Colorado AFNR Course Scope and Sequence

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| **Course Name** | **Food Processing and Safety A** | | Course Details<br>Course Requirements<br>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 |
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| **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.<br><br>**FPPS.01.03.b** Describe evolution and technological advances in food systems.<br><br>**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. *SCIENCE: NGSS.HS.ETS1.3* | **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 | |

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| | | | | supply chains, food system transparency, etc.).<br><br>**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<br><br>**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<br><br>**FPP.03.02**. Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.<br><br>**FPP.03.03.** Create food distribution plans and procedures to ensure safe delivery of food products.<br>*ELA: RW.HS1.3.2*<br>*RW.H2.3.2*<br>*SCIENCE:*<br>*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.).<br><br>**FPP.01.03.01.b.** Analyze characteristics of food products and determine appropriate storage procedures.<br><br>**FPP.03.02.04.a.** Summarize types of materials and methods used in food packaging and presentation.<br><br>**FPP.03.02.04.b.** Analyze the degree of desirable food qualities of foods stored in various packaging.<br><br>**FPP.03.02.04.c.** Construct and implement methods of selecting packaging materials to store a variety of food products.<br><br>**FPP.03.03.01.a**. Assess and describe the environmental impact of distributing food locally and globally. | |

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| | | | | **FPP.03.03.01.b.** Research and document ways to reduce environmental impact from food distribution activities.<br><br>**FPP.03.03.02.a.** Examine the various paths food products take to get from food processing centers to consumers.<br><br>**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.)<br><br>**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)<br><br>**FPPS.04.05.b** Describe sensory properties (i.e. Sour, sweet, bitter in taste)<br><br>**FPPS.04.05.d** Compare and contrast food and their value to product taste/consumer preference | |

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| 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.).<br><br>**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.).<br><br>**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<br>Course Requirements<br>Recommended Prerequisites | Level 3 course in the Food Science Pathway. Second semester of content. |
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| **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 |
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| **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.<br><br>**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<br><br>**FPPS.06.01** Understand food microbiology | **FPP.01.02.04.a.** Describe the effects food-borne pathogens have on food products and humans.<br><br>**FPP.01.02.04.b**. Explain, document and execute the procedures of microbiological tests used to detect food-borne pathogens<br><br>**FPP.01.02.04.c.** Conduct and interpret microbiological tests for food-borne pathogens.<br><br>**FPPS.06.01.a** Explain microbiology and its application to food | |

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| | | | **FPPS.06.02** Understand food deterioration | **FPPS.06.01.b** Describe different types of food microbes<br><br>**FPPS.06.01.c** Describe microbe growth and interaction in food<br><br>**FPPS.06.02.a** Describe the three categories (chemical, physical and biological) and the ten causes (microorganisms, oxygen, enzymes, infestation, etc.) of food deterioration<br><br>**FPPS.06.02.b** Describe preservation techniques to prevent food deterioration (heat, cold, acid, etc.)<br><br>**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.).<br><br>**FPP.01.01.01.b.** Analyze and document attributes and procedures of current safety programs in food products and processing facilities. | |

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| | | | | **FPP.01.01.02.a.** Research and categorize types of equipment used in food products and processing systems.<br><br>**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).<br><br>**FPP.01.02.01.b.** Outline procedures to eliminate possible contamination hazards associated with food products and processing<br><br>**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.).<br><br>**FPP.01.02.02.b.** Construct plans that ensure implementation of safe | |

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| | | **FPPS.09** Understand Food Quality | **FPPS.09.1** Analyze food product handling systems for elimination of defect | handling procedures on food products.<br><br>**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.).<br><br>**FPPS.09.01.a** Identify forms of food defects (blood spots, bruises, PLSCE, DFD, Dark cutter, off flavored dairy)<br><br>**FPPS.09.01.b** Determine causes of food defects<br><br>**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. *SCIENCE: NGSS.HS.ETS1.3* | **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.).<br><br>**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 | |

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| 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<br><br>**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.<br><br>**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<br><br>**FPP.04.03.01.b.** Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.<br><br>**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).<br><br>**FPP.04.03.02.b.** Assess and summarize the application of industry standards in the food products and processing industry.<br><br>**FPPS.09.02.a** Identify different types of regulation (safety, grades, wholesomeness, quality)<br><br>**FPPS.09.02.c** Compare US regulations on domestic and imported food | |

**CAS Academic Standards Alignment:** Online Version: https://www.cde.state.co.us/apps/standards/**;** Download version: https://www.cde.state.co.us/apps/standards/

**Reading, Writing, and Communicating:**

- RW.H1.3.2 – Write informative/explanatory texts using complex ideas and organizational structure and features that are useful to audience comprehension.
- RW.H2.3.2 – Write informative/explanatory texts to examine and convey complex ideas through the effective selection, organization, and analysis of content.

**Math:**

**Science:**

- NGSS.HS.ETS.1.2 – Design a solution to a complex real-world problems by break it down into smaller, more manageable problems that can be solved through engineering.
- NGSS.HS.ETS.1.3 – Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

**Essential Skills:**

Problem Solver:

- Critical Thinking and Analysis: The ability to apply a deliberate process of identifying problems, gathering information, and weighing possible solutions, including: making choices rooted in understanding patterns, cause-and-effect relationships, and the impacts that a decision can have on the individual and others.
- Creativity and Innovation: the ability to demonstrate curiosity and imagination through experimenting with new and emerging ideas.

Community Member:

- Global and cultural awareness: the ability to collaborate with individuals from diverse backgrounds and/or cultures to address national and global issues, and to develop complex, appropriate, and workable solutions.

Communicator:

- Interpersonal communication: the ability to establish and maintain healthy and supportive relationships, including: the capacity to communicate clearly by successfully conveying information and feelings, listening actively, setting boundaries, negotiating conflict constructively, and seeking or offering support and help when needed.