Texas CTE

Principles of Agriculture, Food, and Natural (2010): Grade 9

Adopted 2010

Principles of Agriculture, Food, and Natural Resources

(1) The student learns the employability characteristics of a successful employee. The student is expected to:

(A) identify career development and entrepreneurship opportunities in the field of agriculture, food, and natural resources, including how to search for and obtain employment, what qualifications are required for varying career fields, and how to advance in a position;

(B) identify careers in agriculture, food, and natural resources with required aptitudes in science, mathematics, language arts, and social studies;

(C) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in agriculture, food, and natural resources;

(D) demonstrate knowledge of personal and occupational safety, health, and first-aid policy in the workplace;

(E) develop response plans to emergency situations; and

(F) identify employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.

(2) The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:

(A) plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to the supervised agricultural experience;

(C) design and use a customized record-keeping system for the individual supervised agricultural experience;

(D) participate in youth leadership opportunities to create a well-rounded-experience program in agriculture; and

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(E) produce a challenging approach for a local program of activities in agriculture, food, and natural resources.

(3) The student identifies concepts related to cultural diversity. The student is expected to:

(A) discuss significant similarities and differences in international agriculture;

(B) explain the variety of world markets; and

(C) describe marketing factors and practices that impact other cultures.

(4) The student describes the historical, current, and future significance of the agricultural industry. The student is expected to:

(A) define agriculture;

(B) identify the scope of agriculture and its effect upon society;

(C) identify significant historical and current agriculture, food, and natural resource developments;

(D) identify potential future scenarios for agriculture, food, and natural resource systems;

(E) describe how emerging technologies and globalization impacts agriculture, food, and natural resources; and

(F) compare and contrast issues impacting agriculture, food, and natural resources such as biotechnology, employment, safety, environmental, and animal welfare.

(5) The student analyzes the structure of agricultural leadership in organizations. The student is expected to:

(A) develop premiere leadership skills and collaborate with others to accomplish organizational goals and objectives through the demonstration of characteristics such as empowerment, risk, communication, focusing on results, decision making, problem solving, investment in individuals, resource use and access, service, listening, coaching, developing others, team development, understanding and appreciating others, enthusiasm, creativity, conviction, mission, courage, focus, principles, change, integrity, values, ethics, humility, perseverance, self-discipline, responsibility, community, diversity, global awareness and knowledge, innovation, intuition, adaptation, lifelong learning, and coachability;

(B) develop personal growth skills and collaborate with others to accomplish organizational goals and objectives through the demonstration of characteristics such as attitude, exercise, goal setting, planning, self-discipline, sense of balance, persistence, respect, friendship, integrity, morals, values, etiquette, citizenship, cross-cultural awareness, acceptance of change, respect for differences, decision making, principles, dependability, loyalty, trustworthiness, communication, learning, critical thinking, reasoning, creative thinking, problem solving, self-discovery, coping, friendship, self-reliance, sense of balance, empathy, compassion, ethics, coping, courage, and self-image or worth;

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(C) identify opportunities for leadership development and personal growth;

(D) demonstrate democratic principles in conducting effective meetings;

(E) describe team dynamics; and

(F) describe the development of organizational vision, mission, and goals through strategic planning processes.

(6) The student explains agriculture, food, and natural resource systems at the local, state, national, and international levels. The student is expected to:

(A) identify reasons for world trade;

(B) identify the political impact of agriculture, food, and natural resources;

(C) identify the interdependency of agriculture and the environment;

(D) explain ethical stewardship practices that reduce negative impacts of agriculture upon land, air, and water resources;

(E) review regulations and major laws to evaluate their impact on agriculture, food, and natural resources management;

(F) analyze appropriate written material to stay abreast of current issues impacting agriculture, food, and natural resources management;

(G) collect and analyze public opinion and data in order to make informed decisions; and

(H) use critical-thinking skills to identify, organize alternatives, and evaluate public policy issues related to agriculture, food, and natural resources.

(7) The student demonstrates appropriate personal and communication skills. The student is expected to:

(A) describe professional, ethical, and legal responsibilities;

(B) demonstrate the uses of proper etiquette and behavior;

(C) identify appropriate personal appearance and health habits;

(D) practice written and oral communication skills and employ effective listening skills in formal and informal situations;

(E) analyze written materials common to the agricultural industry;

(F) demonstrate sound writing and preparation skills for oral presentations, including prepared and extemporaneous presentations; and

(G) demonstrate effective speaking skills.

(8) The student applies appropriate research methods to agriculture, food, and natural resources topics. The student is expected to:

(A) define major research and development fields of agriculture, food, and natural resources;

(B) identify and apply research in the food and fiber products industries;

(C) use a variety of resources for both research and development; and

(D) describe scientific methods of research.

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(9) The student applies problem-solving, mathematical, and organizational skills in order to plan and propose supervised agricultural experience programs as well as maintain financial and logistical records. The student is expected to:

(A) Develop project proposals by using business strategies which may include identifying learning objectives; describing project logistics, methodologies, and background; forecasting expenses and potential income through budgeting; and planning for major project timeline events through calendar implementation and documentation;

(B) develop and maintain records appropriate to project type following project approval;

(C) maintain appropriate financial records through use and management of appropriate journals, inventories, income and expense logs, financial statements, and balance sheets; and

(D) conduct formative and summative reflective and financial analyses on project learning objectives and records in order to plan for the future.

(10) The student uses information technology tools specific to agriculture, food, and natural resource to access, manage, integrate, and create information. The student is expected to:

(A) Identify personal management software, electronic mail applications, and Internet applications;

(B) use word-processing, spreadsheet, and presentation software;

(C) identify collaborative, groupware, and virtual meeting software;

(D) explain the benefits of Geographic Information Systems and Global Positioning Systems; and

(E) recognize other computer-based equipment in agriculture, food, and natural resources.

(11) The student develops technical knowledge and skills related to plant systems. The student is expected to:

(A) identify the components and properties of soils;

(B) describe the process of soil formation;

(C) classify soil formations;

(D) describe the structure and functions of plant parts;

(E) discuss plant germination, growth, and development;

(F) describe plant reproduction, genetics, and breeding;

(G) identify plants of importance to agriculture, food, and natural resources;

(H) identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to plant systems; and

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(I) select, maintain, operate, and use tools, equipment, and personal protective equipment common to plant systems.

(12) The student develops technical knowledge and skills related to animal systems. The student is expected to:

(A) describe animal growth and development;

(B) identify animal anatomy and physiology;

(C) identify breeds and classes of livestock; and

(D) discuss animal selection, reproduction, breeding, and genetics.

(13) The student describes the principles of food products and processing systems. The student is expected to:

(A) identify the importance of food products and processing systems;

(B) determine trends in world food production;

(C) identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to food products and processing systems; and

(D) select, maintain, operate, and use tools, equipment, and personal protective equipment common to food products and processing systems.

(14) The student safely performs basic power, structural, and technical system skills in agricultural applications. The student is expected to:

(A) identify major areas of power, structural, and technical systems as well as their impact on world agricultural production;

(B) understand safe and appropriate laboratory procedures and policies;

(C) create proposals that include bill of materials, budget, schedule, drawings, and technical skills developed for basic power, structural, and technical system projects or structures;

(D) identify building materials and fasteners common to power, structural, and technical systems;

(E) use basic tools, skills, and common building materials to construct projects or structures;

(F) select, maintain, operate, and use tools, equipment, and personal protective equipment common to power, structural, and technical systems; and

(G) identify technological needs for improved capacity in transportation, improved production, increased product quality and operation, and specialized skills specific to power, structural, and technical systems.

(15) The student explains the relationship between agriculture and safety, health, and the environment. The student is expected to:

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(A) determine the effects of agriculture, food, and natural resources upon safety, health, and the environment;

(B) identify regulations relating to safety, health, and environmental systems in agriculture, food, and natural resources;

(C) describe methods to maintain and improve safety, health, and environmental systems in agriculture, food, and natural resources;

(D) identify alternative energy sources that stem from or impact agriculture, food, and natural resources;

(E) evaluate energy and water conservation methods; and

(F) describe the importance of safety, health, and environmental regulations and procedures in the workplace.

Small Animal Management

(1) The student describes the importance of responsible small animal ownership. The student is expected to:

(A) explain the domestication and use of small animals;

(B) identify the influence small animals have on society;

(C) describe the importance of the small animal industry;

(D) describe the obligations and benefits of small animal ownership; and

(E) discuss the use and services provided by small animals.

(2) The student learns the hazards associated with working in the small animal industry. The student is expected to:

(A) explain the importance of safe practices when working with small animals;

(B) identify diseases that can be transmitted from small animals to humans;

(C) describe methods of preventing the spread of disease;

(D) follow guidelines for safety when handling dangerous chemicals and when working with small animals; and

(E) demonstrate the proper use of laboratory equipment.

(3) The student evaluates current topics in animal rights and animal welfare. The student is expected to:

(A) compare and contrast animal rights and animal welfare;

(B) research important persons, organizations, and groups involved in the animal rights movement;

(C) create a timeline of dates and acts of legislation related to animal welfare; and

(D) analyze current issues in animal rights and animal welfare.

(4) The student knows the care and management requirements for a variety of small animals. The student is expected to:

(A) discuss the physical characteristics for each species studied;

(B) list the breeds or types of each species studied as appropriate;

(C) discuss the habitat, housing, and equipment needs for each species studied;

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(D) compare and contrast nutritional requirements for each species studied;

(E) explain health maintenance in each species studied, including the prevention and control of diseases and parasites;

(F) describe and practice common methods of handling each species studied; and

(G) use available laboratory equipment to perform procedures such as fecal test, blood testing, and basic grooming procedures.

(5) The student examines career opportunities in small animal care. The student is expected to:

(A) identify, describe, and compare career opportunities in small animal care and management; and

(B) describe the nature of the work, salaries, and educational requirements for careers in small animal care.

(6) The student learns the employability characteristics of a successful employee. The student is expected to:

(A) identify career development and entrepreneurship opportunities in the field of specialty agricultural enterprises;

(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in specialty agricultural enterprises;

(C) demonstrate knowledge of personal and mechanical safety and health practices in the workplace; and

(D) identify employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.

(7) The student develops a supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:

(A) plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to a supervised experience;

(C) design and use a customized record-keeping system for the individual supervised experience;

(D) participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and

(E) produce a challenging approach for a local program of activities in agriculture.

Professional Standards in Agribusiness

(1) The student learns the employability characteristics of a successful contributor to the modern agricultural workplace. The student is expected to:

(A) identify career and entrepreneurship opportunities related to agribusiness;

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(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in agriculture, food, and natural resource industries;

(C) demonstrate employers' expectations, appropriate work habits, and good citizenship skills; and

(D) employ leadership skills to accomplish organizational goals and objectives.

(2) The student demonstrates professional development related to effective leadership in agribusiness. The student is expected to:

(A) describe the importance of positive self-concept, social skills, and maintaining a professional image with respect to cultural diversity;

(B) identify leadership styles;

(C) prepare personal resumés and employment applications; and

(D) use positive interpersonal skills to work cooperatively with others from different cultures, genders, and backgrounds.

(3) The student evaluates employer and employee responsibilities for occupations in agriculture, food, and natural resources. The student is expected to:

(A) identify and discuss work-related and agribusiness-related ethics;

(B) demonstrate methods for working effectively with others;

(C) practice job interview and evaluation skills; and

(D) outline complaint and appeal processes.

(4) The student communicates effectively with groups and individuals. The student is expected to:

(A) understand the elements of communication both in informal group discussions and formal presentations such as accuracy, relevance, rhetorical features, and organization of information by:<ol type="i">
describing how style and content of spoken language varies in different contexts and influences the listener's understanding; and
modifying presentations such as delivery, vocabulary, length, audience needs, and purposes;

(B) identify appropriate written and verbal communications in agribusiness;

(C) demonstrate effective listening in a variety of settings;

(D) demonstrate nonverbal communications skills and effective listening strategies; and

(E) discuss the importance of relationships and group organization.

(5) The student identifies professional agricultural communications in relation to using appropriate spoken communication techniques and procedures. The student is expected to:

(A) identify the importance of verbal and nonverbal communications;

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(B) know the importance of communicating factual and unbiased data and information obtained from reliable sources;

(C) demonstrate speech preparation and delivery skills; and

(D) plan and deliver focused and coherent presentations that convey clear and distinct perspectives and demonstrate solid reasoning.

(6) The student demonstrates the factors of group and individual efficiency. The student is expected to:

(A) define the significance of personal and group goals;

(B) exhibit traits such as empowerment, risk, communication, focusing on results, decision making, problem solving, and investment in individuals when leading a group in solving a problem;

(C) discuss the importance of time management and teamwork;

(D) list the steps in the decision-making and problem-solving processes; and

(E) demonstrate a working knowledge of parliamentary law.

(7) The student identifies involvement opportunities in agribusiness professional organizations. The student is expected to:

(A) discuss the role of agricultural organizations in formulating public policy;

(B) develop strategies for effective participation in agricultural organizations; and

(C) identify various agricultural organizations such as Texas Farm Bureau, The Association of Soil and Water Conservation Districts, Texas and Southwestern Cattle Raisers Association, Independent Cattlemen's Association, agricultural cooperatives, commodity associations, and breed associations.

(8) The student identifies and researches current agribusiness issues. The student is expected to:

(A) compare and contrast the marketing of agricultural and non-agricultural products; and

(B) describe the effects of urbanization on traditional agriculture.

(9) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:

(A) plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to a supervised experience;

(C) design and use a customized record-keeping system for the individual supervised experience;

(D) employ youth leadership opportunities to create a well-rounded experience program in agriculture; and

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(E) produce a challenging approach for a local program of activities in agriculture.

Mathematical Applications in Agriculture, Food, and Natural Resources

(1) The student demonstrates mathematics knowledge and skills required to solve problems related to the agriculture, food, and natural resources industries. The student is expected to:

(A) demonstrate use of relational expressions in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems such as equal to, not equal, greater than, and less than;

(B) apply statistical and data analysis to solve problems in agribusiness, animal, environmental service, food products and processing, natural resources, plant, or power, structural, and technical systems;

(C) analyze mathematical problem statements for missing or irrelevant data essential to agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems;

(D) construct and analyze charts, tables, and graphs from functions and data generated in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems;

(E) analyze data using measures of central tendency when interpreting operational documents in agribusiness, animal, environmental service, food products and processing, natural resources, plant, and power, structural, and technical systems; and

(F) use mathematic operations and knowledge of relationships to solve problems inherent to systems of agriculture and agribusiness such as the calculation of gallons of water from inches of rain, acres of ground water, liquid and gaseous volumes, and conversion of units; calculation of caloric value, parts per million of restricted ingredients, conversion of measurements, and United States Department of Agriculture (USDA) grades; and estimation of wildlife populations, pulpwood yields, and calculation of mapping data.

(2) The student demonstrates mathematics knowledge and skills to solve problems related to agribusiness systems and career opportunities. The student is expected to:

(A) use mathematic operations and knowledge of relationships to solve daily problems inherent to agribusiness systems such as record keeping, profit/loss statements, income statements, capital asset inventories, insurance, risk management, lease agreements, loan documentation, employee payroll, benefits, investments, tax documentation, and real estate contract documentation;

(B) demonstrate knowledge of algebraic applications linear and exponential functions related to agribusiness systems concepts such as simple interest, compound interest, maturity value, tax rates, depreciation, production analysis, market trends, investments, and price determination; and

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(C) demonstrate use of statistical and data analysis for the evaluation of agribusiness systems such as the collection of demographic, production, consumption, weather, market data for analysis through counts, percentages, central tendency, and prediction. Data is to be reported numerically or graphically on concepts such as pricing, market trends, commodity prices, exports and imports, supply and demand, and production yields.

(3) The student demonstrates mathematics knowledge and skills to solve problems related to animal systems and career opportunities. The student is expected to:

(A) use mathematic operations and knowledge of relationships to solve problems inherent to animal systems such as the calculation of purchasing and marketing, housing requirements, conversion of units, average daily gain, topical and injectable medications, USDA grade calculation, feeding schedules, volumes, production cost, stocking rates, breeding, and gestation;

(B) demonstrate knowledge of algebraic applications related to animal systems concepts such as ration calculation using the Pearson Square, percent homozygosity, heritability, USDA grade calculation, gene frequency, cost per unit of nutrient, and weaning weight ratio;

(C) use geometric principles to solve problems inherent to animal systems such as square footage for housing requirements; acreage calculation for normal and irregular shaped pastures; the use of right triangles for perpendicular cross fencing; calculation of feed bin volume based upon shape such as cylinder, cone, cube, or pyramid; and housing volume calculations for ventilation; and

(D) demonstrate use of statistical and data analysis in animal systems such as the collection and analysis of production data to be reported numerically or graphically on concepts such as birth weight, weaning weights, days to market weight, expected progeny differences, feed efficiencies, birth type, litter size, presence or absence of genetic abnormality, milk production, sow productivity index, and veterinary costs or records.

(4) The student demonstrates mathematical knowledge and skills to solve problems related to environmental service systems and career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications to create solutions to problems related to environmental service systems concepts such as the calculation of acre feet of water, water volume in ponds, water well volume, water pressure friction loss, flow rate, total head pressure, pump efficiency, soil solids volume, and soil degree of saturation;

(B) use geometric principles to solve problems inherent to environmental service systems such as acreage calculation for normal and irregular shaped pastures, calculating slope of land, planning runoff drainage structures, and applying differential leveling techniques; and

(C) demonstrate use of statistical and data analysis in environmental service systems such as the collection and analysis of environmental data to be reported numerically or graphically on concepts such as rainfall, soil classifications, groundwater levels, recycling activities, and pollution rates.

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(5) The student demonstrates mathematics knowledge and skills required to solve problems related to food products and processing systems and career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications related to food products and processing systems concepts such as the calculation of exponential growth of bacteria, contribution margin in processing, percentage of weight loss in packaged food, percentage of water absorption in packaged food, and microbe analysis following pasteurization;

(B) use geometric principles to solve problems inherent to food products and processing systems such as the calculation of packaging requirements, construction of food storage structures and containers, liquid transfer materials, and vessels design and volume; and

(C) demonstrate use of statistical and data analysis in food products and processing systems data to be reported numerically or graphically on concepts such as governmental regulations, hazard analysis, critical control points data, taste tests, quality assurance data, and industry packing practices.

(6) The student demonstrates mathematics knowledge and skills to solve problems related to natural resources systems and career opportunities. The student is expected to:

(A) demonstrate knowledge of algebraic applications related to natural resource systems concepts such as the calculation of mean harvest area, calibration of pesticides, and the Doyle Log Rule;

(B) use geometric principles to solve problems inherent to natural resource systems such as planning and construction of structures related to wildlife and fisheries management, determination of lumber volume in given tree stock, and calculation of tank volume for chemical application; and

(C) demonstrate use of statistical and data analysis for the evaluation of natural resource systems data to be reported numerically or graphically for resource data analysis, analysis of Geographic Information Systems and Global Positioning Systems data, analysis of weather-related data, and analysis of data related to wildlife and habitat.

(7) The student demonstrates mathematics knowledge and skills to solve problems related to plant systems and career opportunities. The student is expected to:

(A) use mathematic operations and knowledge of relationships to solve problems inherent to plant systems such as the calculation of crop yields, crop loss, grain drying requirements, grain weight shrinkage, germination rates, greenhouse heating, and cooling and fertilizer application rates;

(B) demonstrate knowledge of algebraic applications related to plant systems concepts such as the calculation of grain handling efficiency, harvesting capacity, crop rotation, seeding rates, fertilizer nutrient requirements, and greenhouse ventilation;

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(C) use geometric principles for the analysis of problems inherent to plant systems such as plan grain storage structures, volume of grain storage vessels, grain handling volume, greenhouse capacity, and regular and irregular shaped planting bed size; and

(D) demonstrate use of statistical and data analysis in plant systems such as crop yields, Global Information Systems data, plant growth data, and climate data.

(8) The student demonstrates mathematics knowledge and skills to solve problems related to power, structural, and technical systems education and career opportunities. The student is expected to:

(A) use mathematic operations and knowledge of relationships to solve problems inherent to power, structural, and technical systems such as the calculation of gear ratio, fuel efficiency, construction costs, project layout, energy costs, unit conversions, bid preparation, and labor-related calculations;

(B) demonstrate knowledge of algebraic applications related to power, structural, and technical systems concepts such as the calculation of strength of magnetism, chain or belt tension, horsepower, Ohm's Law, hydraulic multiplication of force, and Mohr's Circle tensile strength test;

(C) use geometric principles for the evaluation of problems inherent to power, structural, and technical systems such as rafter length, land measurement, differential leveling, concrete volume, heating, ventilating, and air conditioning requirements and creation of structural drawings;

(D) use statistical and data analysis to evaluate power, structural, and technical systems problems such as construction cost data; equipment maintenance; heating, ventilating, and air conditioning efficiencies; engine performance; and labor costs; and

(E) use geometry concepts to develop and implement a plan for construction of a project such as a trailer, an agricultural structure, a storage facility, or a fence.

(9) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:

(A) plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to a supervised experience;

(C) design and use a customized record-keeping system for the individual supervised experience;

(D) participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and

(E) produce a challenging approach for a local program of activities in agriculture.

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Wildlife, Fisheries, and Ecology Management

(1) The student learns the employability characteristics of a successful employee. The student is expected to:

(A) identify career development and entrepreneurship opportunities in the field of natural resources;

(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in natural resources;

(C) demonstrate knowledge of personal and occupational health and safety practices in the workplace; and

(D) identify employers' expectations, including appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.

(2) The student analyzes the importance of wildlife, with an emphasis on use and management. The student is expected to:

(A) analyze the importance of wildlife, fisheries, and ecology management;

(B) discuss the history of wildlife, fisheries, and ecology management;

(C) discuss policies, laws, and the administration of wildlife, fisheries, and ecology management; and

(D) describe how public recreation use is a product.

(3) The student knows the scientific basis for wildlife management. The student is expected to:

(A) identify the basic ecological concepts of game management;

(B) identify game, non-game, and fish species;

(C) describe the management of wildlife populations;

(D) identify observable diseases impacting plants and animals; and

(E) describe how to report observance of disease infestations.

(4) The student knows the interrelationships between the various aspects of wildlife and outdoor public use management. The student is expected to:

(A) identify special areas of importance in wildlife and public use management;

(B) identify laws and regulations regarding the use of wildlife resources;

(C) discuss laws and regulations regarding recreation safety;

(D) list factors involved in landowner and property rights;

(E) demonstrate specific safety certification requirements;

(F) demonstrate precautions to use when interfacing with the public concerning regulations and law enforcement;

(G) describe security issues for closed and restricted areas;

(H) describe solutions to issues concerning public protection;

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(I) recognize potential threat situations for the public and other users;

(J) identify the appropriate law enforcement authority;

(K) describe wildlife harvest techniques and procedures; and

(L) describe fish harvest techniques and procedures.

(5) The student examines natural cycles and related phenomena to describe ecologic concepts and principles. The student is expected to:

(A) explain the hydrologic, nitrogen, carbon, and nutrient cycles;

(B) describe succession;

(C) describe population dynamics;

(D) distinguish between primary and secondary producers;

(E) describe predator-prey relationships;

(F) identify potential pollution sources;

(G) define watershed boundaries;

(H) use the stream classification system; and

(I) describe the influence of weather and climatic factors.

(6) The student applies cartographic skills to natural resource activities. The student is expected to:

(A) describe different types of maps;

(B) interpret map features and legends;

(C) determine map scale and actual distance;

(D) determine direction from map;

(E) determine elevation and terrain features from topographic maps;

(F) use directional tools with maps to locate position;

(G) use land survey and coordinate system; and

(H) use a Geographic Information System to interface geospatial data and interpret photos and images.

(7) The student obtains planning data by monitoring natural resource status. The student is expected to:

(A) describe resource inventory and population studies;

(B) devise sample plots and points;

(C) identify and locate resources;

(D) interpret data concerning resource availability and health;

(E) organize databases of resource data;

(F) use a Geographic Information System to analyze resource data;

(G) create a technical report; and

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(H) describe the relationship of harvest levels to long-term availability of resources.

(8) The student executes various natural resource enhancement techniques using scientific knowledge from the study of environment and wildlife. The student is expected to:

(A) demonstrate stream enhancement techniques;

(B) demonstrate wildlife habitat enhancement techniques; and

(C) demonstrate public use and recreation area enhancement techniques.

(9) The student demonstrates the concepts related to the importance of facilities, harvest, processing, and marketing of aquaculture products. The student is expected to:

(A) discuss the importance and progress of aquaculture as an emerging industry; and

(B) identify and classify plant and animal aquaculture species.

(10) The student demonstrates concepts related to optimum production. The student is expected to:

(A) describe nutritional aspects of aquaculture production;

(B) discuss requirements for optimum growth of species-specific aquacrops;

(C) plan and administer treatments for diseases, parasites, predators, and pests of species-specific aquacrops;

(D) recognize weather-related dangers;

(E) recognize hazards as they relate to terrain;

(F) identify poisonous plants and animals;

(G) recognize hazardous situations; and

(H) demonstrate personal fire prevention precautions while working in natural environments.

(11) The student develops an improved supervised agriculture experience program as it relates to agriculture, food, and natural resources. The student is expected to:

(A) plan, propose, conduct, and evaluate entrepreneurship; placement; exploratory; research, either experimental or analytical; improvement; supplementary; laboratory-based; or other identified, supervised agricultural experience as an experiential learning activity;

(B) apply proper record-keeping skills as they relate to a supervised experience;

(C) design and use a customized record-keeping system for the individual supervised experience;

(D) participate in youth leadership opportunities to create a well-rounded experience program in agriculture; and

(E) produce a challenging approach for a local program of activities in agriculture.