

# FOOD SCIENCE & TECHNOLOGY (FST)

College of Agricultural & Environmental Sciences

## FST 001 – Principles of Food Science (3 units)

*Course Description:* Food science fundamentals. Fresh and processed food technologies; world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value.

*Learning Activities:* Lecture 2 hour(s), Discussion 1 hour(s).

*Credit Limitation(s):* Not open for credit to students who have completed any FST course, except FST 010.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Visual Literacy (VL).

## FST 003 – Introduction to Brewing & Beer (3 units)

*Course Description:* Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing.

*Learning Activities:* Lecture 3 hour(s).

*Credit Limitation(s):* Not open for credit to students who have taken FST 003V.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Scientific Literacy (SL).

## FST 003V – Introduction to Brewing & Beer (3 units)

*Course Description:* Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing.

*Learning Activities:* Web Virtual Lecture 1 hour(s), Web Electronic Discussion 1.50 hour(s), Project.

*Credit Limitation(s):* Not open for credit to students who have taken FST 003.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Scientific Literacy (SL).

## FST 010 – Food Science, Folklore & Health (3 units)

*Course Description:* Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement.

*Learning Activities:* Lecture 3 hour(s).

*Credit Limitation(s):* Not open for credit to students who have completed FST 002.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE) or Social Sciences (SS); Scientific Literacy (SL); Visual Literacy (VL); World Cultures (WC).

## FST 050 – Introduction to Food Preservation (3 units)

*Course Description:* Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation.

*Prerequisite(s):* CHE 002A; BIS 002A (can be concurrent); (STA 013 (can be concurrent) or STA 013Y (can be concurrent) or STA 100 (can be concurrent)).

*Learning Activities:* Lecture 2 hour(s), Laboratory 2 hour(s).

*Enrollment Restriction(s):* Pass One restricted to Food Science majors; Pass Two open to all students.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL).

## FST 055 – Food in American Culture (4 units)

*Course Description:* Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Cross Listing:* AMS 055.

*Grade Mode:* Letter.

*General Education:* Arts & Humanities (AH) or Social Sciences (SS); American Cultures, Governance, & History (ACGH); Domestic Diversity (DD); Writing Experience (WE).

## FST 099 – Special Study for Undergraduates (1-5 units)

*Course Description:* Special study for undergraduates.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable.

*Grade Mode:* Pass/No Pass only.

## FST 100A – Food Chemistry (4 units)

*Course Description:* Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water.

*Prerequisite(s):* (CHE 008B or CHE 118B or CHE 128B); BIS 002A recommended.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Enrollment Restriction(s):* Open to Food Science, Clinical Nutrition, and Nutrition Science majors only.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Visual Literacy (VL).

## FST 100B – Food Properties (4 units)

*Course Description:* Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties. Selected properties of food commodities.

*Prerequisite(s):* FST 100A; CHE 008B; and consent of instructor.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

**FST 100C – Food Physical Chemistry (4 units)**

*Course Description:* Fundamentals of thermodynamics and kinetics related to food physical chemistry. Phase behavior, crystallization, water activity and food stability, solubility, aroma volatility, formation of glasses, gels and dispersions, biopolymers and rheology.

*Prerequisite(s):* PHY 007A; PHY 007B; PHY 007C; FST 100A.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

**FST 101A – Food Chemistry Laboratory (3 units)**

*Course Description:* Study of basic chemical and physical properties that influence the reactivity and functional properties of components in food systems.

*Prerequisite(s):* FST 100A (can be concurrent).

*Learning Activities:* Discussion 1 hour(s), Lecture 1 hour(s), Laboratory 3 hour(s).

*Enrollment Restriction(s):* Open to Food Science and Clinical Nutrition majors only.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL); Writing Experience (WE).

**FST 101B – Food Properties Laboratory (2 units)**

*Course Description:* Study of properties of food described in FST 100B.

*Prerequisite(s):* FST 100B (can be concurrent); must be taken concurrently.

*Learning Activities:* Lecture/Lab 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL); Writing Experience (WE).

**FST 102A – Malting & Brewing Science (4 units)**

*Course Description:* Technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality.

*Prerequisite(s):* (BIS 102, BIS 103) or BIS 105; senior standing recommended.

*Learning Activities:* Lecture 4 hour(s).

*Credit Limitation(s):* Not open for credit to students who have taken FST 102.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE).

**FST 102B – Practical Malting & Brewing (4 units)**

*Course Description:* Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing.

*Prerequisite(s):* FST 102A; CHE 002C.

*Learning Activities:* Lecture/Discussion 2 hour(s), Laboratory 6 hour(s).

*Enrollment Restriction(s):* Open to seniors only in Fermentation Science or Food Science and Technology.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL).

**FST 103 – Physical & Chemical Methods for Food Analysis (4 units)**

*Course Description:* Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed.

*Prerequisite(s):* CHE 002C; CHE 008B; BIS 103; FST 101A; FST 100C (can be concurrent); or consent of instructor.

*Learning Activities:* Lecture 2 hour(s), Discussion 1 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Writing Experience (WE).

**FST 104 – Food Microbiology (3 units)**

*Course Description:* Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry.

*Prerequisite(s):* BIS 002A; BIS 103.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

**FST 104L – Food Microbiology Laboratory (4 units)**

*Course Description:* Cultural and morphological characteristics of microorganisms involved in food spoilage, in foodborne disease, and food fermentation. Analysis of microbiological quality of foods. May be taught abroad.

*Prerequisite(s):* BIS 002A; BIS 103; FST 104.

*Learning Activities:* Lecture 1 hour(s), Discussion 1 hour(s), Laboratory 6 hour(s).

*Enrollment Restriction(s):* Restricted to juniors and seniors in the Food Science major.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL); Writing Experience (WE).

**FST 106 – Food Chemistry for Clinical Nutrition (5 units)**

*Course Description:* Chemical and physical principles that influence functional properties, nutrient content, safety, and sensory aspects of food. Emphasis on the application of these concepts in clinical nutrition.

*Prerequisite(s):* CHE 008B C- or better or CHE 118B C- or better or CHE 128B C- or better; concurrent with FST 100A recommended.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s), Laboratory 3 hour(s).

*Enrollment Restriction(s):* Only open to Clinical Nutrition majors.

*Credit Limitation(s):* Not open to students who have completed FST 101A and/or FST 101B.

*Cross Listing:* NUT 106.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

**FST 107 – Food Sensory Science (4 units)**

*Course Description:* Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food.

*Prerequisite(s):* FST 117 (can be concurrent); (STA 013 or STA 013Y).

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s).

*Credit Limitation(s):* Not open for credit to students who have completed FST 107A.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Writing Experience (WE).

**FST 109 – Principles of Quality Assurance in Food Processing (3 units)**

*Course Description:* Quality assurance systems for food industry with essential measurement & analysis techniques and discussion of QA management & control programs. Regulations and audit, as well as the processes for validation and verification of quality of food systems, are emphasized.

*Prerequisite(s):* STA 013 or STA 013Y.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL).

**FST 110 – Food Processing (4 units)**

*Course Description:* Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation.

*Prerequisite(s):* PHY 007A; PHY 007B; PHY 007C (can be concurrent); (MAT 016C or MAT 017C or MAT 021C).

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Credit Limitation(s):* Not open for credit to students enrolled in College of Engineering.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

**FST 110L – Food Processing Laboratory (2 units)**

*Course Description:* Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales.

*Prerequisite(s):* FST 110 (can be concurrent).

*Learning Activities:* Laboratory 3 hour(s), Discussion 1 hour(s).

*Enrollment Restriction(s):* Open to Food Science majors only.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL).

**FST 113 – Food Law & Regulations (3 units)**

*Course Description:* Food law and regulatory landscape of the food industry. Regulatory aspects of food safety. Major U.S. food laws and regulations including labeling, standards, misbranding, adulteration, food fraud, environmental policies, as well as international law. Laws pertaining to specific food categories including milk, dairy, meat, poultry, eggs, seafood, produce, packaged foods, and alcohol.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Enrollment Restriction(s):* Upper division standing or consent of instructor.

*Grade Mode:* Letter.

*General Education:* Scientific Literacy (SL); Visual Literacy (VL).

**FST 114 – Fermented Foods (4 units)**

*Course Description:* Physiology, biochemistry, and genetics of microorganisms important in food fermentations. How microorganisms are used in fermentations and how raw materials are converted into finished fermented foods and beverages.

*Prerequisite(s):* BIS 103; MIC 102; or consent of instructor.

*Learning Activities:* Lecture 3 hour(s), Term Paper.

*Enrollment Restriction(s):* Pass One restricted to upper division or graduate level Food Science and Viticulture & Enology majors.

*Cross Listing:* VEN 114.

*Grade Mode:* Letter.

**FST 117 – Design & Analysis for Sensory Food Science (4 units)**

*Course Description:* Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametric approaches.

Modifications for quality assurance.

*Prerequisite(s):* STA 013 or STA 013Y.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL).

**FST 119 – Chemistry & Technology of Milk & Dairy Products (4 units)**

*Course Description:* Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products.

*Prerequisite(s):* BIS 002A; BIS 102; consent of instructor.

*Learning Activities:* Lecture 4 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

**FST 123 – Introduction to Enzymology (3 units)**

*Course Description:* Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course BCP 123.)

*Prerequisite(s):* FST 123L (can be concurrent); BIS 102; BIS 103.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

**FST 123L – Enzymology Laboratory (2 units)**

*Course Description:* Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course BCP 123L.)

*Prerequisite(s):* BIS 103; FST 123 (can be concurrent); FST 123 required concurrently.

*Learning Activities:* Lecture 1 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL); Writing Experience (WE).

**FST 127 – Sensory Evaluation of Foods (4 units)**

*Course Description:* Critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization.

*Prerequisite(s):* FST 117.

*Learning Activities:* Lecture 3 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL); Writing Experience (WE).

**FST 128 – Food Toxicology (3 units)**

*Course Description:* Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards.

*Prerequisite(s):* BIS 102; BIS 103.

*Learning Activities:* Lecture 3 hour(s).

*Cross Listing:* ETX 128.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE).

**FST 131 – Food Packaging (4 units)**

*Course Description:* Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine.

*Prerequisite(s):* CHE 008B; BIS 001B; PHY 007C.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Enrollment Restriction(s):* Limited to 50 students.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE).

**FST 151Y – Food Freezing (1 unit)**

*Course Description:* Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at sub-freezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods.

*Prerequisite(s):* FST 110A; or the equivalent.

*Learning Activities:* Discussion 1 hour(s), Web Virtual Lecture.

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Quantitative Literacy (QL).

**FST 159 – New Food Product Ideas (3 units)**

*Course Description:* Create, refine, test and present viable ideas for new food products. Activities include trend monitoring, consumer research, idea generation, concept screening, and new product concept presentations.

*Prerequisite(s):* FST 050; BIS 002A; PHY 007A; PHY 007B; PHY 007C; CHE 002A; CHE 002B; CHE 002C.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

*General Education:* Arts & Humanities (AH) or Social Sciences (SS); Oral Skills (OL); Writing Experience (WE).

**FST 160 – Food Product Development (4 units)**

*Course Description:* Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development.

*Prerequisite(s):* FST 050; FST 103; FST 104; FST 110.

*Learning Activities:* Lecture 1 hour(s), Discussion 1 hour(s), Laboratory 6 hour(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Oral Skills (OL); Visual Literacy (VL).

**FST 190 – Senior Seminar (1 unit)**

*Course Description:* Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities.

*Prerequisite(s):* Senior standing or consent of instructor.

*Learning Activities:* Seminar 1 hour(s).

*Repeat Credit:* May be repeated 2 time(s).

*Grade Mode:* Letter.

*General Education:* Science & Engineering (SE); Oral Skills (OL).

**FST 192 – Internship for Advanced Undergraduates (1-12 units)**

*Course Description:* Work experience on or off campus in the practical application of food science.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Internship 3-36 hour(s).

*Grade Mode:* Pass/No Pass only.

*General Education:* Science & Engineering (SE).

**FST 198 – Directed Group Study (1-5 units)**

*Course Description:* Directed group study. May be taught abroad.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable.

*Grade Mode:* Pass/No Pass only.

*General Education:* Science & Engineering (SE).

**FST 199 – Special Study for Advanced Undergraduates (1-5 units)**

*Course Description:* Special study for advanced undergraduates.

*Prerequisite(s):* Consent of instructor.

*Learning Activities:* Variable.

*Grade Mode:* Pass/No Pass only.

*General Education:* Science & Engineering (SE).

**FST 201 – Food Chemistry & Biochemistry (4 units)**

*Course Description:* Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed.

*Prerequisite(s):* Undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended.

*Learning Activities:* Lecture 4 hour(s).

*Enrollment Restriction(s):* Restricted to Food Science graduate level standing or consent of instructor.

*Grade Mode:* Letter.



**FST 202 – Physical Chemistry of Foods (4 units)**

*Course Description:* Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.

*Prerequisite(s):* CHE 107A; CHE 107B; BIS 102 recommended.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

**FST 203 – Food Processing (4 units)**

*Course Description:* Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods.

*Prerequisite(s):* FST 110A; PHY 007C; CHE 107B; or consent of instructor.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

**FST 204 – Advanced Food Microbiology (4 units)**

*Course Description:* Principles and recent developments in food microbiology. Mechanisms of foodborne disease, pathogen detection, parameters of microbial growth and control in foods, intestinal microbiology including probiotics and prebiotics, and the microbiology of food and beverage fermentations.

*Prerequisite(s):* Undergraduate level coursework in microbiology, or consent of instructor.

*Learning Activities:* Lecture 3 hour(s), Discussion 1 hour(s).

*Grade Mode:* Letter.

**FST 205 – Industrial Microbiology (3 units)**

*Course Description:* Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms.

*Prerequisite(s):* BIS 001A; BIS 102; BIS 103; MIC 130A and MIC 130B or BIS 101 recommended.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

**FST 207 – Advanced Sensory-Instrumental Analyses (3 units)**

*Course Description:* Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor.

*Prerequisite(s):* FST 107; and consent of instructor.

*Learning Activities:* Lecture 2 hour(s), Laboratory 3 hour(s).

*Grade Mode:* Letter.

**FST 210 – Proteins: Functional Activities & Interactions (3 units)**

*Course Description:* Relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

*Prerequisite(s):* BIS 103.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

**FST 211 – Lipids: Chemistry & Nutrition (3 units)**

*Course Description:* Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.

*Prerequisite(s):* BIS 103; CHE 107B; CHE 128B.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

**FST 213 – Flavor Chemistry of Foods & Beverages (3 units)**

*Course Description:* Become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Required to read and critically evaluate flavor chemistry literature.

*Prerequisite(s):* CHE 008B; VEN 123; (VEN 123L or FST 103); or consent of instructor.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Cross Listing:* VEN 213.

*Grade Mode:* Letter.

**FST 217 – Advanced Food Sensory Science (3 units)**

*Course Description:* Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food.

*Prerequisite(s):* FST 107 (can be concurrent); or consent of instructor.

*Learning Activities:* Lecture 3 hour(s).

*Grade Mode:* Letter.

**FST 219 – Biochemistry, Microbiology & Technology of Cheeses of the World (4 units)**

*Course Description:* Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world tasted and discussed.

*Prerequisite(s):* FST 119; (BIS 103 or FST 100A); FST 123; BIS 103;

CHE 107B; CHE 128B; or consent of instructor.

*Learning Activities:* Lecture 4 hour(s).

*Enrollment Restriction(s):* Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology.

*Grade Mode:* Letter.

**FST 227 – Food Perception & the Chemical Senses (2 units)**

*Course Description:* Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake.

*Prerequisite(s):* FST 107B (can be concurrent); and consent of instructor.

*Learning Activities:* Lecture 2 hour(s).

*Grade Mode:* Letter.

**FST 228 – Sustainable Food Systems (3 units)**

*Course Description:* Environmental impacts of food systems. Methods for quantifying resource use and managing waste for food production and processing. Influence of policies, technologies, and consumer demand on advancing sustainable food systems.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Grade Mode:* Letter.

### **FST 230 – Food & Gut Microbiota (4 units)**

*Course Description:* Impact of specific food structures on the structure and function of the animal gut microbiota. How food is transformed by, and modulates, the gut microbiota to provide the host with nutrients and protection.

*Prerequisite(s):* Microbiology and molecular biology undergraduate coursework or consent of instructor.

*Learning Activities:* Lecture 1.50 hour(s), Discussion 1.50 hour(s), Term Paper.

*Enrollment Restriction(s):* Upper division or graduate standing.

*Grade Mode:* Letter.

### **FST 259 – Design Thinking of Food (4 units)**

*Course Description:* Tools of design thinking as applied to high-impact, food-related challenges through a multi-disciplinary team based, experiential learning process. Application of the field of food studies to the social and cultural contexts of eating habits, food systems, and the design solutions that respond to these factors. Working with stakeholders to design innovative solutions to food system challenges.

*Learning Activities:* Lecture/Discussion 3 hour(s); Fieldwork.

*Enrollment Restriction(s):* Open to Graduate students only.

*Grade Mode:* Letter.

### **FST 290 – Seminar (1 unit)**

*Course Description:* Seminar.

*Learning Activities:* Seminar 1 hour(s).

*Repeat Credit:* May be repeated.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **FST 290C – Advanced Research Conference (1 unit)**

*Course Description:* Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Discussion 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **FST 291 – Advanced Food Science Seminar (1 unit)**

*Course Description:* Oral presentation of student's original research, discussion, and critical evaluation.

*Prerequisite(s):* FST 290; completion of at least one quarter of FST 290.

*Learning Activities:* Seminar 1 hour(s).

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **FST 298 – Group Study (1-5 units)**

*Course Description:* Group study.

*Learning Activities:* Variable.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **FST 299 – Research (1-12 units)**

*Course Description:* Research.

*Prerequisite(s):* Consent of instructor; graduate standing.

*Learning Activities:* Variable.

*Grade Mode:* Satisfactory/Unsatisfactory only.

### **FST 396 – Teaching Assistant Training Practicum (1-4 units)**

*Course Description:* Teaching assistant training.

*Prerequisite(s):* Graduate standing.

*Learning Activities:* Variable.

*Repeat Credit:* May be repeated.

*Grade Mode:* Pass/No Pass only.