

Colorado AFNR Course Scope and Sequence

Course Name	Food Processing and Safety A		Course Details Course Requirements Recommended Prerequisites	Level 3 course in the Food Science Pathway. First of two semesters of content.	
Course Description	Food Products and Safety focuses on the food processing industry with special emphasis on the handling, processing and marketing of food products. In addition, understand procedures that ensure safety, sanitation, and quality of food products. Students will develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations.				
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	18302	Schedule calculation based on 60% of a semester instructional time. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Unit Number, Title and Brief Description	Suggested % of Instructional Time	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Unit 1: Food Systems History and Future	8%	FPPS.01 Understand the Food Products and Processing Industry	FPPS.01.03 Understand the history and future response in food systems to agriculture.	FPPS.01.03.a Determine important historical trends in food systems. FPPS.01.03.b Describe evolution and technological advances in food systems. FPPS.01.03.c Analyze trends (population, societal, income, health, environmental) and their impact on food systems.	
Unit 2: Food Systems Changes and Trends.	8%	FPP.04. Explain the scope of the food industry and the historical and current developments of food product and processing.	FPP.04.01. Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production. <u>SCIENCE:</u> <u>NGSS.HS.ETS1.3</u>	FPP.04.01.02.a. Examine the impact of consumer trends on food products and processing practices (e.g., health and nutrition, organic, information about food products, local food movements, farm-to-fork	

				supply chains, food system transparency, etc.). FPP.04.01.02.b. Construct and implement methods to obtain data on food consumer trends in a specific market.	
Unit 3: Food Handling, Packaging, and Distribution	12%	FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities FPP.03. Select and process food products for storage, distribution and consumption	FPP.01.03. Apply food safety procedures when storing food products to ensure food quality FPP.03.02. Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products. FPP.03.03. Create food distribution plans and procedures to ensure safe delivery of food products. ELA: RW.HS.1.3.2 RW.H2.3.2 SCIENCE: NGSS.HS.ETS1.2	FPP.01.03.01.a. Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.). FPP.01.03.01.b. Analyze characteristics of food products and determine appropriate storage procedures. FPP.03.02.04.a. Summarize types of materials and methods used in food packaging and presentation. FPP.03.02.04.b. Analyze the degree of desirable food qualities of foods stored in various packaging. FPP.03.02.04.c. Construct and implement methods of selecting packaging materials to store a variety of food products. FPP.03.03.01.a. Assess and describe the environmental impact of	

				distributing food locally and globally. FPP.03.03.01.b. Research and document ways to reduce environmental impact from food distribution activities. FPP.03.03.02.a. Examine the various paths food products take to get from food processing centers to consumers. FPP.03.03.02.b. Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.	
Unit 4: Food Additive, Types, Purposes, Impact of Use	7%	FPP.02. Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.	FPP.02.02. Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.	FPP.02.02.02.a. Identify common food additives and identify their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors, etc.) FPP.02.02.02.b. Describe the purpose of common food additives and how they influence the chemistry of food.	
Unit 5: Food Product Evaluation	10%	FPPS.04 Implement Food Lab Techniques	FPPS.04.05 Perform product evaluation using consumer sensory criteria.	FPPS.04.05.a Identify the types of product evaluation (consumer sensory, color, aroma, taste, palatability) FPPS.04.05.b Describe sensory properties (i.e. Sour, sweet, bitter in taste)	

				FPPS.04.05.d Compare and contrast food and their value to product taste/consumer preference	
Unit 6: Food Product Development	15%	FPP.02. Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.	FPP.02.03. Apply principles of human behavior to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems	FPP.02.03.02.a. Research and summarize relevant factors in planning and developing a new food product (e.g., regulation, creativity, economics, etc.). FPP.02.03.02.b. Determine consumer preference and market potential for a new food product using a variety of methods (e.g., double-blind testing, etc.). FPP.02.03.02.c. Design new food products that meet a variety of goals (e.g., consumer preferences, market, nutritional needs, regulatory requirements, etc.).	

Course Name	Food Processing and Safety B		Course Details Course Requirements Recommended Prerequisites	Level 3 course in the Food Science Pathway. Second semester of content.	
Course Description	Food Products and Safety focuses on the food processing industry with special emphasis on the handling, processing and marketing of food products. In addition, understand procedures that ensure safety, sanitation, and quality of food products. Students will develop knowledge and skills regarding career opportunities, entry requirements, and industry expectations.				
Note:	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	18305	Schedule calculation based on 60 % of instructional time in semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Unit Number, Title and Brief Description	Suggested % of Instructional Time	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Unit 1: Food Safety & Foodborne Illnesses	14%	FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities. FPPS.06 Understand food quality and deterioration	FPP.01.02. Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality FPPS.06.01 Understand food microbiology	FPP.01.02.04.a. Describe the effects food-borne pathogens have on food products and humans. FPP.01.02.04.b. Explain, document and execute the procedures of microbiological tests used to detect food-borne pathogens FPP.01.02.04.c. Conduct and interpret microbiological tests for food-borne pathogens. FPPS.06.01.a Explain microbiology and its application to food	

			FPPS.06.02 Understand food deterioration	FPPS.06.01.b Describe different types of food microbes FPPS.06.01.c Describe microbe growth and interaction in food FPPS.06.02.a Describe the three categories (chemical, physical and biological) and the ten causes (microorganisms, oxygen, enzymes, infestation, etc.) of food deterioration FPPS.06.02.b Describe preservation techniques to prevent food deterioration (heat, cold, acid, etc.) FPPS.06.02.c Explain the source, importance, and action of food enzymes	
Unit 2: Facility and operational procedures and sanitation	16%	FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities	FPP.01.01. Analyze and manage operational and safety procedures in food products and processing facilities	FPP.01.01.01.a. Research and summarize the purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures (SSOP); Good Manufacturing Practices (GMP); worker safety, etc.). FPP.01.01.01.b. Analyze and document attributes and procedures of current safety programs in food products and processing facilities.	

				FPP.01.01.02.a. Research and categorize types of equipment used in food products and processing systems. FPP.01.01.02.b. Assess specifications and maintenance needs for equipment and facilities used in food products and processing systems (e.g., specifications for machines, sanitation procedures, repair protocol, etc.).	
Unit 3: Product Quality and Sanitation Procedures	14%	FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities	FPP.01.02. Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.	FPP.01.02.01.a. Examine and identify contamination hazards associated with food products and processing (e.g., physical, chemical and biological). FPP.01.02.01.b. Outline procedures to eliminate possible contamination hazards associated with food products and processing FPP.01.02.02.a. Research and summarize procedures of safe handling protocols (e.g., Hazard Analysis and Critical Control Points Plan (HACCP); Critical Control Point procedures (CCP); Good Agricultural Practices Plan (GAP), etc.). FPP.01.02.02.b. Construct plans that ensure implementation of safe	

		FPPS.09 Understand Food Quality	FPPS.09.1 Analyze food product handling systems for elimination of defect	handling procedures on food products. FPP.01.02.03.a. Research and summarize the purposes and objectives of quality assurance tests on food products (e.g., produce safety regulation, safe food transport, food contaminants, etc.). FPPS.09.01.a Identify forms of food defects (blood spots, bruises, PLSCE, DFD, Dark cutter, off flavored dairy) FPPS.09.01.b Determine causes of food defects FPPS.09.01.c Develop processes to minimize food defects;	
Unit 4: Food systems Biosecurity	5%	FPP.04. Explain the scope of the food industry and the historical and current developments of food product and processing.	FPP.04.01. Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production. <u>SCIENCE:</u> <u>NGSS.HS.ETS1.3</u>	FPP.04.01.01.a. Research and summarize examples of policy and legislation that affect food products and processing systems in the United States and around the world (e.g., labeling, GMOs, biosecurity, food system policy, dietary guidelines, etc.). FPP.04.01.01.b. Analyze the similarities and differences amongst policies and legislation that affect the food products and processing system in	

				the U.S. or around the world	
Unit 6: Food Regulations & Organizations	8%	FPP.04. Explain the scope of the food industry and the historical and current developments of food product and processing FPPS.09 Understand Food Quality	FPP.04.03. Identify and explain the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems. FPPS.09.2 Analyze the role of regulation in maintaining food safety and quality	FPP.04.03.01.a. Examine and summarize the purposes of organizations that influence or regulate the food products and processing industry FPP.04.03.01.b. Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies. FPP.04.03.02.a. Examine and describe the importance and usage of regulatory oversight of food safety and security in food products and processing (e.g., internationally, nationally, state and local). FPP.04.03.02.b. Assess and summarize the application of industry standards in the food products and processing industry. FPPS.09.02.a Identify different types of regulation (safety, grades, wholesomeness, quality) FPPS.09.02.c Compare US regulations on domestic and imported food	

Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc)

[CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Standard 1: Oral Expression and Listening

Prepared Graduate 1: *Collaborate effectively as group members or leaders who listen actively and respectfully; pose thoughtful questions, acknowledge the ideas of others; and contribute ideas to further the group's attainment of an objective.*

Students collaborate to conduct microbiological testing, develop food safety and sanitation procedures, analyze food quality systems, design new food products, and evaluate food processing practices through laboratory investigations and problem-solving activities.

Standard 2: Reading for All Purposes

Prepared Graduate 4: *Read a wide range of informational texts to build knowledge and to better understand the human experience.*

Students analyze food safety regulations, microbiology resources, sanitation procedures, HACCP plans, food quality standards, food processing policies, biosecurity legislation, and regulatory agency guidance to understand food processing systems and food safety practices.

Prepared Graduate 5: *Understand how language functions in different contexts, command a variety of word-learning strategies to assist comprehension, and make effective choices for meaning or style when writing and speaking.*

Students develop and apply specialized vocabulary related to microbiology, foodborne pathogens, HACCP, Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP), sanitation, biosecurity, food quality, regulatory oversight, and food product development to communicate effectively in food processing and safety settings.

Standard 3: Writing and Composition

Prepared Graduate 6: *Craft arguments using techniques specific to the genre.*

Students evaluate food safety programs, sanitation procedures, food quality systems, regulatory policies, food product development decisions, and food processing practices, defending recommendations using scientific evidence, laboratory data, and industry standards.

Prepared Graduate 7: *Craft informational/explanatory texts using techniques specific to the genre.*

Students develop laboratory reports, food safety plans, sanitation procedures, product development summaries, food quality analyses, and reports explaining food regulations, biosecurity measures, and food processing systems.

Standard 4: Research Inquiry and Design

Prepared Graduate 10: *Gather information from a variety of sources; analyze and evaluate its quality and relevance; and use it ethically to answer complex questions.*

Students research foodborne pathogens, food safety programs, sanitation procedures, food quality systems, food processing equipment, biosecurity policies, regulatory agencies, consumer preferences, and food product development to design safe food products and improve food processing systems.

Note: *Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.*