

2013 AGRIBIOTECHNOLOGY

ACADEMIC		
AA		SPEAKING AND LISTENING
AA	1	Utilize effective verbal and non-verbal communication skills
AA	2	Participate in conversation, discussion, and group presentations
AA	3	Communicate and follow directions/procedures
AA	4	Communicate effectively with customers and co-workers
AB		READING AND WRITING
AB	1	Locate and interpret written information
AB	2	Read and interpret workplace documents
AB	3	Identify relevant details, facts, and specifications
AB	4	Record information accurately and completely
AB	5	Demonstrate competence in organizing, writing, and editing using correct vocabulary, spelling, grammar, and punctuation
AB	6	Demonstrate the ability to write clearly and concisely using industry specific terminology
AC		CRITICAL THINKING AND PROBLEM SOLVING
AC	1	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)
AC	2	Utilize innovation and problem-solving skills to arrive at the best solution for current situation
AC	3	Implement effective decision-making skills
AD		MATHEMATICS
AD	1	Perform basic and higher level math operations (e.g., addition, subtraction, multiplication, division, decimals, fractions, units of conversion, averaging, percentage, proportion, ratios)
AD	2	Solve problems using measurement skills (e.g., distance, weight, area, volume)
AD	3	Make reasonable estimates
AD	4	Use tables, graphs, diagrams, and charts to obtain or convey information
AD	5	Use deductive reasoning and problem-solving in mathematics
AE		FINANCIAL LITERACY
AE	1	Locate, evaluate, and apply personal financial information
AE	2	Identify the components of a budget and how one is created
AE	3	Set personal financial goals and develop a plan for achieving them
AE	4	Use financial services effectively
AE	5	Demonstrate ability to meet financial obligations
AF		INTERNET USE AND SECURITY
AF	1	Recognize the potential risks associated with Internet use
AF	2	Identify and apply Internet security practices (e.g., password security, login, logout, log off, lock computer)
AF	3	Practice safe, legal, and responsible use of technology in the workplace
AG		INFORMATION TECHNOLOGY
AG	1	Use technology appropriately to enhance professional presentations
AG	2	Demonstrate effective and appropriate use of social media
AG	3	Identify ways social media can be used as marketing, advertising, and data gathering tools
AH		TELECOMMUNICATIONS
AH	1	Select and use appropriate devices, services, and applications to complete workplace tasks
AH	2	Demonstrate appropriate etiquette when using e-communications (e.g., cell phone, e-mail, personal digital assistants, online meetings, conference calls)
EMPLOYABILITY		
EA		POSITIVE WORK ETHIC

EA	1	Demonstrate enthusiasm and confidence about work and learning new tasks
EA	2	Demonstrate consistent and punctual attendance
EA	3	Demonstrate initiative in assuming tasks
EA	4	Exhibit dependability in the workplace
EA	5	Take and provide direction in the workplace
EA	6	Accept responsibility for personal decisions and actions
EB		INTEGRITY
EB	1	Abide by workplace policies and procedures
EB	2	Demonstrate honesty and reliability
EB	3	Demonstrate ethical characteristics and behaviors
EB	4	Maintain confidentiality and integrity of sensitive company information
EB	5	Demonstrate loyalty to the company
EC		SELF-REPRESENTATION
EC	1	Demonstrate appropriate dress and hygiene in the workplace
EC	2	Use language and manners suitable for the workplace
EC	3	Demonstrate polite and respectful behavior toward others
EC	4	Demonstrate personal accountability in the workplace
EC	5	Demonstrate pride in work
ED		TIME, TASK, AND RESOURCE MANAGEMENT
ED	1	Plan and follow a work schedule
ED	2	Work with minimal supervision
ED	3	Work within budgetary constraints
ED	4	Demonstrate ability to stay on task to produce high quality deliverables on time
EE		DIVERSITY AWARENESS
EE	1	Recognize diversity, discrimination, harassment, and equity
EE	2	Work well with all customers and co-workers
EE	3	Explain the benefits of diversity within the workplace
EE	4	Explain the importance of respect for feelings, values, and beliefs of others
EE	5	Identify strategies to bridge cultural/generational differences and use differing perspectives to increase overall quality of work
EE	6	Illustrate techniques for eliminating gender bias and stereotyping in the workplace
EE	7	Identify ways tasks can be structured to accommodate the diverse needs of workers
EE	8	Recognize the challenges and advantages of a global workforce
EF		TEAMWORK
EF	1	Recognize the characteristics of a team environment and conventional workplace
EF	2	Contribute to the success of the team
EF	3	Demonstrate effective team skills and evaluate their importance in the workplace (e.g., setting goals, listening, following directions, questioning, dividing work)
EG		CREATIVITY AND RESOURCEFULNESS
EG	1	Contribute new ideas
EG	2	Stimulate ideas by posing questions
EG	3	Value varying ideas and opinions
EG	4	Locate and verify information
EH		CONFLICT RESOLUTION
EH	1	Identify conflict resolution skills to enhance productivity and improve workplace relationships
EH	2	Implement conflict resolution strategies and problem-solving skills
EH	3	Explain the use of documentation and it's role as a component of conflict resolution

EI		CUSTOMER/CLIENT SERVICE
EI	1	Recognize the importance of and demonstrate how to properly acknowledge customers/clients
EI	2	Identify and address needs of customers/clients
EI	3	Provide helpful, courteous, and knowledgeable service
EI	4	Identify appropriate channels of communication with customers/clients (e.g., phone call, face-to-face, e-mail, website)
EI	5	Identify techniques to seek and use customer/client feedback to improve company services
EI	6	Recognize the relationship between customer/client satisfaction and company success
EJ		ORGANIZATIONS, SYSTEMS, AND CLIMATES
EJ	1	Define profit and evaluate the cost of conducting business
EJ	2	Identify "big picture" issues in conducting business
EJ	3	Identify role in fulfilling the mission of the workplace
EJ	4	Identify the rights of workers (e.g., adult and child labor laws and other equal employment opportunity laws)
EJ	5	Recognize the chain of command, organizational flow chart system, and hierarchy of management within an organization
EK		JOB ACQUISITION AND ADVANCEMENT
EK	1	Recognize the importance of maintaining a job and pursuing a career
EK	2	Define jobs associated with a specific career path or profession
EK	3	Identify and seek various job opportunities (e.g., volunteerism, internships, co-op, part-time/full-time employment)
EK	4	Prepare a resume, letter of application, and job application
EK	5	Prepare for a job interview (e.g., research company, highlight personal strengths, prepare questions, set-up a mock interview, dress appropriately)
EK	6	Participate in a job interview
EK	7	Explain the proper procedure for leaving a job
EL		LIFELONG LEARNING
EL	1	Acquire current and emerging industry-related information
EL	2	Demonstrate commitment to learning as a life-long process and recognize learning opportunities
EL	3	Seek and capitalize on self-improvement opportunities
EL	4	Discuss the importance of flexible career planning and career self-management
EL	5	Employ leadership skills to achieve workplace objectives (e.g., personal vision, adaptability, change, shared vision)
EL	6	Recognize the importance of job performance evaluation and coaching as it relates to career advancement
EL	7	Accept and provide constructive criticism
EL	8	Describe the impact of the global economy on jobs and careers
EM		JOB SPECIFIC TECHNOLOGIES
EM	1	Identify the value of new technologies and their impact on driving continuous change and the need for life-long learning
EM	2	Research and identify emerging technologies for specific careers
EM	3	Select appropriate technological resources to accomplish work
EN		HEALTH AND SAFETY
EN	1	Assume responsibility for safety of self and others
EN	2	Follow safety guidelines in the workplace
EN	3	Manage personal health and wellness
OCCUPATIONAL		
OA		DEVELOPMENT OF BIOTECHNOLOGY IN AGRICULTURE
OA	1	Define biotechnology and explore the historical impact it has had on agriculture

OA	2	Create a timeline and use it to explain the developmental progression of biotechnology
OA	3	Research and report on the major innovators and milestones in the development of biotechnology
OA	4	Investigate current applications of biotechnology in agriculture
OA	5	Research and report on current work being done in agricultural biotechnology
OA	6	Analyze the scope and impact of agricultural biotechnology in today's global society and economy
OA	7	Examine potential future applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture
OA	8	Research and report on emerging problems and issues associated with agricultural biotechnology
OA	9	Assess the future impact agricultural biotechnology could have on world populations
OB		REGULATION
OB	1	Describe the role of agencies that regulate biotechnology
OB	2	Interpret the major regulatory issues related to biotechnology
OB	3	Research, evaluate, and articulate a major regulatory issue pertaining to biotechnology
OC		ETHICS OF BIOTECHNOLOGY
OC	1	Explore ethical, legal, and social biotechnology issues
OC	2	Evaluate the benefits and risks associated with biotechnology.
OC	3	Research, evaluate, and articulate the implications of an ethical, legal, social, or cultural biotechnology issue
OC	4	Explore the emergence, evolution, and implications of bioethics
OC	5	Examine an ethical dilemma associated with biotechnology by identifying it's components
OC	6	Research and debate an ethical issue associated with biotechnology
OC	7	Explain the meaning of intellectual properties as related to biotechnology
OC	8	Examine intellectual properties associated with biotechnology by defining their component
OC	9	Analyze an intellectual property issue associated with bioethics
OC	10	Describe how agribiotechnology impacts the global economy
OC	11	Compare conventional fossil fuel production to biotechnological alternative fuel production (e.g., ethonol, biodiesel)
OD		LABORATORY RECORDS
OD	1	Maintain a biotechnology laboratory notebook
OD	2	Analyze strengths of the research based on data, procedures, and propose future investigation
OD	3	Utilize external reviews and compare them to research conducted
OE		LABORATORY EQUIPMENT
OE	1	Operate basic laboratory equipment and measurement devices (e.g., microscope, microipet, autoclave, centrifuge)
OE	2	Operate advanced laboratory equipment and measurement devices (e.g., thermalcycler, electrophoresis equipment, microarray, spectrometer)
OE	3	Calibrate laboratory equipment and conduct instrument qualification tests
OF		LABORATORY PROCEDURES
OF	1	Demonstrate basic aseptic techniques in the biotechnology laboratory
OF	2	Demonstrate advanced aseptic techniques in the biotechnology laboratory
OF	3	Perform bioassays and experiments under aseptic conditions
OF	4	Perform procedures with biological materials according to directions
OF	5	Select an appropriate standard operating procedure for working with biological materials
OF	6	Develop a standard operating procedure for a biological process
OG		MATERIAL MANAGEMENT
OG	1	Prepare simple chemical solutions using standard operating procedures
OG	2	Prepare buffers, reagents, solutions, and media
OG	3	Verify the physical properties of buffers, reagents, solutions, and media

OG	4	Identify and describe hazards associated with biological and chemical materials
OG	5	Identify the process to inventory biological and chemical materials, and maintain accurate records of supplies and expiration dates
OG	6	List the procedures to order, stock, and maintain supplies of biological and chemical materials
OG	7	Maintain a safe environment by properly identifying and disposing of laboratory waste
OG	8	Diagram the flow of waste after it leaves the laboratory
OG	9	Devise a management plan to reduce laboratory waste
OH		MICROBIOLOGY/MOLECULAR/ENZYMOLGY/IMMUNOLOGY
OH	1	Differentiate the types of organisms and demonstrate how to handle them safely
OH	2	Isolate, maintain, quantify, and store cell cultures
OH	3	Characterize the physical, chemical, and biological properties of microbes
OH	4	Explain the structures of DNA and RNA and how genotype influences phenotype
OH	5	Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations
OH	6	Analyze factors that influence gene expression
OH	7	Extract and purify DNA and RNA
OH	8	Perform electrophoretic techniques and interpret electrophoresis fragmentation patterns
OH	9	Perform DNA and RNA recombinations such as basic cloning/subcloning, blotting, sequencing, and amplification
OH	10	Perform simple enzyme activity assays to detect proteins
OH	11	Perform protein separation techniques and interpret the results
OH	12	Characterize the biochemical properties of proteins
OH	13	Describe how antibodies are formed and how they can be used in biotechnology applications
OH	14	Conduct an Enzyme-Linked Immunosorbent Assay (ELISA)
OH	15	Use antibodies to detect and quantify antigens
OH	16	Explain reasons for detecting microbes and identify sources of microbes
OH	17	Research and describe the use of biotechnology to detect microbes
OH	18	Design and perform an assay to detect a target microorganism in food, water, or the environment
OI		GENETIC ENGINEERING
OI	1	Explain biological, social, agronomic, and economic reasons for genetic modification of eukaryotes
OI	2	Diagram the processes and describe the techniques used to produce transgenic eukaryote
OI	3	Design and conduct an experiment to evaluate an existing transgenic eukaryote
OI	4	Describe enzymes, the changes they cause in foods and the physical/chemical parameters that affect enzymatic reactions
OI	5	Describe processes by which enzymes are produced through biotechnology
OI	6	Use biotechnology tools or microbial strain selection to improve or discover enzymes for use in food processing
OI	7	Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes
OI	8	Diagram the process by which organisms are genetically engineered for waste treatment
OI	9	Monitor and evaluate the treatment of a waste product using a genetically engineered organisms
OI	10	Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of aquatic species
OI	11	Investigate and report on genetic engineering procedures used in the production of aquatic species
OI	12	Conduct field or clinical trials for genetically modified aquatic species
OJ		BIOTECHNOLOGY PROCESSES IN AGRICULTURE
OJ	1	Explain the functions of hormones in animals
OJ	2	Describe the processes used to produce animal hormones from transgenic organisms
OJ	3	Administer hormones to enhance animal health, growth, or reproduction and monitor/analyze the results

OJ	4	Identify foods produced through fermentation
OJ	5	Compare and contrast bioengineering and conventional pathways used in food processing
OJ	6	Process food using biotechnology
OJ	7	Explain the process of fermentation
OJ	8	Describe the process used in producing alcohol from biomass
OJ	9	Produce alcohol and co-products from biomass
OJ	10	Explain the process of transesterification
OJ	11	Diagram the process used in producing biodiesel from biomass
OJ	12	Produce biodiesel and co-products from biomass
OJ	13	Explain the process of methanogenesis
OJ	14	Illustrate the process used in producing methane from biomass
OJ	15	Produce methane and co-products from biomass
OK		BIOTECHNOLOGY TO MONITOR PROCEDURES IN AGRICULTURE
OK	1	Describe the selective plant breeding process
OK	2	Select biotechnology tools used to monitor and direct plant breeding
OK	3	Design and conduct an experiment using biotechnology tools to evaluate selectively bred plants
OK	4	Describe biotechnology processes applicable to animal health
OK	5	Assess the benefits, risks, and opportunities associated with using biotechnology to promote animal health
OK	6	Implement animal-care protocols that use biotechnology tools to ethically monitor and promote animal systems (Institutional Animal Care and Use Committee develops animal-care protocols)
OK	7	Give examples of instances in which bioremediation can be applied to clean up environmental contaminant
OK	8	Describe the use of biotechnology in bioremediation
OK	9	Monitor and evaluate the effectiveness of bioremediation efforts by participating in a bioremediation project
OK	10	Explain the use of microorganisms in biological waste management
OK	11	Describe the processes involved in biotreatment of biological wastes
OK	12	Monitor and evaluate the treatment of biological wastes with microorganisms
OK	13	Explain the role of microorganisms in industrial chemical waste treatment
OK	14	Interpret the processes involved in biotreatment of industrial chemical wastes
OK	15	Monitor and evaluate the treatment of industrial chemical wastes with microorganisms
OK	16	Explain the global importance of biodiversity
OK	17	Select biotechnology tools used to measure biodiversity
OK	18	Use biotechnology tools to measure biodiversity in a population
OK	19	Explain the consequences of agricultural practices on wild populations
OK	20	Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations
OK	21	Analyze the implications of biotechnology on wild species
OK	22	Explain biomass and sources of biomass
OK	23	Assess the characteristics of biomass that make it useful for biofuels production
OK	24	Evaluate the technologies used to create biofuels from biomass
OK	25	Define industrial biotechnology, describe the benefits and risks associated with it's use in the manufacturing of fabrics, plastics, and other products
OK	26	Describe the processes used in the production of molecules for use in industrial applications
OK	27	Monitor and evaluate biotechnology processes used in the synthesis of a molecule