FN A195: FOOD SCIENCE

Item	Value
Curriculum Committee Approval Date	10/20/2021
Top Code	130600 - Nutrition, Foods and Culinary Arts
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• OC Physical/Biological Sci - AA (OB)
Associate Science Local General Education (GE)	• OCC Physical/Biological Sci-AS (OSB)

Course Description

Food science is the scientific study of raw food materials and their behavior during formulation, processing, packaging, storage, and includes evaluation as consumer food products. Meets the AS Laboratory Science requirement. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Identify different methods of food processing and how these methods affect the sensory and physical properties of food.
2. Create a new food product including ingredient specifications, HACCP plan, nutritional analysis, and sensory and objective testing.

Course Objectives

- 1. Explain the interdisciplinary nature of food science (including biology, engineering, chemistry, and physics)
- 2. Describe avenues of advanced study in the field of food science.
- 3. Discuss the principles of food chemistry as they apply to the chemical and physical properties of foods.
- 4. Explain the historical perspective of food law as they apply to labeling and food regulation.
- 5. Describe processing methods of major food commodities
- 6. Apply principles of microbiology and fermentation, food handling and safety, food contamination, HACCP principles and toxicology to the development of a new food product.
- 7. Apply food engineering concepts and applications, biotechnology and the field of sensory evaluation to the development of a new food product.
- 8. Apply standard and consistent experimental methods to experiments conducted in class. (SCANS: Technology, Basic Skills)
- 9. Use objective and sensory experimental procedures to evaluate food. (SCANS: Systems, Thinking)
- 10. Organize, conduct, evaluate, and present the results of laboratory experiment in written and oral form. (SCANS: Systems, Thinking)
- 11. Evaluate different methods of food processing as these processing methods affect the sensory and physical properties of food. (SCANS: Information, Systems)
- 12. Explain acidity, pH, solutions, suspensions, dispersions, enzymatic and non-enzymatic browning, crystallization, heating, freezing, and other terms as they apply to food preparation and processing. (SCANS: Information)
- 13. In teams of 2-3, develop a new cook/chill item, research ingredients, develop a food label and HACCP program, and present this project to the class. (SCANS: Interpersonal Skills, Resources, Information, Technology, Foundation Skills)

Lecture Content

Introduction to Food Science. Food science as an applied science The food processing industry Food science education Laboratory the Challenge Reading the Research and Metric System Chemistry Basics, Functional Groups and Properties Chemical symbols, formulas and equations Atom and Periodic Chart, building chemical modals Laboratory the electronic balance Chemical reactions in foods Functional Groups Laboratory enzymatic reactions Food Chemistry: Water and Acids Chemical and Functional Properties of water Laboratory water analysis The chemical and functional properties of food acids Laboratory pH and titration Food Chemistry: Carbohydrates and lipids Food carbohydrates Laboratory Challenge Ch 6 The chemistry of sweeteners, sugar and pectin Food lipids Laboratory Challenge Ch 4 Food Systems (emulsions and foams) Food Chemistry: Protein and review Proteins in foods Laboratory Challenge Ch 5 Milk Protein Chemistry (cottage cheese) Food Chemistry: Color, flavor and texture Food Color Chemistry Fruits and vegetables Laboratory food colors in vegetables Flavor and texture Laboratory Challenge Ch 2 phytochemicals as food components Food Additives and Dietary Supplements. Food additives Labels Laboratory creation of a food label and Challenge Ch 7 Regulation of Functional Foods, Bioengineered Foods and Organic Foods Introduction of cook/chill project Understanding Dimensions of Food Processing and Preservation: Animal Products. Food processing from farm to consumer Heat trans fer Food preservation Dairy, egg and meat processing Laboratory ice cream, heat transfer Project cook/chill group formation Understanding Dimensions of Fat, Sugar, Beverage, and Plant Product Processing. Processing for fat and oils Sugar processing Laboratory candy making Project cook/chill group work Food Microbiology and Fermentation Factors affecting microbiological growth Food spoilage by microorganisms Fermentation Laboratory bread making And Challenge Ch 10 Microbial sampling to verify food quality Project cook/chill market order for first cook Food Safety Other types of biological hazards in food Preventing foodborne illness HACCP Laboratory: Risk Assessment for Biological Hazards Project HACCP for cook/chill and 1st cook Food Engineering and packaging Basic principles of food engineering Deep-fat frying Laboratory deep fat frying Project packaging for cook/chill and product evaluation and market order Food Biotechnology Food biotechnology Genetic engineering Sustainable agriculture Laboratory Challenge Ch 13 Food Packaging Project cook/chill 2nd cook Sensory Evaluation and Food Product Development Sensory evaluation What is sensory evaluation Taste, odor, flavor, texture Laboratory Challenge Ch 15 Experimental design in product development Project cook/chill product evaluation and sensory analysis Project final cook and presentation Laboratory wrap up

Lab Content

Introduction to Food Science Laboratory the Challenge Reading the Research and Metric System Chemistry Basics, Functional Groups and Properties Laboratory enzymatic reactions Food Chemistry: Water and Acids Laboratory pH and titration Food Chemistry: Carbohydrates and lipids Laboratory Challenge Ch 4 Food Systems (emulsions and foams) Food Chemistry: Protein and review Laboratory Challenge Ch 5 Milk Protein Chemistry (cottage cheese) Food Chemistry: Color, flavor and texture Laboratory Challenge Ch 2 phytochemicals as food components Food Additives and Dietary Supplements. Understanding Dimensions of Food Processing and Preservation: Animal Products. Laboratory ice cream, heat transfer Understanding Dimensions of Fat, Sugar, Beverage, and Plant Product Processing. Laboratory candy making Food Microbiology and Fermentation Laboratory bread making And Challenge Ch 10 Microbial sampling to verify food quality Food Safety Laboratory: Risk Assessment for Biological Hazards Project HACCP for cook/chill and 1st cook Food Engineering and packaging Laboratory deep fat frying Project packaging for cook/chill and product evaluation and market order Food Biotechnology Laboratory Challenge Ch 13 Food Packaging Project cook/chill 2nd cook Sensory Evaluation and Food Product Development Laboratory Challenge Ch 15 Experimental design in product development Project cook/chill product evaluation and sensory analysis Project final cook and presentation .

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Instructional methodologies will include lecture and video presentations. The application of ideas will be used as small groups work together report experiments conducted in the laboratory. Instructor feedback will be used in grading and evaluation of laboratory reports and student work habits.

Reading Assignments

Students will spend approximately 2 - 3 hours per week reading from assigned text.

Writing Assignments

Students will spend approximately 2 - 3 hours per week on written laboratory reports and a written report for a cook/chill project.

Out-of-class Assignments

Students will spend approximately 4 - 6 hours per week on out-of-class assignments, including reading assignments, writing assignments, laboratory reports, and a cook/chill project (research report and oral presentation).

Demonstration of Critical Thinking

Student evaluation will be a combination of written laboratory reporting and examination. Each laboratory will be evaluated by the use of a written laboratory report. (SCANS: Information, Basic Skills)In groups of 2-3, students will decide on, research, produce, package, label, cost, and present a new cook/chill item. Final report will include both a written and oral presentation. (SCANS: Resources, Information, Interpersonal Skills, Technology, Foundation Skills)Lecture will be evaluated by class discussion, and written examination. Examinations will contain both multiple choice and essay questions. A final exam will be given.

Required Writing, Problem Solving, Skills Demonstration

Each laboratory will be completed with a written evaluation and explanation of results. Neatness and correct form will be required. Critical thinking skills will be developed throughout. The cook/chill project will include both a written and oral report with a description of the process and results.

Eligible Disciplines

Nutritional science/dietetics: Masters degree in nutrition, dietetics, or dietetics and food administration OR bachelors degree in any of the above AND masters degree in chemistry, public health, or family and consumer studies/home economics OR the equivalent. (Note: A bachelors degree in nutrition, dietetics, or dietetics and food administration, and certification as a registered dietician, is an alternative qualification for this discipline.) Masters degree required. Title 5, section 53410.1

Textbooks Resources

1. Required Vaclavik, V.A. Christian, E.W.. Essentials of Food Science, 5th ed. Springer, 2020