, galvanized

Electrical

33. Illustrate correct use of electrical terms and symbols in electrical diagrams.
Examples: AC/DC, voltage, amperage, switches, outlets, lights
34. Identify physical components of an electrical system.
 - Power source
 - Wire
 - Connectors
 - Circuit breaker
 - Switch
 - Outlet
35. Demonstrate procedures for making electrical splices and connections.
Examples: single pole switch with light, three-way switch with light, duplex receptacle

AGRICONSTRUCTION FINISHING

AgriConstruction Finishing is a one-credit course designed to facilitate student understanding of finish construction as it relates to agriculture. Students become familiar with types of agriculture finishing and their applications. In addition, students are provided opportunities to develop skills in the areas of planning, safety, and finishing for various agriculture structures.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

INTRODUCTION TO AGRICONSTRUCTION FINISHING

Career Opportunities

1. Compare job characteristics of various career opportunities related to AgriConstruction Finishing.
 - Nature of work
 - Compensation
 - Benefits
 - Qualifications

Planning

2. Illustrate techniques in designing a fixture for the interior of a structure.
 - Sketching and drawing
 - Scale drawings
 - Drawing tools

Safety

3. Identify general safety practices used in the construction industry.
 - Recognizing dangers
 - Identifying safety practices
 - Wearing proper clothing
 - Wearing eye protection
 - Lifting heavy materials
 - Carrying materials

Grades and Types of Lumber

4. Compare uses and applications of lumber by type.
 - Hardwoods
Examples: cabinets, furniture
 - Softwoods
Examples: molding, trim, facing
5. Identify lumber by grades.
 - Appearance grades
 - Timber grades
 - Dimension grades
6. Identify lumber defects.
 - Knots
 - Wane
 - Splits and checks
 - Warps

Storing Lumber

7. Identify methods and purpose of seasoning lumber.
 - Air drying
 - Kiln drying
8. Discuss methods of stacking lumber and plywood to avoid warpage.
Examples: stacking lumber flat, using spacers when air drying lumber

Calculating Lumber

9. Determine a bill of materials for a specific project.
10. Perform mathematical computations to determine material quantities.
 - Board footage
 - Linear footage

Tools

11. Select tools for specific jobs related to finish construction.
12. Identify hand tools used in finish construction.
Examples: measuring tools, layout tools, boring tools, fastening tools, cutting tools, planes and chisels
13. Identify portable power tools.
Examples: portable circular saws, routers, sanders, drills, miter saws
14. Identify stationary power tools.
Examples: table saw, radial arm saw, band saw, drill press, jointer
15. Apply safety rules when using hand, portable, and stationary power tools.

Interior Fixtures

16. Identify fixtures used in structures.
 - Cabinets
 - Shelves
 - Countertops
17. Identify materials used in cabinet construction.
Examples: plywood, hardwoods, softwoods
18. Identify fixtures used in cabinet construction.
 - Styles
 - Rails
 - Toe board
 - Backsplash
 - Doors

Specialized Materials

19. Describe various specialized materials used in finish construction.
Examples: plastic laminates, composite materials, veneers
20. Explain the processes used to laminate and bend wood.

Assembly

21. Identify adhesives used in finishing construction.
22. Demonstrate the application of mechanical fasteners in finish construction.
Examples: pneumatic staple gun, screws, nails, corrugated fasteners
23. Demonstrate the assembly of finished wood products.
Examples: wood molding and trim, door and window casings

Finishes

24. Prepare wood for finishing.
25. Select finishing materials.
Examples: paints, lacquers, varnishes, stains, preservatives
26. Identify types of application methods.
Examples: pneumatic application, china bristle brushes, synthetic bristle brushes
27. Differentiate characteristics of types of interior finishes.
Examples: sheetrock, wood
28. Identify criteria for selecting tools and methods for the application of paint, stains, finishes, and preservatives.
29. Select sanding materials.
Examples: sandpaper, foam sanding pads

Interior Fixtures Installation

30. Identify methods of installing interior fixtures.
Example: changing cabinets

AGRIMARKETING

AgriMarketing is a one-credit course that provides students with the opportunity to develop an understanding of the principles and practices of marketing as they relate to agriculture-related products and services. Students learn fundamental aspects of developing a business plan as well as establishing and maintaining an effective and profitable business strategy. Course content enables students to explore various aspects of marketing from local market niches to operating in the global arena including marketing concepts, marketing risks, advertising, agreements, and contracts. Application of agriculture-related case studies are used to demonstrate and reinforce skills taught in the course.

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Students will:

Marketing History

1. Describe major changes in the historical development of agricultural marketing.
Examples: barter systems, direct sales, futures markets, commodities markets

Career Opportunities

2. Recognize career opportunities associated with agricultural marketing.
 - Production agriculture
 - Research and development
 - Marketing and sales (wholesale and retail)
 - Advertising
 - Accounting
 - Agricultural processing
 - Business management
 - Government policy and regulation

Marketing Plans

3. Explain the necessity for and components of a marketing plan.
4. Explain the role of management in agrimarketing.
5. Demonstrate the preparation and implementation of a marketing plan.

Marketing Concepts

6. Describe characteristics of the free market system in the United States.
7. Explain how free enterprise is important to agrimarketing.
8. Distinguish between selling and marketing.
9. Explain the role and importance of various marketing concepts.
 - Law of Supply and Demand
 - Value of money
 - Competition
 - Market share
 - Promotion
 - Consumer preference
 - Sales potential
 - Market development
 - Market identification
 - Marketing functions
 - Marketing strategies
10. Identify important factors that influence the value of money.
 - Present worth
 - Future worth
 - Simple interest
 - Compound interest
11. Describe the role of information resources in agrimarketing.
 - Commodity reports
 - Extension agents
 - Internet
 - Print media
 - Marketing agents/brokers
12. Describe consumer influence on agrimarketing.

Marketing and Sales

13. Explain the role of interpersonal communication in agrimarketing.
14. Describe different approaches for sales and marketing.
 - Global sales and marketing
 - Niche sales and marketing
 - Traditional agricultural sales and marketing
 - Direct-to-consumer sales and marketing
 - “U-pick” sales and marketing
15. Explain the role of cooperatives and associations in agrimarketing.

16. Evaluate strategies of the various marketing entities to ensure product quality in agrimarketing systems.
 - Producer
 - Shipper
 - Processor
 - Distributor
 - Retailer
17. Design a sales presentation for an agriculture product or service.
18. Discuss factors to be considered in pricing agricultural products and services.
 - Materials
 - Labor
 - Overhead
 - Profit
 - Other

Global Marketing

19. Discuss the impact of global marketing on agricultural products and services produced in Alabama and in the United States.
 - Production agriculture sector
 - Agricultural processing sector
 - Consumer products sector
20. Assess the importance of international considerations in global marketing.
 - Cultural issues
 - Market accessibility
 - Tariffs
 - Quotas
 - Free trade
 - Trade agreements

Niche Marketing

21. Explain processes for identifying, developing, and utilizing a niche market for various agricultural products and services.
 - Specialty crops and animals
Examples: exotic fruits, cashmere goats, meat goats, ratites, organically grown vegetables, mushrooms
 - Gourmet value-added products
Examples: specialty meats, homemade dairy products, homemade jams and jellies
 - Farm-fresh products
Examples: fresh fruits and vegetables, fresh eggs, fresh milk
 - Specialized services
Examples: lawn services, specialty maintenance, pampered pet care
 - Tourism and recreation
Examples: “dude ranch” vacations, guided nature tours

Marketing Risk

22. Explain the significance of financial position and risk-taking in agrimarketing.
23. Explain the process for evaluating marketing risk in various marketing systems.
 - Stock/bond/fund markets
 - Futures trading/options
 - Global marketing
 - Direct marketing
 - Niche marketing
 - Value-added marketing
 - “U-pick” marketing
 - Traditional producer to processor to consumer agrimarketing
24. Illustrate strategies for market diversification.

Agreements, Contracts, and Regulations

25. Explain the role of legal counsel in agrimarketing.
 - Negotiating agreements and contracts
 - Marketing regulations
 - Dispute resolution
26. Explain roles of negotiation in agrimarketing.
 - Establishing price for products and services
 - Setting terms for contract and lease agreements
 - Resolving disputes
27. Compare objectives of the various parties involved in negotiating agreements and contracts.
 - Buyer
 - Seller
 - Processor
 - Broker
 - Lender
28. Describe governmental involvement and influence in agrimarketing.
 - Regulations
 - Programs
 - Policies

Advertising

29. Identify various methods of advertising.
 - Video
 - Internet
 - Print media
 - Signs
 - Billboards

30. Assess the impact of various methods of advertising in agrimarketing systems.
- Global marketing
 - Direct marketing
 - Niche marketing
 - Value-added marketing

Marketing By-Products

31. Assess risks and benefits such as increased profits and consumer acceptance of marketing by-product materials.
- Examples: selling processed manure as garden fertilizer, selling processed peanut hulls as animal feed

Technology Applications

32. Analyze the widespread use of and reliance upon computer technology in agrimarketing.
- Market analysis
 - Sales forecasts
 - Telemarketing
 - Databases
 - Spreadsheets
 - Video marketing
 - Internet
 - Specialty software

AGRIMETAL FABRICATION

AgriMetal Fabrication is a one-credit course that provides students with opportunities to examine safety and technical information in agricultural metal fabrication and additional opportunities to participate in hands-on activities in the laboratory. Careers, safety, robotics, new technology, environmental issues, tools and equipment, metal structure planning, metal preparation and finishing, oxyacetylene welding, shielded metal arc welding, gas metal arc welding, plasma cutting, sheet metal work, and tap and die procedures are addressed in this course.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

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Students will:

Introduction to Agricultural Careers

1. Describe careers available to persons with various levels of skill in agricultural metals.
2. Discuss the history of metal fabrication.

Robotics and New Technology

3. Explain important issues in the history of robotics and automated systems used in metal fabrication.
Examples: impact of reduction in number of workers in job market, programming robots to perform different tasks
4. Explain the use of robots and automated systems in the job market.
Examples: cutting, welding, drafting
5. Compare skills required in different types of metal fabrication.
 - Soldering
 - Arc welding
 - Aluminum welding
 - Pipe welding
 - Underwater welding
 - Oxyacetylene

Safety Orientation and Procedures

6. Discuss hazards associated with metal fabrication processes.
Examples: being exposed to fumes, looking directly at an arc
7. Explain safety colors used in the agricultural metal fabrication laboratory.
Examples: red=danger, orange=warning, yellow=caution, blue=information
8. Discuss protective clothing and equipment needed when working with agricultural metals.
Examples: leather gloves, leather jackets
9. Explain the importance of wearing proper eye protection when fabricating metal.
10. Select fire extinguishers for a particular fire classification.
11. Explain how to avoid harmful health effects associated with metal fabrication.
Example: effects of welding fumes

Environmental Issues

12. Explain the importance of recycling damaged and scrap metal pieces.

Tool and Equipment Identification and Selection

13. Explain uses of different tools used in oxyacetylene, arc, MIG, and TIG welding.
Examples: chip hammer, metal tongs, metal vise grips
14. Demonstrate the use of cold metal tools.
 - Hacksaw
 - Cold chisel
 - File
 - Drill
15. Compare properties and uses of different types of metals.
Examples: cast iron, cast aluminum, steel, tin

Planning Metal Structures

16. Discuss the type of welding machine to use for various types of metals.
Examples: Tungsten Inert Gas (TIG) welder for aluminum, Metal Inert Gas (MIG) or arc welder for steel
17. Explain the use of mechanical drawing equipment.
18. Describe procedures used to make mechanical drawings.
 - Selecting drawing instruments
 - Selecting symbols to use
 - Determining scale to use
 - Using scale to complete end, top, and side views of a drawing

19. Interpret blueprint drawings and symbols.
20. Explain how to estimate a bill of material needed to complete a project.
21. Utilize building codes related to metal fabrication.
 - State guidelines
 - Federal guidelines
 - Occupational Safety and Health Administration (OSHA)
22. Distinguish among tensile strength, polarity, rate of travel, and metallurgy.
23. Explain the importance of grinding, cleaning, and painting metal.
Examples: rust prevention, increasing attractiveness, friction reduction, sharp edge removal

Metal Preparation and Finishing

24. Demonstrate techniques for cleaning metal for fabrication.
25. Demonstrate how to plan and drill customized holes in various metals.
26. Explain the different colors of welding units and hoses.
Examples: green for oxygen tanks, orange or black for acetylene tanks
27. Compare properties and uses of different shaded lenses used in oxyacetylene welding.

Oxyacetylene Welding/Cutting

28. Demonstrate the ability to set up the oxyacetylene unit.
 - Checking chain security
 - Checking for cracks and leaks in hoses/gauges
 - Setting unit gauges for cutting/welding
29. Demonstrate the ability to use the oxyacetylene unit.
 - Lighting torch/welding tip
 - Adjusting flame to neutral
 - Cutting metal to pre-determined length/angle
 - Brazing metal with/without rod
30. Explain different shades of lenses and clothing needed to arc weld.

Shielded Metal Arc Welding (SMAW)

31. Explain different parts of the arc welding machine.
32. Compare different types of welding rods used in shielded metal arc welding.
Examples: E6010, E6013, E7013

33. Demonstrate the ability to set up and weld different joints using the shielded metal arc machine.
- Butt joint
 - Lapp joint
 - Corner joint
 - T-joint
 - Pipe weld

Gas Metal Arc Welding (GMAW)

34. Explain different parts of the gas metal arc welding machines.
- MIG
 - TIG
35. Explain different shades of lenses needed to weld with gas metal arc welding machines.
- MIG
 - TIG
36. Demonstrate the ability to setup and weld different joints using the MIG and TIG machines.
- Butt
 - Lapp
 - Corner
 - T-joint
 - Pipe weld
37. Demonstrate the ability to weld in all welding positions.
- Flat
 - Vertical
 - Horizontal
 - Overhead

Plasma Cutting

38. Demonstrate proper procedures for using plasma cutting equipment and machines.

Sheet Metal

39. Explain the ordered steps in laying out and cutting sheet metal.
- Measuring and laying out metal
 - Opening tin snips completely
 - Sliding against metal and squeezing handles together for cutting

Drilling and Tapping

40. Explain the operation and use of a riveter.
41. Explain criteria for selecting tap and die sizes.
42. Demonstrate the ability to use a tap and die set.

AGRIPOWER MECHANICS

AgriPower Mechanics is a one-credit course designed to prepare students for entry-level employment or advanced training in agricultural mechanics including, but not limited to, small engines, power units, machinery equipment, and systems related to each. Students study safety, identification of terms related to two- and four-cycle engines, preventive maintenance, theory of engine operation, fuel systems, oil systems, cooling systems, electrical systems, hydraulics, troubleshooting techniques, and career opportunities.

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Students will:

Safety

1. Demonstrate safe practices when using tools and equipment.
2. Identify precautions involved in handling and storing flammable liquids.

Career Opportunities

3. Compare job characteristics of various career opportunities in power mechanics.
 - Nature of work
 - Compensation and benefits
 - Requirements
 - Qualifications

Theory of Engine Operation

4. Explain scientific principles of small engines.
 - Power
 - Work
 - Horsepower
 - Torque
5. Summarize the two-stroke cycle and the events that occur during each stroke.
6. Summarize the four-stroke cycle and the events that occur during each stroke.

Two- and Four-Cycle Engines

7. Identify terms related to two- and four-cycle engines.
8. Distinguish between a two-stroke and four-stroke engine.
9. Describe the applications of two- and four-cycle engines.
10. Identify tools used with small gas engines and their functions.
Examples: micrometer, caliper, torque wrench
11. Categorize major causes of engine failure.

Preventive Maintenance

12. Identify preventive maintenance procedures used to check and service engines and machinery.
 - Specifications
 - Maintenance schedules

Fuel Systems

13. Identify different types of fuel and their agricultural applications.
 - Gasoline
 - Diesel
 - Alternative fuels
14. Evaluate gasoline octane ratings and purposes.
15. Evaluate grades of diesel fuel and their uses.
16. Explain the steps in replacing fuel filters, pumps, lines, and bleeding air from selected fuel systems.

Oil Systems

17. Evaluate lubricants according to service, grade, and function.
18. Describe oil system types, characteristics, and functions.
 - Circulating splash
 - Internal force-feed splash
 - Full internal force-feed splash
19. List steps involved in changing oil.
20. Explain the importance of oil systems in internal combustion engines.

Cooling Systems

21. Identify cooling system components and their functions.
22. Explain the process and need for draining and replacing coolant.
23. Identify problems to check in cooling system components.
 - Hoses
 - Pumps
 - Radiator

Electrical Systems

24. Identify major components and functions of an electrical system.
25. Describe techniques for finding shorts, grounds, and opens in electrical circuits.
26. Describe basic sub-circuits of an electrical system.
27. Explain how an ignition system functions.

Hydraulic Systems

28. Identify systems in farm machinery that utilize hydraulics.
29. Explain basic hydraulic principles using Pascal's law.
30. Identify components and functions of a hydraulic system.
31. Explain the two types of hydraulic cylinder actions.
 - Single acting
 - Double acting

Drive Trains

32. Identify drive train components and their functions on selected power equipment.
33. Diagnose clutch and transmission problems.

Control Systems

34. Identify criteria by which different control systems are recognized.
 - Electronic
 - Digital
 - Analog
 - Pneumatic
 - Hydraulic
 - Robotic

Troubleshooting Techniques

35. Sequence steps for solving ignition problems.
36. Describe manual and computerized techniques for locating, diagnosing, and solving problems in mechanical systems.
 - Fuel
 - Oil
 - Electrical
 - Cooling
 - Hydraulic

Environmental Issues

37. Evaluate environmental issues related to power mechanics.
 - Waste management
Examples: oil, coolant, fluids, filters
 - Recycling
Examples: oil, coolant, fluids, filters
 - Pollution considerations
Examples: oil, coolant, fluids, filters
 - Noise abatement

ANIMAL BIOTECHNOLOGY

Animal Biotechnology is a one-credit course that provides students with an opportunity to develop an understanding of the principles and practices of animal genetics and biotechnology as they relate to agriculture-related products and services. Students learn fundamental aspects of genetics and selection and the application of various forms of biotechnology to influence selection. Students learn the importance of trait selection in productivity, discuss the exploitation of biotechnology for the improvement of human life, and explore ethical and moral considerations related to the use of animal biotechnology. Application of agriculture-related case studies is used to demonstrate and reinforce skills taught in this course.

Content standards identified in this course of study prescribe the minimum required content of the Animal Biotechnology course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Introduction to Animal Biotechnology

1. Evaluate the historical development and future promise of animal biotechnology to improve efficiency of agricultural production.
2. Explain the importance of animal biotechnology to the enhancement of human quality of life.
 - Medical advancement
Example: synthesis of medicines
 - Environmental advancement
Examples: animal disease resistance, pest control
 - Product and service advancements
Examples: increased yield, disease-resistant animals, consumer issues

Safety

3. Identify safety considerations and procedures required for work in various areas of animal biotechnology.
 - Laboratory safety
 - Biological safety
 - Chemical safety
 - Radiation safety
 - Physical safety

Career Opportunities

4. Recognize career opportunities associated with animal biotechnology.
 - Production agriculture
 - Research and development
 - Sales and marketing

Ethical Considerations

5. Select methods of genetic manipulation in animals that best accomplish specific goals.
Examples: natural breeding, genetic engineering, artificial insemination, embryo transfer, cloning
6. Evaluate religious, cultural, and bio-ethical considerations regarding various methods of genetic manipulation used on animals to increase productivity and to enhance quality of human life.

Heterogeneity

7. Discuss heterogeneity as an important strategy in maintaining health and productivity in animal populations.
8. Describe methods of maintaining heterogeneity in different animal populations.
Examples: introduction of non-native animals, managed breeding

Applied Genetics and Breeding/Biotechnology Concepts

9. Identify procedures for adding desired characteristics to an animal population.
Examples: incorporation of heat tolerance into a cattle herd via selection for slick hair gene, improvement of economically valuable traits (weaning weight, milk production, coat color) in an animal herd
10. Identify desired characteristics in an animal as homozygous or heterozygous.
Examples: coat color, presence of horns, slick hair
11. Discuss the need for homozygous traits in foundation stock for animal breeding programs.
 - Purebred seed stock herds
 - Commercial herds
12. Explain the importance of heterosis in increasing productivity in commercial herds.
13. Evaluate the methods used in genetically engineering animals.
 - Gene manipulation
 - Gene splicing
 - Gene transfer
 - Hormone manipulation

14. Recognize heritable characteristics of animals.
 - Physical structure
 - Chemical composition
 - Behavior
15. Describe the major components/organelles of animal cells and their functions.
 - Major cellular organelles
Examples: nucleus, ribosome, plasmodesmata
 - Function of animal cell organelles as coordinated subcomponents of the cell
16. Evaluate the basic relationship among gene (DNA), RNA, and protein (one gene/one protein).
 - Language of life
 - DNA and RNA codons
 - Protein assembly
17. Describe inheritance patterns based on chromosomes, genes, alleles, and gene interaction.
 - Dominant and recessive traits
 - Incomplete dominance and co-dominance
18. Explain the transfer of information from parents to offspring through genes within DNA molecules.
 - Genetic code
 - Gene expression (protein synthesis)
 - Gene regulation
19. Identify mechanisms of protein synthesis involving m-RNA and t-RNA.
20. Apply Mendel's laws to determine possible combinations of offspring.
 - Monohybrid cross
 - Dihybrid cross
21. Analyze factors in the population that cause genetic mutations in an organism and/or its offspring.
 - Radiation
 - Chemicals
 - Chance
22. Analyze outcomes of the application of animal biotechnology.
 - Genetic alteration
 - Selective breeding
 - Cloning
 - Treatments for disease
 - Use of growth hormones

Biotechnology Investigation Techniques

23. Demonstrate biotechnological investigative techniques.
 - Genomic DNA extraction
 - Polymesase chain reaction
 - Restriction digestion
 - DNA fingerprinting
 - Protein extraction, purification, and separation

Global Issues

24. Interpret the impact of global opinion and acceptance of various methods of genetic manipulation on aspects of international marketing of United States meat and animal products.
 - Sales
 - Market availability
 - Advertising
 - Labeling

Marketing and Labeling Issues

25. Interpret the impact of public opinion and acceptance of various product treatments (irradiation, ultra high temperature sterilization) on marketing and sales, labeling, and government regulation of meat and animal products from the United States.

Environmental Impacts and Concerns

26. Evaluate the potential impacts of genetic manipulation of animal populations on the environment and natural populations.
 - Disease resistance
 - Proliferation of resistant wild species
 - Introduction of new dominant speciesExample: excessive competition

Agricultural Research

27. Discuss relevant impacts of significant scientific discoveries and advancements in animal biotechnology.
 - Societal importance
 - Economic value
 - Exploitation potential

Applied Genetics/Biotechnology

28. Discuss the use of binomial nomenclature in determining related organisms for biotechnology applications.
29. Discuss genetic factors that affect biotechnology applications within and across species.

Biotechnology Applications

30. Describe the application of biotechnology to methods of food preservation.
 - Irradiation
 - Ultra high temperature sterilization
 - Salting
 - Smoking
 - Dehydration
 - Genetic modification
 - Pasteurization
 - Refrigeration

Phenotype Versus Genotype

31. Identify the significance of phenotype and genotype in describing offspring of genetic manipulations.
 - Dominant and recessive traits
 - Incomplete dominance and co-dominance

Livestock Selection

32. Identify criteria used in evaluating and selecting superior animals (cattle, swine, sheep) for various purposes.
 - Breeding stock
 - Milk production
 - Slaughter animals

Animal Diseases

33. Identify differences in disease resistance and susceptibility in commercial animal groups.
Examples: animal groups—cattle, swine, poultry, sheep;
diseases—brucellosis, anthrax bovine encephalitis, coccilliosis, avian pneumonia, streptococcus, equine encephalitis

34. Describe advances in biotechnology that enhance the ability of animal immune systems to fight disease.
- Introduction of resistant genes
 - Development of vaccines and medicines
 - Advancements in disease detection technology
 - Advancements in treatment technology

Influence of Scientific Research and Consumer Preference on Animal Development

35. Illustrate how scientific research, consumer preference, and advances in biotechnology influence animal development and production.
Examples: milk content, egg size, loin-eye size

ANIMAL SCIENCE

Animal Science is a one-credit course that provides students with the opportunity to acquire necessary skills for the care and management of animals. Identification, safety, nutrition, genetics, selection, and careers are major instructional areas. Students gain knowledge regarding the tools and facilities used in the animal industry.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Importance of Animal Industry

1. Discuss the history of domestication of animals.
Example: more reliable source of food and clothing
2. Classify large animal and poultry breeds into biological categories.
 - Kingdom
 - Phylum
 - Class
 - Order
 - Family
 - Genus
 - Species
3. Explain benefits of livestock production.
 - Conversion of low value carbohydrates to high value protein
Example: grazing of marginal grasses to produce meat protein for human consumption
 - Use of marginal land

4. Identify important factors associated with animal production.
 - Employment
 - Recreation
 - Food production
 - Fibers and leather
 - Drug production
 - Tissue/organ production and research
 - Record keeping
 - Consumer education
 - Community relations
5. Compare job characteristics in various career opportunities in the animal industry.
 - Nature of work
 - Compensation and benefits
 - Qualifications for employment

Breed Identification and Characteristics

6. Identify important economic breeds of beef, swine, equine, goats, sheep, and specialty animals.
7. Identify origins and history of major large animal breeds.
Example: Limousine—originated in France and genetically modified to produce lean meat
8. Discuss important natural and bioengineered characteristics in major large animal breeds of livestock and poultry.
Examples: muscle mass, frame size, trimness

Safety

9. Describe safety techniques used in working with livestock.
Examples: transporting, handling
10. Assess national, state, and local regulations regarding important aspects of the livestock industry.
Examples: laws and regulations dealing with imports, vaccination, disposal, quarantine
11. Evaluate environmental factors affecting livestock operations.
 - Soil
 - Water
 - Air quality
 - Climate
 - Predation
 - Harmful plants

Facilities

12. Evaluate facility components used to manage livestock efficiently.
Examples: farrowing crates, HVAC systems, flooring materials, loading facilities
13. Compare types of systems used in the production of poultry.
Examples: ventilation systems–tunnels, baffles;
waste removal systems–composters, freezers, incinerators

Nutrition

14. Compare animal digestive systems.
 - Non-ruminant
 - Ruminant
 - Crops in birds
15. Evaluate the importance of proper nutrition for various animals.
Examples: weight gain, body maintenance, eggshell quality
16. Identify nutrient classes that affect the health of livestock.
Examples: vitamins, minerals, proteins, fats, carbohydrates, roughages, concentrates, feed additives, hormone implants
17. Evaluate the nutritional value of corn, soybeans, oats, and hay.
Examples: protein, fiber
18. Balance rations for the needs of various animals.

Genetics

19. Describe basic functions of deoxyribonucleic acid (DNA) in the transmission of genetic characteristics.
20. Explain the process of genetic inheritance in livestock reproduction.

Disease and Parasite Control, Prevention, and Treatment

21. Evaluate methods of disease prevention and treatment in livestock and poultry.
Examples: parasite control, vaccination, sanitation
22. Categorize symptoms of important animal diseases for diagnostic purposes.
Example: Blackleg symptoms–lameness, swollen muscles, severe depression, high fever
23. Compare common drugs used to treat diseases.
Examples: antibiotics, dewormers, applications, side affects

Selection

24. Explain the concept of natural selection.
25. Explain how selective breeding has influenced the development of animals.
26. Compare factors used in the selection of market animals and breeding animals.
Examples: structure, trimness, muscle, breed characteristics, size, scale
27. Identify anatomical features of swine, beef, poultry, horses, sheep, and poultry.
Example: poultry—comb, wattle, breast, wing primaries and secondaries, thigh

Reproduction/Breeding

28. Describe the structure and function of male and female reproductive systems in a variety of animals.
29. Discuss the benefits of artificial insemination.
Examples: use of high quality blood lines, lower cost
30. Assess the use of biotechnology in animal reproduction and genetics.
Examples: cloning, gene splicing, genetic engineering, bovine somatotropin (BST), porcine somatotropin (PST), embryo transfer

Management and Care

31. Describe activities necessary in producing and caring for animals.
 - Selection
 - Breeding
 - Feeding
 - Care
 - Marketing

Animal Rights Versus Animal Welfare

32. Compare the concept of animal rights with animal welfare.
33. Discuss responsible ownership of animals.
Example: concern for animal health and welfare
34. Evaluate issues regarding human use of animals for food, pleasure, and experimentation.
35. Analyze practices used in the production of animals.
Examples: castration, tail docking, beak trimming, confinement, dehorning, branding, marking

Global Marketing

36. Analyze the Law of Supply and Demand.
37. Analyze the impact of world economic, cultural, and political issues on the marketing of animal products.
Examples: yen compared to dollar, opposition to genetically modified foods

Specialty Animals and Animal Products

38. Identify economically important specialty animals and animal products.
Examples: alligators; cashmere goats; quail; ratites; pheasants; specialty meats, cheeses, animal products
39. Compare requirements for specialty animal production and traditional animal production.
 - Care and feeding
 - Management
 - Housing and environment
 - Marketing and sales

AQUACULTURE SCIENCE

Students in this one-credit course develop an appreciation for the importance of the aquaculture industry. Aquaculture Science relates science and math skills to the world of aquaculture. Aquaculture Science is the systematic study of the laws and principles governing the production of aquatic plants and animals. Students participate in hands-on activities in the areas of water management, aquaculture systems, raising fish, careers, safety, technology, employability skills, computer applications, leadership development, microbiology, fish anatomy, chemistry, biology, mathematics, marketing, and business.

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Students will:

Introduction

1. Explain the historical background of aquaculture.
2. Explain how aquaculture relates to agriculture.
3. Discuss science and technology relative to the development of aquaculture.
4. Describe the role of scientific research regarding the future of the aquaculture industry.
5. Explain the economic significance of aquaculture at the local, state, and national levels.
6. Describe differences among freshwater, brackish water, and saltwater ecosystems.
 - Biological
 - Chemical
 - Geological
 - Physical
7. Discuss aquaculture species.
8. Relate geological and hydrological phenomena and fluid dynamics to aquatic systems.
Examples: identifying interrelationship of plate tectonics, ocean currents, climates, and biomes; describing results of research on fluid dynamics in an upwelling
9. Explain the importance of cycles in an aquatic environment.
 - Role of carbon, nitrogen, oxygen, and water
 - Role of climate and weather
 - Global environmental issues

Water Chemistry and Management

10. Determine the importance, unique properties, and content of water as related to aquaculture.
 - Cations and anions in water
 - Turbidity
 - pH
 - Temperature–dissolved oxygen relationship
 - Pollutant chemicals, organisms, and nitrogenous waste
 - Valued properties of water–polarity, high specific heat, high heats of fusion/vaporization, density
11. Apply appropriate units of measure and significant figures in measurements and calculations.
Example: parts per million (ppm)
12. Explain the process for monitoring and maintaining water quality standards for the production of desired species.
 - Analyzing and plotting significant data
 - Source of water
 - Water quality management (analysis and treatment)
 - Filling time and treatment for volumes of water
 - Recognition and correction of oxygen deficiency
 - Causes of turbidity
 - pH control
 - Aquatic plant control

Aquatic Biology

13. Explain the correct use and care of the microscope.
14. Explain correct ways to make and use wet mount slides.
15. Describe the role of microorganisms.
16. Determine presence and type of microorganisms using appropriate sampling methods.
17. Classify aquatic species.
 - Taxonomy
 - Scientific nomenclature
 - Characteristics of species
 - Energy use
18. Describe important biological characteristics in selecting a species for aquaculture.
19. Describe the external and internal anatomy of aquatic species.
20. Explain the reproductive processes of selected species.
21. Discuss the nutrient requirements of selected species at various stages of growth.
22. Identify sources of nutrients and feed components.

23. Interpret the relationship of aquatic species to their environment.
Example: adaptation to environment

Business and Economics

24. Define entrepreneurship and the basic requirements of a good business plan.
- Determining cost
 - Determining resource requirements
25. Analyze the results of a market survey.
26. Analyze various market outlets.
- Local
 - Regional
 - National
 - International
27. Describe the process of market promotions.
28. Demonstrate basic record-keeping skills.

Career Opportunities

29. Describe career opportunities available in aquaculture.
30. Describe the career decision-making process.

Aquaculture Systems and Techniques

31. Analyze data to determine the appropriate system for use in a variety of circumstances.
Examples: system types—raceways, ponds, tanks, vats; site water quality; soil suitability
32. Describe various management techniques and their effectiveness for various types of aquaculture systems.
33. Describe factors that affect harvesting and processing methods.
- Health regulations
 - Sanitation procedures
 - Transportation

Health and Sanitation

34. Define terms associated with health management of aquacrops.
35. Identify major diseases and their causes.
Example: pathogenic micro-species

36. Identify disease prevention and control measures with treatment and calculations.
37. Discuss control measures for predators and pests.
Examples: parasites, trash fish, predatory fish, plant pests

Safety

38. Practice laboratory safety and effective management in aquaculture.
 - Electricity
 - Water
 - Machinery
 - Health
 - Chemicals
39. Demonstrate appropriate techniques for safe operation, maintenance, and repair of machinery, equipment, and facilities used in aquaculture.

System Design and Maintenance

40. Identify site specifications, system components, and operations.
41. Determine a system design based on production goals.
42. Utilize an appropriate maintenance plan.

Aquaculture Issues

43. Identify agencies and regulations relative to effluent standards.
44. Identify effluent treatment methods.
45. Evaluate genetic and chemical manipulation of aquaculture species.
 - Genotype
 - Phenotype
 - Growth rate
46. Compare cultured versus captured products.
Examples: overfishing, food safety
47. Discuss exotic, invasive, and indigenous species.
48. Identify potential land and water use conflicts.

ENVIRONMENTAL SCIENCE AND MANAGEMENT

Environment Science and Management is a one-credit course that provides students with the opportunity to develop an understanding of the principles and practices of environmental science and natural resource management. Students learn the fundamental aspects of waste management, natural resource management, soil science, environmental quality management and monitoring, and the impact of human activity on natural systems. Students also learn the importance of environmental stewardship and conservation, the importance of balancing exploitation of natural resources with protection of biodiversity to ensure sustainability for future generations and to maintain quality of life, and the importance of exploring local issues related to environmental science and natural resource management. Application of agriculture-related case studies are used to demonstrate and reinforce skills taught in the course.

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Students will:

Introduction to Environmental Science

1. Explain the importance of natural resources and the environment.

Safety

2. Identify safety considerations and procedures required to work in environmental science.
 - Laboratory safety
 - Biological safety
 - Chemical safety
 - Radiation safety
 - Physical safety

Career Opportunities

3. Recognize career opportunities associated with environmental science.
 - Environmental science
 - Geology
 - Environmental engineering
 - Research and development
 - Governmental policy and regulation
 - Consulting
 - Contracting
 - Education
 - Sales and marketing
 - Environmental law

Availability of Natural Resources

4. Predict the future availability of various renewable and nonrenewable resources based on current utilization rates and practices.
 - Soil
 - Water
 - Mineral
 - Metal
 - Energy resources
Examples: coal, petroleum, natural gas, solar, wind, geothermal, tidal
 - Plant and animal
 - Air
 - Space
 - Ocean floor
5. Identify the impact of changes in current utilization practices on the rate of consumption and future availability of various renewable and nonrenewable resources.
6. Identify significant environmental impacts (positive and negative) of current natural resource utilization practices.

Waste Management

7. Describe the methods of managing different types of waste materials.
Examples: methods—recycling, reuse, composting, landfilling, incineration, methane production, encapsulation;
types—animal waste, other agricultural waste, chemical waste, biological waste, radiological waste, construction and demolition waste, sanitary waste, medical waste, “space junk”
8. Describe factors to be considered in preparing a waste management plan.

Water Quality and Management in Agricultural Operations

9. Describe the uses of water in agricultural operations.
 - Consumption (plant, animal, human)
 - Irrigation
 - Processing agricultural products
 - Cleaning
 - Heating and cooling
 - Transporting agricultural products
10. Explain the importance of water management in agricultural operations.
11. Describe factors to be considered in preparing a water conservation/management plan for groundwater and surface water resources.
 - Water availability
 - Water quality
 - Water sources
 - Consequences of lowering water tables (groundwater)
 - Well head protection areas (groundwater)
 - Run-on/run-off (surface water)
 - Siltation of reservoirs (surface water)
 - Sediment quality (surface water)
 - Irrigation
 - Watersheds (purpose, function)
 - Wetlands (purification, habitat)
 - Pollution

Air Quality and Pollution

12. Compare interactions between agricultural and nonagricultural operations and air quality/air pollution.
Example: odor issues from animal production operations

Soil Science

13. Explain the importance of soils in agricultural systems and the environment.
14. Describe differences in various soil types.
 - Origin
 - Composition
Examples: silt, sand, clay, organic matter, mineral content
 - Physical
Examples: grain size, shrink/swell
 - Use
Examples: growth medium, structural foundations, ceramics/pottery

15. Describe properties that are important to various uses of soils.
 - Agronomic
 - Structural
 - Water storage (aquifers)
 - Waste treatment (septic systems, land application of manures)
Examples: percolation potential, pollutant retention and degradation
 - Commercial pottery/ceramics/masonry
16. Demonstrate processes for identifying and classifying soils using various methods.
 - Field evaluation
 - ASCS maps
17. Relate the significance of nutrient management to various factors in agricultural operations
 - Productivity
 - Profitability
 - Pollution of soil and water
 - Waste management methods
Example: land application of manures
18. Discuss the importance of soil testing to an effective nutrient management program.

Pollution

19. Discuss contamination of water, soils, and air in the environment.
 - Types of pollutants
Examples: nutrients, salinity, pesticides, organic and inorganic chemicals, metals
 - Sources of contamination
Examples: manmade, natural
 - Land application of organic wastes
Examples: agricultural, animal, municipal
 - Nutrient management issues
 - Impact of contamination
 - Methods of remediation

Biodiversity and Adaptation

20. Explain the importance of biodiversity and adaptation in the survival of species and stability of the environment.
 - Evolution and progression of species
 - Benefits, risks, and implications of monocultures

Meteorology

21. Describe fundamentals of meteorology and their importance in agricultural operations.

Environmental Laws and Regulations

22. Describe governmental laws and regulations related to the environment and natural resources.
- Historic role
 - Types
 - Impact

Interactions Among Plant, Animal, and Human Environmental Systems

23. Describe interactions among various biological and physical systems
- Plant
 - Animal
 - Human
 - Environmental

Environmental Monitoring

24. Describe the importance of environmental monitoring of resources in maintaining environmental quality and agricultural and natural resource productivity.
- Surface water
 - Groundwater
 - Air
 - Soil

Conservation

25. Explain the importance of various conservation methods in maintaining productivity and protecting the quantity and quality of air, water, and soil resources.
- No-till crop systems
 - Minimum tillage crop systems
 - Contour farming and terracing systems
 - Crop rotation
 - Erosion control systems

Pesticide Management and Use

26. Demonstrate the process for determining proper application rates based on label directions for various methods of pesticide application.
- Broadcast spreader
 - Handheld sprayer
 - Boom sprayer
 - Chemigation

27. Demonstrate the process for calibrating various pesticide application equipment.
 - Broadcast spreader
 - Handheld sprayer
 - Boom sprayer
 - Chemigation
28. Analyze factors to be considered in the use and management of pesticides.
 - Benefits
 - Risks
 - Environmental impacts
 - Health impacts

Local Issues and Concerns

29. Analyze the history of a local environmental issue and various impacts on the local community.
 - Impact on local quality of life
 - Impact on productivity and utilization of natural resources
 - Impact on agricultural operations
Examples: commercial operations, home gardens and lawns, golf courses
 - Potential regional/national/global impacts

Human/Wildlife Habitat Concerns

30. Analyze the positive and negative effects of human activity on the environment.
 - Depletion of natural resources
 - Pollution from point and nonpoint sources
 - Positive or negative actions impacting air and water quality
 - Ozone depletion
 - Habitat destruction/restoration
 - Introduction/removal of non-native species
 - Wetland construction/protection/filling
 - Enactment of laws, regulations, and policies

Environmental Stewardship

31. Explain the importance of stewardship of natural resources and the environment by various components of society.
 - Individuals
 - Communities
 - Businesses (including agricultural operations)
 - Local, state, and national government
 - Global community

Structure and Function of Living Systems and Dynamic Earth

32. Recognize components of the dynamic Earth.
 - Characteristics of the planet Earth
 - Components of the biosphere
Examples: abiotic factors, biotic factors
33. Distinguish among the various biomes.
 - Desert and tundra
 - Grassland
 - Forest
Examples: tropical rain forest, temperate rain forest, temperate deciduous forest, taiga
 - Freshwater
 - Marine
34. Describe the interaction of matter and energy in the biosphere.
 - Producers, consumers, decomposers (autotrophs and heterotrophs)
 - Food chain/food web
 - Energy pyramids
35. Describe the major biogeochemical cycles in the biosphere.
 - Carbon cycle
 - Nitrogen cycle
 - Oxygen cycle
 - Phosphorus cycle
 - Water cycle
36. Explain how the biogeochemical cycles recycle resources through the atmosphere, hydrosphere, lithosphere, and biosphere.
37. Identify characteristics of water chemistry in different aqueous environments.
 - Fresh water
Examples: lakes, streams, ponds, wetlands
 - Brackish water
Examples: bays, inland seas, marshes
 - Salt water
Example: open oceans
 - Groundwater
Examples: water table aquifers, confined aquifers
38. Identify how different biomes affect the various components of the atmosphere.
39. Identify the relationships between landforms and types of biomes.
 - Beaches
 - Piedmonts
 - Deserts
 - Plateaus
 - Plains
 - Mountains

Identification and Management of Ecosystems

40. Identify characteristics of major ecosystems of the United States.
 - Grassland
 - Forest
 - Aquatic
 - Wetland
41. Analyze the impact of agricultural activity on the biomes and ecosystems of the United States, particularly in the Southeast.
42. Analyze the interdependence of organisms and the environment.
 - Local impacts
 - Regional impacts
 - Global impacts

Sustainable Agriculture

43. Describe the components of a sustainable agricultural system.
44. Describe positive and negative implications of utilizing various methods of land use planning on agriculture, natural resources, and the environment.
 - Urban sprawl/greenfields development
 - Brownfields redevelopment
 - Greenspace preservation
 - Land trusts/conservation easements
 - Private property rights versus community concerns
 - Quality of environment versus quality of life

Recycling and Reusing of Materials

45. Explain the importance of recycling and reusing materials to maintain environmental quality and natural resources availability for future generations.

Energy Conservation

46. Analyze how environmental, economic, and quality of life issues impact energy conservation and development of alternative energy resources.
 - Fossil fuel availability
 - Agriculturally derived resources
 - Examples: biomass, alcohol fuels, methane
 - Solar resources
 - Nuclear resources
 - Geothermal resources
 - Wind resources
 - Oceanic resources
 - Examples: tidal energy, salinity gradients

EQUINE SCIENCE

Equine Science is a one-credit course that enables students to become knowledgeable in the areas of caring for and managing horses. Equine health, nutrition, safety, reproduction, and selection are major instructional areas. Students learn about tools, tack, and facilities necessary for proper care of horses. Students develop leadership skills, realize personal growth, and are better prepared for career success through the knowledge gained and skills acquired in this course.

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Students will:

Career Opportunities

1. Compare job characteristics of various career opportunities related to management and care of horses.
 - Nature of work
 - Compensation
 - Benefits
 - Qualification

History and Development

2. Describe breed characteristics and uses of major breeds of horses.
 - Light horses
Examples: Quarter Horse, Appaloosa, Thoroughbred, Arabian, Morgan, American Saddlebred, Tennessee Walking Horse, Paint
 - Draft horses
Examples: Clydesdale, Shire, Percheron, Belgian
 - Ponies
Examples: Welsh, Shetland, Pony of the Americas, American Walking Pony
3. Identify equine breed characteristics.
Examples: structure, muscle, color, size, head and neck
4. Discuss roles of horses throughout history.
 - Beasts of burden
 - Transportation
 - Recreation

5. Identify origins and historical aspects of major breeds of horses.
Example: Spanish descent of the American Paint horse

Safety

6. Describe horse behaviors that cause injuries.
Examples: submission to some members of the herd, dominance over others, fight or flight animals
7. Identify safety techniques to be considered when handling and transporting horses.
Examples: approaching a horse from the front or side, avoiding sudden movement, speaking quietly
8. Identify various tack and equipment used in the horse industry.

Performing First Aid

9. Identify structures and functions of components of the equine circulatory system.
10. Identify structures and functions of components of the equine respiratory system.
11. Describe normal equine ranges for vital signs.
Examples: heart rate, labored respiration
12. Compare critical to noncritical equine injuries.
Examples: cuts, broken bones
13. Describe basic treatment of equine wounds.
Examples: cleaning, ointments, bandages, stitches

Anatomy and Physiology

14. Identify the parts of the anatomy of a horse.
 - External
Examples: withers, crest, poll, forehead, muzzle, point of shoulder, pastern, coronet, fetlock
 - Internal
Examples: respiratory, muscular, skeletal, circulatory
15. Identify structures and functions of components of the equine digestive system.
Examples: esophagus—food carried down esophagus by a series of muscle contractions; cecum—roughage digested by bacterial action

Nutrition

16. Analyze feed stuffs used in feeding horses according to nutritional value.
Examples: grains, roughage, vitamins, minerals, water
17. Explain problems associated with feeding horses.
Examples: overfeeding, underworking, feeding routine, foundering
18. Explain the balance of rations for horses at different stages of development.

Health Disease and Prevention

19. Describe causes of major equine diseases and methods for prevention.
Examples: diseases–Laminitis (nutritional disorder caused by overeating of concentrates);
methods of prevention–management practice
20. Differentiate between internal and external parasites.
Examples: deerflies, lice mites, ringworm, ticks, botflies, strongyles, ascarids, pinworms

Hoof Care

21. Identify causes and symptoms of lameness.
Examples: stone bruise, overextension, tendonitis
22. Identify the internal parts of a foot.
Examples: frog, toe, white line, bars, heel
23. Analyze situations that necessitate the assistance of a farrier.
 - Protection
 - Pastern angles
 - Performance
24. Describe trimming techniques.
25. Explain causes of foot problems.
 - Thrush
 - Cracked hooves
 - Sole bruising
26. Describe common tools used in caring for a horse's hoof.
 - Apron
 - Hoof gauge
 - Hoof knife
 - Hoof pick
 - Anvil
 - Rasp
 - Hoof nippers
 - Nail clincher

Reproduction

27. Identify structures and functions of the male and female equine reproductive systems.
28. Analyze important factors in a breeding program.
Examples: heat cycle, gestation, lactation, record keeping
29. Evaluate methods used for breeding horses.
Example: artificial insemination
30. Discuss issues associated with fertility, genetics, and reproduction in equine breeding.

Selection/Conformation

31. Compare factors in selecting a horse for a particular use.
Example: draft horses for pulling heavy loads
32. Describe procedures for determining the age of a horse.
33. Describe factors to consider in judging halter and performance classes.

Facilities

34. Discuss different barn styles.
Examples: gambrel, gable
35. Evaluate techniques and facilities for training a horse.
Examples: round pen, stables
36. Analyze environmental issues related to maintaining and caring for horses.
 - Waste management
 - Overgrazing

Training

37. Evaluate various training methods/techniques.
Examples: controlling the horse, longeing, halter breaking, western pleasure, English

FISH AND WILDLIFE MANAGEMENT

Fish and Wildlife Management is a one-credit course that provides students with the opportunity to become more knowledgeable about some of today's most valued, yet vulnerable, natural resources. Students develop an understanding of the important role these resources play in the ecosystem as they participate in hands-on activities in the classroom. Topics included in the course are careers, outdoor safety, history of fish and wildlife management, administration of fish and wildlife management, fish and wildlife issues, fish and wildlife classification, fish and wildlife ecology and relationships, fish and wildlife identification, fish and wildlife regulations and sport hunting, fish and wildlife management (nutrition, cover, nesting, and habitat), endangered species, fish and wildlife pest management, and outdoor recreation.

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This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Career Opportunities

1. Compare characteristics of various career opportunities in fish and wildlife management.
 - Nature of work
 - Compensation and benefits
 - Qualifications
 - Requirements

Outdoor Safety

2. Discuss principles of hunter ethics.
3. Describe firearm safety procedures.
4. Explain water safety rules.
5. Describe procedures for survival and first aid.
6. Describe recreational safety issues for specific applications.
 - ATV use
 - Watercraft
 - Camping

History of Fish and Wildlife Management

7. Describe the history of fish and wildlife management.

Administration of Fish and Wildlife Management

8. Describe laws and methods used by private, state, and federal agencies to protect fish and wildlife.
9. Assess the need for private, state, and federal regulatory agencies.
10. Identify primary sources of funding for fish and wildlife enhancement/habitat conservation.

Fish and Wildlife Issues

11. Describe specific acts of humans that harm fish and wildlife habitats.
Examples: polluting, filling wetlands
12. Analyze effects of introducing native and nonnative species into an area.
13. Discuss how fish and wildlife may cause economic damage to crops and the environment.
14. Evaluate legal issues concerning rare, endangered, and threatened species of fish and wildlife.

Fish and Wildlife Classification

15. Distinguish wildlife species as game, nongame, extinct, endangered, threatened, or rare.
16. Identify categories of wildlife.
 - Mammals
 - Birds
 - Reptiles
 - Amphibians

Fish and Wildlife Ecology and Relationships

17. Identify fish and wildlife ecosystems.
 - Wetlands
 - Woodlands
 - Grasslands
18. Describe components of a wildlife ecosystem.
19. Identify factors used to correct an unbalanced ecosystem.
20. Describe interdependence between wildlife and humans in various ecosystems.
21. Compare primary and secondary biological succession.

Fish and Wildlife Identification

22. Identify characteristics of common fish and wildlife indigenous to Alabama and/or the United States within specific categories.
 - Large mammals
 - Small mammals
 - Waterfowl
 - Game birds
 - Freshwater fishes
 - Song birds
 - Birds of prey
 - Reptiles
 - Amphibians
 - Saltwater fishes

Fish and Wildlife Regulations and Sport Hunting

23. Explain fish and wildlife rules and regulations in Alabama.
24. Discuss laws that protect fish and wildlife.
25. Describe the impact of sport hunting in Alabama.
Examples: economic impact, population control

Fish and Wildlife Management

26. Describe basic habitat requirements of fish and wildlife species.
 - Water
 - Cover
 - Food
 - Arrangement
27. Design a habitat improvement project or plan for a fish or wildlife species.
Examples: nesting boxes, feeders
28. Explain methods and practices used to improve and enhance fish and wildlife habitats.

Endangered Species

29. Explain how fish and wildlife species become extinct, rare, endangered, or threatened.
30. Discuss recovery strategies used to manage a specific endangered species.
31. Explain the importance of saving an endangered species.

Fish and Wildlife Pest Management

32. Identify pests affecting common fish and wildlife species in Alabama.
 - Diseases
 - Insects
 - Plants

Outdoor Recreation

33. Identify recreational opportunities on public and private lands in a specific area.
34. Identify distinguishing characteristics of state parks in Alabama.
35. Describe criteria used to identify popular national parks in the United States.
36. Identify methods of developing and managing outdoor recreational enterprises.
 - Hunting
 - Fishing
 - Camping

FLORAL DESIGN AND INTERIORSCAPING

Floral Design and Interiorscaping is a one-credit course designed to introduce students to career possibilities in this field and to provide basic instruction in techniques of floral/interior design and merchandising. Students participate in hands-on activities in the areas of careers; technological advancements; employability skills; SAEPs; computer applications; leadership development; and design and arrangement of flowers, foliages, and accessories. The selection, placement, and care of plants used in interior locations are also included in this course.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

INTRODUCTION

History

1. Describe the history of the two styles of floral design.
 - Occidental style
 - Oriental style

Career Opportunities

2. Examine resources for career opportunities in retail/wholesale florist business.
 - Internet
 - Newspaper/classified ads
 - Trade journals
 - Personal contacts/interviews
Examples: florists, university personnel, trade associations
 - Local businesses
 - Industry trade shows/conferences
 - University career days

Safety

3. Describe safety rules and procedures for the floral industry.
Examples: tool safety, transportation safety, floral shop safety, laboratory safety

FLORAL DESIGN

Basic Design Principles

4. Demonstrate the basic line designs of floral arrangements.
Examples: inverted T, L-pattern, vertical, crescent, Hogarth curve, contemporary freestyle

Flower and Foliage Identification

5. Identify commonly used cut flowers.
6. Identify commonly used foliages.

Flower and Foliage Conditioning, Storage, and Handling

7. Demonstrate procedures to follow in handling foliage and flowers upon arrival from the wholesaler.
Examples: removing dead flowers and foliage, placing in preservation water, inspecting for damage

Dried and Permanent Flowers

8. Identify different types of permanent flowers.
Examples: silk, plastic, paper, dried, preserved

Construction Principles

9. Illustrate various construction techniques used in fresh and dried flower arrangements.
 - Bud vases
 - Circular
 - Triangular
 - Line
 - Wreaths
 - Holiday
 - Wedding
 - Sympathy
 - Boutonnieres and corsages
 - Potted plants

INTERIORSCAPING

Indoor Plant Identification

10. Identify common indoor flowering and foliage plants.

Interior Design and Construction

11. Analyze selective criteria important in interior design.
 - Site location
 - Plant characteristics
 - Plant growing conditions

Background and History

12. Relate the history of interiorscaping to the environmental protection movement.

CULTURE REQUIREMENTS

Light Requirements

13. Explain differences in plants grown in different light sources.
 - Natural sunlight
Examples: direct sun, partial sun, indirect or filtered light
 - Filtered sunlight
 - Incandescent
 - Fluorescent
 - High density discharge light

Water and Drainage

14. Describe watering techniques used with different types of plants.
15. Identify symptoms of over watering and under watering.
16. Compare drainage characteristics of different growing media.

Pest and Disease Control

17. Identify symptoms of damage produced by common insects and diseases affecting interior plants.
18. Design a plan to control common insects and diseases affecting interior plants.
19. Evaluate factors that favor insects and diseases in interior plants.

Nutrition

20. Compare major plant fertilizers used in interiorscaping.
 - Time release
 - Soluble
21. Identify symptoms of common nutritional disorders in plants.

Care and Maintenance

22. Design a maintenance schedule for common interiorscape processes.
 - Watering
 - Pruning
 - Fertilizing
 - Cleaning
 - Controlling pests

Environmental Issues

23. Evaluate the impact of plants on the environment.
Example: source for food, beauty, oxygen

BUSINESS MANAGEMENT

Pricing

24. Identify pricing criteria used in the floral industry.
Example: $\text{price} = \text{material} + \text{labor} + \text{overhead} + \text{profit}$

Marketing

25. Design a market survey for a potential floral business.

26. Design an advertising campaign using different marketing strategies.
 - Immediate response advertising
 - Attitude advertising
27. Design a marketing display.

Customer Relations

28. Discuss characteristics of an effective salesperson.
 - Friendliness
 - Helpfulness
 - Knowledge
 - Honesty
 - Good grooming
 - Articulate speech
 - Courtesy
29. Demonstrate different types of sales transactions.
Examples: computer/cash register, charge card, telephone order, floor sales, E-commerce
30. Describe successful managerial skills for operating a floral business.
Examples: scheduling work, handling customer complaints, keeping records, inventorying and ordering, invoicing, budgeting, advertising, relating to employees, partnering, communicating orally and in writing
31. Identify the procedures for conducting a sales transaction.
Example: initiating and closing a sale

FORESTRY

Forestry is a one-credit course designed to enable students to become knowledgeable of forestry and wood technology. Students acquire an appreciation for increased emphasis on managing and securing forests for the future. Students develop skills for producing, managing, harvesting, marketing, and developing forestry products. Students also develop skills in the area of biotechnology, surveying, and mapping. Students evaluate practices to insure protection of natural resources found in the forest ecosystem. Students learn to identify forest trees, forest products, forest insects, and forest diseases. Students use tools associated with forestry and wood technology. Students develop leadership skills, realize personal growth, and are better prepared for career success through the knowledge gained and skills acquired in this course.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Introduction to Forestry

1. Assess the value of trees in both rural and urban settings.
Examples: economic, aesthetic, environmental
2. Identify safety practices associated with the forest industry.
 - Recognizing dangers
 - Identifying safety precautions
 - Identifying poisonous snakes
 - Identifying poisonous plants
3. Compare job characteristics of various careers related to the forestry industry.
 - Availability
 - Requirements
 - Compensation and benefits
4. Compare roles of Alabama Forestry Agencies.
Examples: Alabama Forestry Commission, Alabama Forestry Association, Alabama Cooperative Extension System, Natural Resource Conservation Service

Tree Study

- Analyze functions of the major parts of a tree.
 - Crown—leaves, twigs, flowers, fruits
 - Trunk—cambium, heartwood, sapwood
 - Roots—taproot, lateral roots, root tips or root hairs

Forest Environment

- Evaluate a site for growing trees.
 - Determining site index
 - Appearance

Tree Identification and Classification

- Explain how trees are classified.
 - Hardwood
 - Softwood
 - Taxonomy
- Identify important forest trees.
 - Distinguishing between characteristics of gymnosperms and angiosperms
 - Identifying leaf arrangements, margins, forms
 - Identifying trees listed in the FFA Forestry Career Development Events (CDE) manual

Biometrics

- Identify tools used in measuring trees.
 - D-tape
 - Tree scale stick
 - Clinometer
 - Increment borer
 - Tree calipers
- Measure growth and determine age of trees using an increment borer.
- Determine the volume of standing timber.
 - Pulpwood
 - Sawtimber

Forestry Surveying and Mapping

- Demonstrate proper use of surveying devices used in forestry.
 - Land measurements
 - Mapping (GPS)
 - Compass

Legal Land Description

13. Describe the United States Public Land Survey System.
 - Townships
 - Range
 - Section
14. Interpret land description.
 - Locating parcels of land using legal land descriptions
 - Observing land deeds
 - Other methods of land description
Example: butts and bounds

Silviculture

15. Analyze various forestry management objectives.
 - Timber
 - Wildlife
 - Recreation
 - Aesthetics
 - Multiple use

Timber Harvesting and Cutting Practices

16. Compare methods of harvesting timber.
 - Seed tree
 - Clear-cut
 - Selection
17. Identify harvesting equipment.
 - Saws
 - Feller-bunchers
 - Pre-haulers
 - Skidders
 - Whole tree chippers
 - Loaders
 - Hauling vehicles

Environmental Issues

18. Analyze current forestry issues.
 - Watershed management
 - Ecosystem management
 - Recycling
 - Importing forest products
 - Air quality
 - Conservation
 - Ownership

19. Survey a forest ecosystem.
Examples: soil, water, trees, insects, wildlife
20. Analyze forestry Best Management Practices (BMP) and their effects on water quality.
21. Identify endangered plants and animals.

Forest Product Identification and Use

22. Identify uses for material derived from the forest.
 - Building materials
 - Medicines
 - Paper products
 - Horticultural products

Forest Entomology

23. Identify forest insects.
 - Bark beetles
 - Leaf eaters
 - Tip feeders
 - Wood borers
24. Compare insects by symptoms and damage.
Examples: symptom–pitch tubes, damage–bark beetle infestation
25. Describe advantages and disadvantages of various methods used to control insects.
Examples: chemicals, cutting, burning

Forest Pathology

26. Identify forest diseases.
 - Brown Spot Needle Disease
 - Annosus Root Rot
 - Fusiform Rust
 - Little Leaf
 - Needle Cast Fungi
27. Identify diseases by symptoms and damage.
28. Describe various methods used to control forest diseases.

Timber Marketing

29. Analyze marketing practices for selling at the highest return.
 - Estimating standing timber
 - Determining the value of timber
30. Identify potential timber markets.
 - Pulp/paper mills
 - Post mill
 - Sawmill
 - Specialty markets
 - Export markets
 - Firewood sales
 - Individuals
31. Describe legal documents used in a timber sale.
 - Timber sale contract
 - Timber deed
 - Harvest contract

Reforestation

32. Identify sources of tree seedlings.
 - Private nurseries
 - State nurseries
 - Federal nurseries
33. Select methods for the handling and care of seedlings.
 - Heel-in
 - Cold storage
 - Field care
34. Evaluate methods of planting trees.
 - Direct seeding
 - Hand planting
 - Machine planting
35. Compare types of reforestation.
 - Artificial
 - Natural
36. Analyze economics of reforestation.
 - Site preparation
 - Cost and species of trees
 - Government programs

Urban Forestry

37. Compare management strategies for urban and rural forests.

Wildlife

38. Discuss management practices for common wildlife found in Alabama and/or the United States.
 - Large mammals
 - Small mammals
 - Reptiles/amphibians
 - Waterfowl
 - Game birds
 - Song birds
 - Birds of prey
 - Freshwater fish

Fire Utilization and Control

39. Identify classes of forest fires.
 - Ground
 - Surface
 - Crown
40. Identify fire-fighting tools according to use.
 - Rakes and swatters
 - Cutting tools
 - Drip torch
 - Fire plows
41. Explain the importance of prescribed burning.
42. Develop a prescribed burning plan.
 - Fire lanes
 - Weather conditions
 - Wind speed and direction
 - Timber type
 - Fuel conditions and manpower
 - Burning permit

Technology

43. Identify technological advancements related to forestry.
 - Biotechnology
 - Computer programs
 - Internet
 - Mapping systems

HORTICULTURE

Horticulture is a one-credit course in which students receive instruction about this multi-faceted industry and participate in hands-on activities in the areas of careers, technological advancements, employability skills, SAEPs, computer application, basic plant science, plant propagation, soil and media mixture, plant nutrition, greenhouse design and structures, nursery crops, hydroponics, and vegetable gardening.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

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Students will:

Introduction: History and Importance

1. Evaluate the importance of horticulture to the local, state, nation, and world economies.
Examples: jobs in the community, exports, crop value, value to community

Career Opportunities

2. Compare skills and qualifications for different careers in horticulture.
Examples: greenhouse worker–high school education, plant breeder–college education

General Safety Practices

3. Identify practices required in the safe use of pesticides.
 - Reading and following labels
 - Selecting methods of application
 - Practicing safety procedures
 - Storing of pesticides
 - Disposing of pesticides
 - Cleaning and storing equipment
 - Documenting pesticide use

Plant Physiology/Plant Growth

4. Describe plant structures and functions in annuals, biennials, and perennials.
 - Vegetative plant parts
 - Simple and compound leaves
 - Herbaceous and woody plant stems
 - Dicot and monocot structures
 - Tap root and fibrous root system
 - Flower and fruit
 - Seeds
5. Describe the uses of growth hormones.
 - Rooting
 - Growth stimulant
 - Retardant

Soil Media

6. Identify different kinds of media.
 - Soil
 - Soilless medium
7. Differentiate textures of soils.
 - Sand
 - Silt
 - Clay
 - Loam

Plant Nutrition

8. Describe the function and symptoms of deficiencies of macronutrients needed for plant growth in different crops.
 - Major
 - Nitrogen
 - Phosphorus
 - Potassium
 - Secondary
 - Calcium
 - Sulfur
 - Magnesium
9. Describe the functions of micronutrients.
 - Zinc
 - Iron
 - Boron
 - Copper
 - Manganese

10. Design short- and long-term action plans based on information provided in a soil test.
 - Selecting types of fertilizers
 - Calculating fertilizer ratios
 - Choosing methods of application
 - Soil-testing schedule

Plant Propagation

11. Describe methods of asexual and sexual plant propagation.
 - Seeds
 - Stem cuttings
 - Budding
 - Grafting
 - Layering
 - Division
 - Separation
 - Root cutting
 - Leaf cutting

Plant Management

12. Describe techniques for maintaining plants.
 - Pruning
 - Mulching
 - Fertilizing
 - Controlling pests
 - Watering

Irrigation and Watering Techniques

13. Describe specific uses of equipment needed in major greenhouse irrigation systems.
 - Spray
 - Trickle or drip
 - Ooze tubes
 - Water loops
 - Capillary mats
 - Ebb and flow
 - Hand

Plant Identification and Classification

14. Identify horticulture plants.
 - Natural classification system
 - Greenhouse plants
 - Nursery plants
 - Vegetables and fruits

Greenhouse Facilities

15. Describe greenhouse designs and components.
 - Even-span
 - Gothic arch
 - Uneven-span
 - Quonset
 - Lean-to
 - Attached/gutter-connected
16. Compare the transparent coverings used for a greenhouse.
 - Glass
 - Polyethylene
 - Fiberglass
 - Acrylic
 - Polycarbonate
17. Design benches and bench arrangements for a greenhouse.
Examples: benches—wood, welded wire, prefabricate plastic;
bench arrangements—longitudinal, cross, peninsula
18. Compare the methods used in controlling greenhouse temperature.
 - Heating
 - Cooling
 - Ventilation

Greenhouse Production

19. Design a crop production schedule.
20. Describe containers used in greenhouse production.
Examples: plastic inserts, plastic pots, clay pots, peat pots
21. Describe methods of spacing greenhouse crops.
 - Expanded
 - Fixed

Nursery Crops

22. Compare differences between container and field nurseries.
23. Examine factors that determine how field nurseries are laid out.
24. Describe methods for irrigating nursery crops.
 - Stationary
 - Portable
 - Semi-portable
25. Describe methods of fertilization for nursery crops.

Pest Management

26. Identify symptoms and causes of plant injury.
 - Symptoms–wilting, color change, rotting, holes
 - Causes–water, fertilizer, pesticide, insect, disease
27. Describe types of pesticides and their safe use.
 - Insecticides
 - Herbicides
 - Fungicides
 - Bactericides
28. Explain the concept of Integrated Pest Management (IPM).

Hydroponics

29. Compare the following hydroponic systems.
 - Sand culture
 - Gravel culture
 - Bag culture
 - Aeroponic
 - Continuous flow
 - Nutrient film technique

Vegetable Gardening

30. List components to consider when choosing the location of a vegetable garden.
Examples: water supply, trees, sunlight, topography
31. Design a vegetable garden plan.
 - Four-vegetable minimum
 - Tips for successful planting
 - Spring garden
 - Fall garden
32. Identify vegetable varieties suitable for the local area.
 - Spring crop
 - Fall crop

Technological Application

33. Discuss the benefits and limitations of modern technology on horticulture.
34. Examine technological advances that serve the horticulture industry.
 - Computers
 - Software
 - Controls and sensors

LANDSCAPE DESIGN AND MANAGEMENT

Landscape Design and Management is a rapidly growing area in agriscience. Landscapers play important roles in our lives and in the Earth's ecosystem. This one-credit course allows students to become more knowledgeable about and appreciative of landscape design and management. Students receive instruction that allows them to participate in hands-on activities in the areas of careers; safety; landscape drawing and design; landscape plant identification, classification, and selection; landscape growth and the environment; landscape establishment and management; landscape tools and equipment; landscape drainage and irrigation; insects, diseases, and weeds; landscape features; residential turfgrass management; interior plantscapes; xeriscaping; business management; and environmental issues.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Career Opportunities

1. Compare job characteristics for various career opportunities in landscape design and management.
 - Nature of work
 - Compensation and benefits
 - Requirements
 - Qualifications

Safety

2. Identify safety precautions for landscape operations.
 - Pesticide safety
 - Power equipment safety
 - Hand tool safety

Drawing/Design

3. Apply the principles of landscape design.
 - Simplicity
 - Balance
 - Focalization of interest
 - Rhythm and line
 - Scale and proportion
 - Unity
4. Categorize features of outdoor landscape-use areas.
 - Public area
 - Family living area
 - Private living area
 - Service area
5. Apply symbols of all major landscape features.
Example: drawing a landscape plan
6. Measure lengths and distances to scale.
7. Apply computer-assisted design techniques to landscape planning.

Landscape Plant Identification, Classification, and Selection

8. Classify landscape plants into biological categories.
 - Kingdom
 - Division/phylum
 - Class
 - Order
 - Family
 - Genus
 - Species
9. Identify common plants used in landscape design.
 - Trees
 - Shrubs
 - Ground covers
 - Vines
 - Flowers
 - Turf

10. Select plants for landscape applications based on physical and cultural characteristics.
 - Hardiness
Examples: heat, cold
 - Mature size
Examples: height, width
 - Flowering
 - Fruiting
 - Color
 - Foliage
 - Sun/shade tolerance

Landscape Growth and the Environment

11. Describe environmental factors that affect plant growth.
Examples: temperature, light
12. Explain the importance of specific plant processes to landscape plants.
 - Photosynthesis
 - Respiration
 - Transpiration
13. Describe symptoms used to diagnose deficiencies and toxicity in landscape plants due to amounts of primary, secondary, and trace nutrients.
 - Primary nutrients
Examples: nitrogen, phosphorus, potassium
 - Secondary nutrients
Examples: calcium, sulfur, magnesium
 - Trace nutrients
Examples: boron, manganese, chlorine, zinc, molybdenum, iron, copper, aluminum
14. Describe functions of the primary and secondary nutrients utilized by landscape plants.

Landscape Establishment

15. Demonstrate proper methods for planting landscape plants.
 - Shrubbery
 - Trees
 - Annuals
 - Turf
 - Bulbs
 - Ground covers
 - Vines

Landscape Management

16. Describe techniques for maintaining an established landscape.
 - Pruning
 - Fertilizing
 - Irrigating
 - Mulching
 - Controlling pestsExamples: weeds, insects, diseases

Tools and Equipment

17. Identify criteria used in the selection of hand tools, power tools, power equipment, and machinery for a specific landscape task or job.
Example: hand pruners for large leaf plants
18. Describe basic maintenance procedures required for tools and equipment used in a landscape.
Examples: sharpening, lubricating, cleaning

Drainage and Irrigation

19. Describe methods of proper drainage in a landscape.
Examples: tile, slope
20. Discuss common methods of irrigating landscapes.
 - Impulse
 - Oscillating
 - Automatic
 - Pop-up

Insects, Diseases, and Weeds

21. Diagnose pest problems for landscapes.
 - Insects
 - Diseases
 - Weeds
22. Describe types of selective and nonselective pesticides used in landscapes.

Landscape Features

23. Explain criteria used in the selection of enrichment, enclosures, and surfacing features used in a landscape.
24. Calculate the amount, area, volume, and cost of plant and features in a landscape.

Turfgrass Management

25. Describe a maintenance program for residential turfgrass.

Interior Plantscaping

26. Identify characteristics for the most common indoor plants used in interior plantscaping.
27. Discuss principles of interior design.
28. Describe common needs for interior plants.
 - Light
 - Media
 - Watering and drainage
 - Fertilization
 - Temperature
 - Humidity

Xeriscaping

29. Select proper techniques used to achieve xeriscaping concepts.

Business Management

30. Demonstrate appropriate business-related work ethics.
Examples: following instructions, being on time, working with others
31. Demonstrate managerial skills for successful operation of a landscape or turf business.
 - Record keeping
 - Budgeting
 - Pricing
 - Scheduling work
 - Inventorying and ordering
 - Advertising
 - Handling customer complaints
 - Communicating in oral and written form

Environmental Issues

32. Discuss environmental issues relating to landscape design and management.
Example: application of pesticides

Technology

33. Identify technological advancements that enhance the landscape design and management industry.
 - Computer programs
 - Internet

PLANT BIOTECHNOLOGY

Plant Biotechnology is a one-credit course that provides students with an opportunity to develop an understanding of the principles and practices of plant genetics and biotechnology regarding agricultural-related products and services. Students learn fundamental aspects of cellular biology, genetics and selection, and the application of various forms of biotechnology to influence selection. Students learn the importance of trait selection in productivity, discuss the exploitation of biotechnology for the improvement of human life, and explore ethical and moral considerations related to the use of plant biotechnology. Application of agriculture-related case studies is used to demonstrate and reinforce skills taught in this course.

Content standards identified in this course of study identify the minimum required content of the Plant Biotechnology course. Local school systems may expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course expands students' critical thinking skills, use of the scientific method, integration of technology, development of leadership skills, and application of knowledge and skills related to practical questions and problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Introduction to Plant Biotechnology

1. Evaluate the historical development and future promise of plant biotechnology to improve the efficiency of agricultural production.
2. Explain the importance of plant biotechnology to the enhancement of human quality of life.
 - Medical advancement
Example: synthesis of medicines
 - Environmental advancement
Examples: plant disease resistance, pest control
 - Product and service advancements
Examples: increased yield, disease-resistant plants, herbicide-resistant plants, consumer issues

Safety

3. Identify safety considerations and procedures required for work in various areas of plant biotechnology.
 - Laboratory safety
 - Biological safety
 - Chemical safety
 - Radiation safety
 - Physical safety

Career Opportunities

4. Identify career opportunities associated with plant biotechnology.
 - Production agriculture
 - Research and development
 - Sales and marketing

Ethical Considerations

5. Select methods of genetic manipulation in plants that best accomplish specific goals.
Examples: natural breeding, genetic engineering, tissue culture
6. Explain religious, cultural, and bioethical considerations regarding various methods of genetic manipulation used on plants to increase productivity and to enhance the quality of human life.

Cellular Biology

7. Describe the major components/organelles of plant cells and their functions.
 - Major cellular organelles
Examples: nucleus, ribosome, plasmodesmata
 - Function of plant cell organelles as coordinated subcomponents of the cell
8. Evaluate the basic relationship among gene (DNA), RNA, and protein (one gene/one protein).
 - Language of life
 - DNA and RNA codons
 - Protein assembly
9. Describe the process of protein synthesis.
10. Analyze chromosome structure in terms of double helix structure and gene arrays.
11. Identify codons for amino acid assembly.
12. Describe the functions of gene components in the promoter, intron and exon, and the gene sequence.
Example: subdividing gene coding for Rubisco into logical components
13. Identify mechanisms of protein synthesis involving *m*-RNA and *t*-RNA.
14. Evaluate size, structure, and important functions of common proteins in protein folding, proteins as enzymes, methods of protein identification, and separation.

Applied Genetics/Biotechnology Concepts

15. Illustrate applications of major genetic principles.
Example: Mendel's laws
16. Explain the general concept of genes and the principles of crossing, segregation, alleles, linkage, and translocation.
17. Differentiate between types of cell division (mitosis and meiosis).
18. Recognize heritable characteristics of plants.
 - Physical structure
 - Chemical composition
 - Behavior
19. Analyze outcomes of the application of plant biotechnology.
 - Genetic alteration
 - Selective breeding
 - Treatments for disease
 - Use of growth hormones

Plants in Agricultural and Ecological Settings

20. Discuss productivity and sustainability of various farming systems.
Examples: row crops, orchards, vineyards, forests
21. Describe the role of plants in meeting human needs.
 - Nutrition
 - Fiber
Examples: clothing, paper products
 - Shelter
Example: building materials
 - Energy
Examples: firewood, alcohol fuels
22. Analyze the role of plants in ecological conservation.
 - Soil conservation
 - Carbon sequestration
 - Air purification
 - Water purification
 - Oxygen production
Examples: air, dissolved oxygen in water
23. Identify biotic challenges to plants from weeds, insects, and diseases in modern agriculture as well as in sustainable agricultural systems.
 - Weeds
 - Insects
 - Diseases—viruses, fungi, bacteria

Biotechnology Investigation Techniques

24. Demonstrate biotechnological investigative techniques.
 - Genomic DNA extraction
 - Polymerase chain reactions
 - Restriction digestion
 - DNA fingerprinting
 - Protein extraction, purification, and separation

Bioinformatics

25. Identify specific uses for computer-based biotechnology information databases.
Examples: BIOSIS, Agricola, USDA/GRIN, NIH/Genbank

Plant Tissue Culture

26. Describe techniques for standard plant tissue culturing processes.
 - Hydroponics
 - Totipotency
 - Micropropagation
 - Somatic embryogenesis
 - Differentiation and plant regeneration from cells and callus

Plant Genetic Engineering

27. Describe transformation using crown gall (*Agrobacterium*), including the mechanism by which this bacterial can exchange genes with plants.
28. Evaluate the methods used in engineering plants using particle bombardment.
Examples: particle-based DNA delivery, helium-driven biolistic delivery of genes
29. Determine improved pest and weed management based on surveys of transformed crops.
30. Identify agronomically important properties of plants.
Examples: cold water tolerance, salt tolerance
31. Identify important post harvest qualities of plants and plant products.
Examples: ripening rate, higher starch content, vitamin A content
32. Identify criteria used in evaluating and selecting superior plants for harvesting of parent material.
33. Identify survey techniques to assess success/failure in accomplishing crop modification.

Plant and Microbial Genome Efforts

34. Evaluate the extent and effect of plant gene mapping efforts.

Biotechnology Applications

35. Describe the role of various public agencies and private entities in regulating plant biotechnology.
36. Compare progress in approaches and technology development in agriculture and biomedicine.
37. Identify applications of plant biotechnology to biomedical sciences.
38. Describe the application of biotechnology to methods of food preservation.
 - Irradiation
 - Ultra high temperature sterilization
 - Salting
 - Smoking
 - Dehydration
 - Genetic modification
 - Pasteurization
 - Refrigeration

Global Issues

39. Interpret the impact of public opinion and acceptance of various product treatments on marketing and sales, labeling, and government regulation of plant products from the United States.
Examples: irradiation, ultra high temperature sterilization

Marketing and Labeling Issues

40. Identify national and international marketing and labeling issues related to engineered crops.
41. Discuss positive and negative aspects of labeling GMO foods.

Environmental Impacts and Concerns

42. Evaluate the potential impact of genetic manipulation of plant populations on the environment and natural populations.
 - Disease resistance
 - Proliferation of resistant wild species
 - Introduction of new dominant species
Example: excessive competition

Hormonal Effects

43. Evaluate the effects of plant hormones on plant, animal, and human growth and development.
 - Indigenous hormones
 - Intentionally introduced hormones
 - Unintentionally introduced hormones

Agricultural Research

44. Discuss relevant impacts of significant scientific discoveries and advancements in plant biotechnology.
 - Societal importance
 - Economic value
 - Exploitation potential

POULTRY SCIENCE

Poultry Science is a one-credit course that provides students with instruction and opportunities to participate in hands-on activities in areas of careers, safety, environmental issues, consumer issues, biotechnological advancements, selection of poultry, anatomy and physiology of poultry, nutrition, housing and equipment, management practices, diseases and disorders, and marketing and grading poultry. Knowledge and skills acquired in this course allow students to develop an appreciation of the importance of the poultry science industry.

The content standards are not intended to serve as the entire curriculum. Teachers are encouraged to expand the curriculum beyond the limits of these content standards to accommodate specific community interests and utilize local resources. This course encourages critical thinking, use of the scientific method, integration of technology, development of student leadership skills, and application of knowledge and skills related to practical questions/problems. Safe field and laboratory investigations should be used in instruction to the maximum extent possible to illustrate scientific concepts and principles and to support inquiry instruction.

This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Introduction to Poultry Science Careers

1. Discuss the history of poultry science.
2. Compare requirements of various careers associated with the poultry industry.

Safety Orientation and Procedures

3. Explain the importance of safe handling of chemicals and drugs used in poultry production.
Example: preventing chemicals from leaking into the ground water supply
4. Describe safe handling procedures for transporting poultry.
 - Securing birds in crates
 - Moving birds to truck with heavy-duty loader
 - Stacking and securing crates on truck
 - Driving to processing plant safely

Environmental Issues

5. Explain the importance of keeping laying hen facilities free of debris.
Example: preventing reptile and rodent infestations
6. Identify reasons for placement of electrical outlets/circuits in poultry housing.

7. Describe procedures for disposal of poultry waste.
 - Dry spreading
 - Wet spreading
 - Lagoon
 - Dehydration
 - Incineration
 - Processing for fuel
 - Freezing
 - Composting

Consumer Issues

8. Identify government regulations pertaining to poultry processing and packaging.
 - State
 - Federal
 - United States Department of Agriculture (USDA)
 - Occupational Safety and Health Administration (OSHA)
9. Identify safety and health issues in poultry processing.
Examples: spreading bacterial infections, storing sharp objects, determining location of machinery
10. Discuss the importance of consumer education and community relations in poultry production and processing.
Examples: odor issues, irradiation of meat, water quality

Biotechnological Advancements

11. Identify biotechnological advancements in poultry science.
 - Increasing muscle mass
 - Using eggs to produce medicines
 - Vaccinating eggs

Selection of Poultry

12. Analyze the nature of the poultry industry.
 - Types of enterprises
 - Trends in production and consumption
 - Advantages and disadvantages of raising poultry
13. Identify different breeds of poultry in terms of anatomical features.
Examples: Plymouth Rock–red earlobes, Cornish White–pearl eyes
14. Compare different classes of chickens.
Examples: Mediterranean, American, English, Asiatic
15. Compare techniques of cross-mating, breed-crossing, and inbreeding chickens.

16. Analyze varieties of turkeys.
Examples: Broad Breasted Large White, Broad Breasted Bronze, Beltsville Small White, Narragansett, Bourbon Red
17. Analyze breeds of ducks.
Examples: Aylesbury, Muscovy, Khaki Campbell, Indian Runner
18. Examine breeds of geese.
Examples: Toulouse, Embden, Chinese, Pilgrim, African

Anatomy and Physiology

19. Describe the structure and function of different body systems in poultry.
 - Skeletal
 - Digestive
 - Reproductive
 - Excretory
 - Respiratory
 - Circulatory
 - Nervous

Nutrition

20. Compare accepted feeding practices for different kinds of poultry.
 - Chickens
 - Turkeys
 - Ducks
 - Geese
21. Explain practices of feeding for egg production.
 - All mash system
 - Mash and grain system
 - Cafeteria system

Housing

22. Describe equipment requirements for housing various kinds of poultry.
 - Control systems
 - Ventilation
 - Alarm systems
 - Drainage
 - Lighting
23. Analyze factors to be considered in the design of energy-saving housing.
Examples: brooding, housing, ventilation, lighting, feeding, watering, processing eggs

Equipment

24. Explain uses of automation in poultry production.
 - Feeding
 - Watering
 - Air conditioning
 - Egg collecting
 - Waste removal
25. Identify methods of reducing heat stress in poultry.
 - Circulation fans
 - Fogging nozzles
 - Evaporative cooling pads

Management Practices

26. Describe approved management practices for different kinds of poultry.
 - Brooding chickens; turkeys; ducks and geese
 - Raising laying pullets
 - Laying flock
 - Reducing heat stress
 - Growing range/confinement turkeys
 - Handling waste
 - Keeping records
27. Identify advantages and disadvantages of contracting with large poultry firms.
28. Identify provisions that make up good contracts.
Examples: tenure, renewal, cancellation, management, production and credit resources, payment or settlement, assignment of interest, arbitration

Diseases and Disorders

29. Describe procedures for controlling disease and parasites in poultry production.
 - Removing moveable equipment outside facility and washing with disinfectant
 - Cleaning manure and litter from facility
 - Sweeping walls and ceilings
 - Scraping and brushing floor
 - Hosing inside of facility with high-pressure washer and applying approved disinfectant
30. Identify symptoms and control measures for common poultry diseases.
Examples: symptoms—loss of appetite and darkening of the head (blackhead); controls—brood on wire, separating chicken and turkey flocks
31. Identify the symptoms of common parasite problems in poultry.
 - Internal problems
 - External problems

32. Compare production and price trends in poultry and eggs.
- Long-term
 - Seasonal

Marketing

33. Describe methods of marketing poultry and eggs.
Example: poultry not under contract
34. Explain classes of ready-to-cook poultry.
Examples: capons, fryer-roasted turkey, ducklings, young geese

Grading

35. Explain grades of ready-to-cook poultry.
- Grade A
 - Grade B
 - Grade C
36. Explain factors that determine grades of eggs.
- Shell
 - Air cell
 - Egg white
 - Egg yolk

Specialty Poultry and Poultry Products

37. Identify economically important specialty poultry and poultry products.
Examples: quail, ratites, pheasant, specialty meat and egg products
38. Compare requirements for specialty poultry production and traditional poultry production.
- Care and feeding
 - Management
 - Housing and environment
 - Marketing and sales

SPORTS AND RECREATION TURF

Sports and Recreation Turf is one of the newest and most rapidly expanding branches of today's landscape industry. Future career opportunities in this field are projected to continue to grow. Students enrolled in this one-credit course participate in hands-on activities in the areas of careers; safety; turfgrass identification, classification, and selection (warm, cool, and transitional); turfgrass growth and the environment; turfgrass establishment; turfgrass renovation; turfgrass management and fertilization; types of sports fields management; golf course management; turfgrass pest management; pesticide application (insects, diseases, weeds); turfgrass drainage and irrigation systems; turfgrass tool and equipment identification; maintenance of tools and machinery; and business management skills.

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This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Career Opportunities

1. Compare job characteristics in various career opportunities in sports and recreation turf.
 - Nature of work
 - Compensation and benefits
 - Requirements
 - Qualifications

Safety

2. Identify practices required in the safe use of pesticides.
 - Reading and following labels
 - Selecting methods of application
 - Practicing safety procedures
 - Storing pesticides
 - Disposing pesticides
 - Documenting pesticide use

Turfgrass Identification, Classification, and Selection

3. Identify the species, characteristics, and uses of warm season, cool season, and transitional grasses.

Turfgrass Growth and the Environment

4. Distinguish the three growth habits of turfgrass.
 - Rhizome
 - Stolon
 - Bunch
5. Analyze components and importance of soils to turfgrass growth.
6. Recognize the climatic/transition regions in the United States for which specific grasses are suitable.
Examples: Region 1–Kentucky bluegrass, Region 2–Bermuda grass

Turfgrass Establishment

7. Evaluate factors important to the four commonly used methods of establishing turfgrass.
 - Seeding
 - Sodding
 - Plugging
 - Sprigging
8. Explain soil preparation techniques for various turfgrass establishments.
Examples: grading, drainage, fertilization

Turfgrass Renovation

9. Identify strategies or corrections needed during turfgrass renovations.
Examples: tree shading–selecting or removing, heavy soils–aeration

Turfgrass Management and Fertilization

10. Describe the function of primary and secondary nutrients and symptoms of their deficiencies in turfgrass.
 - Nitrogen
 - Phosphorus
 - Potassium
 - Calcium
 - Sulfur
 - Magnesium
11. Conduct soil-testing procedures.
12. Describe strategies for typical turf care problems.
 - Freezing and thawing–rolling turf
 - Irregular top surface–top dressing
 - Thatch buildup–vertical mowing

13. Identify methods and techniques used in mowing various turfgrasses.
 - Various mowing heights
 - Frequency of mowing
 - Various patterns of mowing

Types of Sports Fields and Management

14. Design dimensions and components of a football field, a baseball field, and a soccer field.
15. Describe the unique components for specific sports fields.
Examples: lines, soil covers, painting

Golf Course Management

16. Identify the characteristics of different parts of a golf course.
 - Greens
 - Fairways
 - Roughs
 - Traps
 - Tees
17. Describe the basic design and layout features of a golf course.
Examples: sample courses, number of greens, number of sand traps, water features, yardage
18. Prescribe maintenance procedures performed on a golf course.
 - Mowing height of greens, tees, roughs, and fairways
 - Pin movement and placement
 - Trimming around fixtures, lakes, and paths
19. Evaluate the responsibilities of the superintendent, director of grounds, golf professional, marshals, and maintenance crew.

Turfgrass Pest Management

20. Identify major insects, diseases, and weeds that affect specific turfgrasses.
Examples: army worms, grubs, dollar spot, fairy ring, crabgrass, mole crickets, annual bluegrass
21. Assess types of pesticides available for the turfgrass industry.
Examples: pre-emergence, post-emergence, selective and non-selective Monosodium Monoarsenate (MSMA)
22. Evaluate methods of controlling insects, diseases, and weeds for specific turfgrasses.
23. Apply techniques needed to calibrate and prepare pesticide mixtures.
 - Following label instructions
 - Measuring

Turfgrass Drainage and Irrigation Systems

24. Evaluate the design and layout of drainage and irrigation systems for turfgrasses.
Examples: coverage, volume
25. Demonstrate skills needed to maintain drainage and irrigation systems.
Examples: plumbing, electricity

Turfgrass Tools and Equipment Identification and Maintenance

26. Identify uses of tools and equipment needed for the maintenance of turfgrass.
 - Power equipment
 - Mowers–reel and rotary
 - Sprayers–boom and hand-held
 - Hand tools
 - Pumps
27. Demonstrate maintenance procedures for tools and equipment used to maintain turfgrasses.
Examples: lubrication, filters, sharpening blades

Business Management

28. Demonstrate appropriate business-related work ethics.
Examples: following instructions, being on time, working with others
29. Demonstrate managerial skills for the successful operation of a landscape or turf business.
 - Record keeping
 - Budgeting
 - Pricing
 - Scheduling work
 - Inventorying and ordering
 - Advertising
 - Handling customer complaints
 - Communicating orally and written

Technology

30. Identify technological advancements that enhance the sports and recreation turf industry.
 - Computer programs
 - Internet
 - GIS/GPS
 - Weather radar

VETERINARY SCIENCE

The Veterinary Science course is a one-credit course designed to prepare students for entry-level employment or for advanced training in the veterinary assisting industry. The curriculum focuses on broad, transferable skills and stresses understanding and demonstration of the following elements as they relate to veterinary science: planning, finance, management, genetics, anatomy/physiology, and related use of technology. Students also explore health, safety, and issues related to labor, community, and the environment.

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This course emphasizes SAEP and FFA opportunities that develop students' potential for premier leadership, personal growth, and career success.

Students will:

Career Opportunities

1. Compare job characteristics of various career opportunities in veterinary science.
 - Nature of work
 - Compensation and benefits
 - Requirements
 - Qualifications
2. Describe working conditions encountered in various veterinary science careers.

Safety

3. Identify safety rules used when working with animals.
 - Rules for handling
 - Rules for disease control
 - Rules in laboratory
 - Rules for first aid

Veterinary Services

4. Identify differences in veterinary services applicable to various classes of animals.
 - Small mammals
 - Large mammals
 - Exotics
 - Reptiles
 - Amphibians
 - Birds
 - Fish

Vaccines

5. Discuss the roles of various vaccines used in animal health.
6. Compare the use of vaccines for infectious diseases across classes of animals.

Laws and Regulations

7. Assess issues related to laws and regulations involving animal disease and animal well-being.
Examples: leash, barking, mandatory slaughter
8. Describe effects of captivity on exotic animals.

Disease Control

9. Relate diagnostic processes to effects of diseases on animals.
Examples: Blackleg, parasite infestation
10. Evaluate principles of disease control in animals.
 - Vaccinations
 - Quarantine
 - Cleanliness
11. Describe internal and external parasites and methods of control.
12. Describe common diseases found in local animal populations.

Anatomy and Physiology

13. Identify structures and functions of various systems of selected animals.
 - Skeletal
 - Muscular
 - Circulatory
 - Respiratory
 - Nervous
 - Urinary
 - Endocrine
 - Digestive

Reproduction and Genetics

14. Compare breeding techniques used with selected animals.
 - AI
 - Controlled breeding season
 - Embryo transfer
15. Evaluate the process of genetic inheritance in livestock production.
16. Describe the pedigree of selected animals.
 - Registration papers
 - Genetic studies
17. Describe causes and solutions of problems associated with animal over population.

Hormones and Growth Disorders

18. Identify abnormalities associated with growth in selected large and small mammals.
 - Dwarfism
 - Reproduction problems
19. Identify treatments used to correct hormone and growth disorders.

Animal Anesthesiology

20. Describe uses of anesthesiology.
 - Minor surgery
 - Major surgery
 - Grooming

Drug and Medication Techniques

21. Identify techniques of preventive medicine and disease control in different classes of animals.
22. Identify appropriate dosage and method of administering drugs and medications in specific situations.
Example: Beef Quality Assurance (BQA) standards

Management Techniques

23. Categorize housing needs for selected animals.
Examples: horse–stall/pasture, fish–aquarium
24. Evaluate nutritional requirements in selected species in terms of different digestive systems.
Examples: poultry, cattle, horses
25. Evaluate the use of animal health products.
 - Vitamins
 - Minerals
 - Parasite controls
26. Describe effective grooming techniques on selected animals.
Examples: shearing, trimming
27. Demonstrate restraint and control techniques for selected animals.

Humane Treatment

28. Relate the effects of human-animal bonding on human health.
29. Describe effects of animal control and humane societies on local communities.
30. Compare the concept of animal rights with animal welfare.
31. Appraise humane treatment in a variety of settings.
 - Concentrated feeding operations
 - Hunting
 - Trapping
 - Zoos
 - Rodeos
 - Home (pets)
 - Processing plants
 - Research laboratories
32. Explain normal and abnormal animal behaviors.
Examples: aggression, loss of appetite

Hygiene

33. Identify proper hygiene techniques for selected animals.
Examples: grooming, bedding material

Business Management Practices

34. Identify steps in maintaining health records.
35. Identify techniques to enhance customer relations.
- Human relations
 - Communications
 - Leadership
36. Identify accepted practices in financial management.

Basic Surgery Procedures

37. Explain basic surgery procedures for selected animals.
- Cesarean birth
 - Castration
 - Spaying
 - Nail and claw removal

Applications of Technology

38. Analyze advantages and disadvantages of the use of and reliance on technology.
39. Identify uses of technology in veterinary science applications.
Examples: genetic engineering, animal transport, tracking devices, wireless fencing

