

# Agricultural Power, Structural and Technical Systems

## ACADEMIC SKILLS

### AA SPEAKING AND LISTENING

AA1 Utilize effective verbal and non-verbal communication skills

AA2 Participate in conversation, discussion and group presentations

AA3 Communicate and follow directions/procedures

AA4 Utilize speaking and listening skills to communicate effectively with customers and co-workers

### AB READING AND WRITING

AB1 Locate and interpret written information

AB2 Read and interpret workplace documents, e.g., reports, manuals, schematics, flowcharts, tables, graphs

AB3 Identify relevant details, facts and specifications

AB4 Record information accurately and completely

AB5 Demonstrate competence in organizing, writing and editing using correct vocabulary, spelling, grammar and punctuation

AB6 Demonstrate the ability to write clearly and concisely using industry-specific terminology

### AC CRITICAL THINKING AND PROBLEM SOLVING

AC1 Utilize critical-thinking skills to determine best options/outcomes, e.g., analyze reliable/unreliable sources of information, use previous experiences, implement crisis management, develop contingency planning

AC2 Utilize innovation and problem-solving skills to arrive at the best solution for the current situation

AC3 Implement effective decision-making skills

### AD MATHEMATICS

AD1 Perform basic and higher-level math operations, e.g., addition, subtraction, multiplication, division, decimals, fractions, units of conversion, averaging, percentage, proportion, ratios, numbering systems

AD2 Solve problems using measurement skills, e.g., distance, weight, area, volume

AD3 Make reasonable estimates

AD4 Use tables, graphs, diagrams and charts to obtain or convey information

AD5 Use reasoning and problem-solving skills in mathematics

## **AE FINANCIAL LITERACY**

AE1 Locate, evaluate and apply personal financial information

AE2 Identify the components of a budget and how one is created

AE3 Set personal financial goals and develop a plan for achieving them

AE4 Describe types of financial service providers and considerations in selecting a provider

AE5 Demonstrate ability to meet financial obligations

## **AF INTERNET USE AND SECURITY**

AF1 Recognize the potential risks associated with internet and social media use

AF2 Identify and apply internet security practices, e.g., password security, login, logout, log off, lock computer

AF3 Practice safe, legal and responsible use of technology in the workplace

## **AG INFORMATION TECHNOLOGY**

AG1 Use technology appropriately to enhance professional presentations

AG2 Demonstrate effective, appropriate and ethical use of social media

AG3 Identify ways social media can be used as marketing, advertising and data gathering tools

## **AH TELECOMMUNICATIONS**

AH1 Select and utilize the appropriate environment, devices, services and applications to complete workplace tasks

AH2 Demonstrate appropriate etiquette when using telecommunications, e.g., cell phone, e-mail, messaging services, online meetings, conference calls

# **EMPLOYABILITY SKILLS**

## **EA POSITIVE WORK ETHIC**

EA1 Explain the importance of pride and confidence about work and learning new tasks

EA2 Demonstrate consistent and punctual attendance

EA3 Demonstrate initiative in assuming tasks

EA4 Exhibit dependability in the workplace

EA5 Take and provide direction in the workplace

EA6 Accept responsibility for personal decisions and actions

## **EB INTEGRITY**

EB1 Abide by workplace policies and procedures, e.g., safety, internet and cell phone use, code of conduct

EB2 Demonstrate honesty and reliability

EB3 Demonstrate ethical characteristics and behaviors

EB4 Maintain confidentiality and integrity of company information

EB5 Support the mission and vision of the company

## **EC SELF-REPRESENTATION**

EC1 Demonstrate appropriate dress and hygiene in the workplace

EC2 Use language and manners suitable for the workplace

EC3 Demonstrate polite and respectful behavior toward others

## **ED TIME, TASK AND RESOURCE MANAGEMENT**

ED1 Plan and follow a work schedule

ED2 Complete work tasks successfully with minimal supervision

ED3 Work successfully within budgetary constraints

ED4 Demonstrate ability to stay on task to produce high-quality deliverables on time

## **EE DIVERSITY AWARENESS**

EE1 Define and differentiate diversity, equity, inclusion, discrimination and harassment

EE2 Work effectively with all customers and co-workers

EE3 Explain the benefits of diversity within the workplace

EE4 Explain the importance of respect for the feelings, values and beliefs of others

EE5 Identify strategies to bridge cultural/generational differences and use differing perspectives to increase the overall quality of work

EE6 Illustrate techniques for eliminating bias and stereotyping in the workplace

EE7 Identify ways tasks can be structured to accommodate the diverse needs of workers

EE8 Recognize the challenges and advantages of a global workforce

## **EF TEAMWORK**

EF1 Recognize the characteristics of a team environment and conventional workplace

EF2 Demonstrate effective team skills, e.g., setting goals, listening, following directions, questioning, dividing work, conflict resolution, meeting facilitation, and evaluate their importance in the workplace

## **EG CREATIVITY AND RESOURCEFULNESS**

EG1 Explain the importance of contributing and conveying new ideas in the workplace

EG2 Describe the importance of posing questions when developing ideas

EG3 Explain the value of varying ideas and opinions

EG4 Locate and verify information during the creative process

## **EH CONFLICT RESOLUTION**

EH1 Identify conflict resolution skills to enhance productivity and improve workplace relationships

EH2 Implement conflict resolution strategies and problem-solving skills

EH3 Explain the use of documentation and its role as a component of conflict resolution

## EI CUSTOMER/CLIENT SERVICE

EI1 Recognize the importance of and demonstrate how to properly greet/approach customers and clients

EI2 Identify and address needs of customers/clients

EI3 Provide helpful, courteous and knowledgeable service

EI4 Identify appropriate channels of communication with customers/clients, e.g., online, phone call, face-to-face

EI5 Identify techniques to seek and use customer/client feedback to improve company services

EI6 Explain the relationship between customer/client satisfaction and company success

## EJ ORGANIZATIONS, SYSTEMS AND CLIMATES

EJ1 Define profit and identify factors affecting the profitability of a business

EJ2 Identify "big picture" issues in conducting business, e.g., forecasting, global market, risk management

EJ3 Identify roles in fulfilling the mission of the workplace

EJ4 Identify the rights of workers, e.g., adult and child labor laws, and other equal employment opportunity laws

EJ5 Recognize the chain of command, organizational flow chart system and hierarchy of management within an organization

## EK JOB ACQUISITION AND ADVANCEMENT

EK1 Recognize the importance of maintaining a job and pursuing a career

EK2 Define jobs associated with a specific career path or profession

EK3 Identify and seek various work experience opportunities, e.g., volunteerism, internships, co-op, part-time/full-time employment

EK4 Prepare a resume, cover letter and job application

EK5 Prepare for and participate in a job interview, e.g., research company, highlight personal strengths, prepare questions, conduct a mock interview, dress appropriately

EK6 Explain the components of a successful job interview

EK7 Identify key factors to evaluate employment offers, e.g., salary, benefits packages

EK8 Explain the proper procedure for leaving a job

## **EL LIFELONG LEARNING**

EL1 Acquire current and emerging industry-related information

EL2 Demonstrate commitment to learning as a life-long process and recognize learning opportunities

EL3 Identify various self-improvement opportunities

EL4 Explain the importance of adaptability in career planning and self-management, e.g., diverse portfolio, credentials, professional development

EL5 Employ leadership skills to achieve workplace objectives, e.g., personal vision, adaptability, change, shared vision

EL6 Recognize the importance of job performance evaluation and coaching as it relates to career advancement

EL7 Accept and provide constructive criticism

EL8 Describe the impact of the global economy on jobs and careers

## **EM JOB SPECIFIC TECHNOLOGIES**

EM1 Identify the value of new technologies and their impact on driving continuous change and the need for lifelong learning

EM2 Research and identify emerging technologies for specific careers

EM3 Select appropriate technological resources to accomplish work

## **EN HEALTH AND SAFETY**

EN1 Identify and assume responsibility for the safety of self and others

EN2 Follow safety guidelines in the workplace, e.g., OSHA, CDC

EN3 Explain the impact of personal health and wellness on job performance

# OCCUPATIONAL SKILLS

## OA ASSESS ENERGY SOURCES USED IN AGRICULTURE, FOOD AND NATURAL RESOURCES

OA1 Discuss the advantages and disadvantages of types of renewable and non-renewable energy, e.g., solar, wind, hydro, fossil fuels

OA2 Compare the efficiency of various energy sources, e.g., gas, diesel, natural gas, biofuels

## OB PROPER UTILIZATION OF TOOLS AND EQUIPMENT

OB1 Demonstrate safe practices specific to agriculture power, structural and technical systems, e.g., PPE, materials handling, shop/laboratory operation

OB2 Discuss the function of safety systems on tools and equipment, e.g., PTO guard, SawStop, nail gun with sequential trigger

OB3 Demonstrate proper use of measurement and layout tools

OB4 Select, maintain and use hand/power tools in service, construction and fabrication

## OC APPLY ELECTRICAL PRINCIPLES IN AGRICULTURAL POWER STRUCTURAL AND TECHNICAL SYSTEMS

OC1 Identify hazards and safety practices in planning and installing an electrical circuit

OC2 Identify materials and tools used in electrical installation, e.g., wiring, fixtures, breakers, fuses, conduit

OC3 Interpret basic electrical components, e.g., wiring, switches, receptacles, duplexes and diagrams

OC4 Differentiate between alternating and direct current

OC5 Describe types of electrical measurements, e.g., amperage, voltage, wattage, resistance

OC6 Calculate measurements of electricity, e.g., watts, amps, volts, Ohm's Law

OC7 Differentiate between the design and function of parallel and series electrical circuits

OC8 Test and service electrical systems using a multimeter

OC9 Diagnose malfunctioning electrical system components such as battery and lighting

OC10 Describe basic operation of electric motors, e.g., parts, electromagnetism

OC11 Select the proper electric motors, e.g., repulsion start, capacitor, split-phase, for various applications in AFNR

## **OD OPERATE, MAINTAIN AND REPAIR ENGINES USED IN THE AGRICULTURE INDUSTRY**

OD1 Differentiate between the operation of gasoline and diesel engines

OD2 Identify components and systems, e.g., cooling, compression, exhaust, fuel, lubrication, ignition, of internal combustion engines

OD3 Select lubricants based on viscosity, source and equipment compatibility

OD4 Discuss proper use and disposal of lubricants

OD5 Assess an internal combustion engine to determine service and repair of basic ignition, fuel and compression using technical manuals and diagnostics

## **OE UTILIZE HYDRAULIC AND PNEUMATIC SYSTEMS**

OE1 Identify principles of hydraulic and pneumatic system operation, e.g., Pascal's Law, pressure, flow, valves

OE2 Interpret basic symbols and diagrams in hydraulic and pneumatic systems

OE3 Identify basic hydraulic and pneumatic system fittings and ports

## **OF OPERATE POWER UNITS AND EQUIPMENT USED FOR AGRICULTURAL PURPOSES**

OF1 Demonstrate safe practices in the operation of power units and equipment, e.g. tractors, lawnmowers, generators

OF2 Outline power unit and equipment controls, startup and shutdown procedures and pre-operation inspections using owners/service manuals

OF3 Establish a preventative maintenance schedule for power units and equipment, e.g., lubricants, fluids, filters

OF4 Describe the importance of adjusting equipment including belts, drives, chains, sprockets and maintenance of fluid conveyance components, e.g., hoses, lines, nozzles

## **OG DEVELOP PLANS FOR AGRICULTURAL STRUCTURES**

OG1 Identify symbols and drawing techniques used to develop plans, sketches and basic blueprints

OG2 Identify the different types of construction drawings, e.g., design, electrical, elevation, floor plans

OG3 Create sketches and plans of agricultural structures using scales and legends

OG4 Prepare bills of materials, e.g., structures, fencing, repair, to accompany plans and sketches

## **OH CONSTRUCT AND MAINTAIN AFNR STRUCTURES**

OH1 Develop criteria for selecting materials based on cost, quantities and characteristics for a specific project plan

OH2 Apply basic principles of design, fabrication and installation of agricultural structures

OH3 Describe options available to make AFNR structures more energy efficient, e.g., solar panels, geothermal energy, natural lighting, rainwater harvesting

OH4 Discuss the steps, e.g., measuring, cutting, fastening, finishing, in constructing a project out of wood

OH5 Calculate materials for concrete, brick, stone or masonry units in agricultural construction

OH6 Describe the proper process to follow when pouring and finishing concrete

OH7 Distinguish plumbing materials and products, e.g., copper, iron, steel, PVC, PEX

OH8 Demonstrate basic plumbing skills, e.g., tool selection, measuring, installing, sweating/soldering, repair

OH9 Determine proper insulation material and use for a given task in AFNR structures

OH10 Calculate areas and volumes for coatings, e.g., paints, stains, varnishes

OH11 Determine proper paint/coating material and method for various tasks

## **OI WELDING AND METAL FABRICATION**

OI1 Identify metal materials, e.g., steel, aluminum, stainless steel and their characteristics

OI2 Describe the steps in basic repair, e.g., welding, brazing, riveting, of a metal object

OI3 Distinguish welding processes, positions, materials preparation and equipment workpiece setup, e.g., beveling/grinding

OI4 Construct and/or repair metal structures and equipment using welding procedures, including those associated with SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch methods

## **OJ APPLY APPROPRIATE TECHNOLOGICAL ADVANCEMENTS IN THE AGRICULTURE INDUSTRY**

OJ1 Discuss the use of computer-based systems in agriculture, food and natural resources, e.g., web-based service information, software diagnostics

OJ2 Describe how Geographic Information System (GIS), Remote Sensing (RS) and Global Positioning System (GPS) are utilized in the agriculture industry

OJ3 Describe equipment and processes, e.g., auto-guidance, variable-rate technology, yield maps, sensor technology used in precision agriculture

OJ4 Explain how triangulation is utilized in geospatial technology

OJ5 Describe robotic and drone applications utilized in agriculture