south dakota DEPARTMENT OF EDUCATION
Learning. Leadership. Service.

Ag Biotechnology

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18308
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0 credit
Program of Study and Sequence	Pathway course in Animal Systems, Food Product and Processing Systems, Plant Systems, or Natural Resources and Environmental Science Systems – Ag Biotechnology – Capstone Course
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	https://sdmylife.com/images/Approved-CTE-Dual-Credit.pdf
Teacher Certification	Agriculture, Food and Natural Resources Cluster Endorsement; Plant Systems Pathway Endorsement; *Agriculture Education
Resources	

Course Description

Our lives are increasingly touched by technological advances in biology from discoveries in disease and pest control to reproductive capabilities in plants and animals as well as biological benefits in environmental sciences. Agricultural biotechnology will continue to experience rapid growth in all sectors. Utilizing appropriate equipment and technology may enhance classroom and laboratory content; mathematics, English, biology, and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conferences, and skills competitions such as science-related Career Development Events, Leadership Development Events, Agriscience Fair and Proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program (SAE).

Program of Study Application

Ag Biotechnology is an upper-level pathway course in the Animal Systems, Food Product and Processing Systems, Plant Systems, and Natural Resources and Environmental Science Systems pathways in the Agriculture, Food and Natural Resources Cluster. Ag Biotechnology would follow a cluster course in any of those pathways and would precede a capstone experience.

Course Standards

AB 1: Understand and use safe practices.

Webb Level	*Sub-indicator*
Two Skill/Concept	AB 1.1 Demonstrate safe use and knowledge of tools and equipment used in this area.
Two Skill/Concept	AB 1.2 Demonstrate workplace/worksite safety procedures and protocols.

AB 2: Assess factors that have influenced the evolution of biotechnology in agriculture. [National AFNR BS.01.]

Webb Level	*Sub-indicator*
Three Strategic Thinking	AB 2.1 Investigate and explain the relationships among past, current, and emerging applications of biotechnology in agriculture.
Three Strategic Thinking	AB 2.2 Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests.
Four Extended Thinking	AB 2.3 Analyze the relationships and implications of bioethics, laws, and public perceptions on applications of biotechnology in agriculture.

AB 3: Illustrate the functions and importance of biotechnology at the cellular level.

Webb Level	*Sub-indicator*
One Recall	AB 3.1 Recognize components of cells and their application to genetic improvement.
One Recall	AB 3.2 Recognize components of genetic transfer.
One Recall	AB 3.3 Illustrate the role of cell structures in genetic theory.
Two Skill/Concept	AB 3.4 Explain the role of genetics and cell structures in gene expression.

AB 4: Safely apply appropriate skills to complete tasks in a biotechnology research and development environment.

Webb Level	*Sub-indicator*
Two Skill/Concept	AB 4.1 Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations, and results.
Three Strategic Thinking	AB 4.2 Implement standard operating procedures (SOP) for the biotechnology sector.

AB 5: Analyze the application of biotechnology to solve problems in Agriculture, Food and Natural Resources (AFNR) systems.

Webb Level	*Sub-indicator*
Three Strategic Thinking	AB 5.1 Investigate biotechnology principles, techniques, and processes to enhance plant systems.
Three Strategic Thinking	AB 5.2 Investigate biotechnology principles, techniques, and processes to enhance animal systems.
Three Strategic Thinking	AB 5.3 Investigate biotechnology principles, techniques, and processes to enhance food products and processing systems.
Three Strategic Thinking	AB 5.4 Investigate biotechnology principles, techniques, and processes to enhance natural resources and environmental service systems.
Three Strategic Thinking	AB 5.5 Investigate the impact agriculture biotechnology has had on modern medicine

AB 6: Develop employability skills related to the Animal, Food Product and Processing, Plant, and Natural Resources and Environmental Science Systems.

Webb Level	*Sub-indicator*
Two Skill/Concept	AB 6.1 Investigate the impact agriculture biotechnology has had on modern medicine.

AB 7: Implement an individual project for career development through a Supervised Agriculture Experience/Work based Experience.

Webb Level	*Sub-indicator*
Two Skill/Concept	AB 7.1 Develop an individual project plan with goals and timeline.
Two Skill/Concept	AB 7.2 Explore opportunities within AFNR industries.
Three Strategic Thinking	AB 7.3 Apply concepts of financial management appropriate to agricultural projects and personal finances.
Three Strategic Thinking	AB 7.4 Develop and document knowledge and skills to ensure workplace safety regarding personal health and environmental management.
Four Extended Thinking	AB 7.5 Research and analyze how public policy, laws, and advocacy impact agricultural systems and agricultural literacy.