NFSC 601/ANSC 601 General Animal Nutrition
Credits 3. 3 Lecture Hours.
Comparative nutrition of animal species contrasting digestive, metabolic
and physiological functions involved in processing and using nutrients.
Prerequisite: ANSC 303/NFSC 303 or ANSC 318 or equivalent.
Cross Listing: ANSC 601/NFSC 601.

NFSC 602/ANSC 602 Energetics of Metabolism and Growth
Credits 3. 3 Lecture Hours.
Current fundamental concepts in protein and energy metabolism relating
to nutrients required for maintenance, growth and development of
animals.
Prerequisite: BICH 410 or approval of instructor.
Cross Listing: ANSC 602/NFSC 602.

NFSC 603 Chemistry of Foods
Credits 3. 3 Lecture Hours.
Chemical covalent and noncovalent interactions in food systems; the
glass transition and moisture in foods; carbohydrate chemistry; reactions
of food lipids; food protein functionality; chemistry of flavor; processing
chemistry; food additives; and nutraceutical phytochemicals.
Prerequisite: BICH 410 or BICH 603.

NFSC 605/ANSC 605 Microbiology of Foods
Credits 3. 3 Lecture Hours.
Nature and function of beneficial and defect-producing bacteria in
foods; food-borne illness, effects of processing, storage and distribution;
techniques for isolation and identification from foods.
Cross Listing: DASC 606/NFSC 606.

NFSC 607/ANSC 607 Physiology and Biochemistry of Muscle as a Food
Credits 3. 3 Lecture Hours.
Biochemical, histological, anatomical and physical characteristics of
muscle cells and factors associated with transformation of muscle cells
into meat.
Prerequisite: BICH 410 or approval of department head.
Cross Listing: ANSC 607/NFSC 607.

NFSC 610 Nutritional Pharmacometrics of Food Compounds
Credits 3. 3 Lecture Hours.
Introduction into nutritional pharmacokinetics and pharmacodynamics of
food compounds; specific examples of toxicological and pharmacological
effects of food compounds.
Prerequisite: NFSC 202, NFSC 203, NFSC 201, CHEM 227, or CHEM 222,
or instructor approval.

NFSC 611/POSC 611 Advanced Egg & Poultry Meat Processing
Credits 3. 3 Lecture Hours.
Advanced Egg & Poultry Meat Processing. Focuses on egg markets, egg
processing, grading, packaging, safety, quality and consumer acceptance
of shell eggs; poultry meat processing (specifically turkeys and broilers),
meat quality, markets, consumer acceptance of poultry meat and safety.
Prerequisite: Graduate classification.
Cross Listing: POSC 611/NFSC 611.

NFSC 613 ANSC 613 Protein Metabolism
Credits 3. 3 Lecture Hours.
Basic concepts and recent advances in protein metabolism in animals
with emphasis on physiological and nutritional significances; discussion
of protein digestion; absorption of peptides; absorption, synthesis and
degradation of amino acids; hormonal and nutritional regulation of
protein turnover; determination of protein quality and requirements.
Prerequisite: BICH 411 or BICH 601 or equivalent or approval of
instructor.
Cross Listing: ANSC 613/NFSC 613.

NFSC 614 Fermentation and Gastrointestinal Microbiology
Credits 3. 3 Lecture Hours.
Fermentation and gastrointestinal ecosystems in terms of
microorganisms present, their activities and requirements and their
interactions in a dynamic system.
Prerequisite: Beginning microbiology and/or biochemistry or approval of
instructor.
Cross Listing: POSC 614 and VTMI 614.

NFSC 617/ANSC 617 Experimental Techniques in Meat Science
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Methods used in separating and identifying muscle proteins and fats;
techniques for determining postmortem changes of muscle tissue as a
result of antemortem treatments.
Prerequisite: ANSC 607/NFSC 607; BICH 411.
Cross Listing: ANSC 617/NFSC 617.

NFSC 618/ANSC 618 Lipids and Lipid Metabolism
Credits 3. 3 Lecture Hours.
Chemical nature of various classes of lipids and lipid-derived hormones;
absorption and metabolism of fatty-acids and lipids; regulation of lipid
biosynthesis and obesity; relationship between lipid metabolism and
cholesterol homeostasis; lipids as hormones.
Prerequisite: BICH 410 or approval of instructor.
Prerequisite: BICH 410 or BICH 601 or equivalent or approval of
instructor.
Cross Listing: ANSC 618/NFSC 618.

NFSC 619 NFSC 619 Molecular Methods for Microbial Characterization
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Underlying principles of molecular methods for microbial detection
and characterization in natural and man-made ecosystems; emphasis
on method application and data interpretation; emphasis on microbial
pathogens and indicator organisms in foods and environment; laboratory
covers select protocols.
Prerequisites: NFSC 326/ANSC 326; SCSC 405; POSC 429; approval of
instructor.
Cross Listing: SCSC 619, POSC 619, and VTMI 619.

NFSC 623/BAEN 623 Nanotechnology in Food Processing
Credits 3. 3 Lecture Hours.
Fundamental and applied knowledge related to nanoscale systems and
technologies utilized in processing of foods; includes nanoscale physico-
chemical properties of foods, applications, manufacture and analysis of
nanotechnologies for food processing and preservation; relevant
industrial and regulatory food nanotechnology associated aspects.
Prerequisites: NFSC 312/DASC 312, NFSC 313/DASC 313, NFSC 315/
AGSM 315, or AGSM 315/NFSC 315, or equivalent coursework, or
approval of instructor.
NFSC 629/POSC 629 Microbiology of Food Irradiation
Credits 3. 3 Lecture Hours. 2 Lab Hours.
Lecture plus laboratory overview of electron beam and x-ray based food irradiation principles; provides a working knowledge of using electronic pasteurization as a means of destroying microbial pathogens or retarding microbial spoilage in foods.
Cross Listing: POSC 629/NFSC 629.

NFSC 630/SCSC 630 Cereal Grains for Human Food
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Fundamental concepts of dry milling, wet milling, oil extraction, baking, malting, brewing, storage, sanitation and quality evaluation and control interrelated with physical and biochemical properties of cereals and their products; use of instruments and techniques to evaluate cereal quality.
Prerequisite: Approval of instructor.
Cross Listing: SCSC 630/NFSC 630.

NFSC 631 Food Carbohydrates
Credits 3. 3 Lecture Hours.
Chemistry, structure, functionality and nutritional properties of food carbohydrates; fiber chemistry, functionality and nutritional properties, artificial sweeteners, starch structure and functionality and hydrocolloid functionality.
Prerequisite: BICH 410. (Offered in alternate years.)

NFSC 632 Nutrition in Disease
Credits 3. 3 Lecture Hours.
Human nutritional requirements in health and disease, emphasizing effects of disease states on intake, digestion, absorption, metabolism and excretion of nutrients; relationship of diet to development of certain diseases.

NFSC 634 Oilseed Proteins for Foods
Credits 3. 3 Lecture Hours.
World production, composition, processing technologies, uses of products (oil, meal, protein concentrates and isolates, and texturized products) in feeds and foods; present and potential food applications of oilseed proteins.
Prerequisites: CHEM 228 and CHEM 317. (Offered in alternate years.)

NFSC 635 Oil and Fat Food Products
Credits 3. 3 Lecture Hours.
Composition, properties and reactions; sources, handling and storage of raw materials; extraction refining and bleaching; hydrogenation, deodorization, esterification and interesterification; fractionation; uses in salad oils, shortenings, margarine, bakery products and other foods.
Prerequisites: CHEM 228 and CHEM 317. (Offered in alternate years.)

NFSC 640 Therapeutic Microbiology I
Credits 3. 3 Lecture Hours.
Alimentary (gastrointestinal) microbiology including (i) the "normal" intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (iii) recombinant pharmabiotics; (iv) gut-associated lymphoid tissue and intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (ii) gut-associated lymphoid tissue and intestinal microbiota; (iv) foodborne gastrointestinal pathogens; and (vi) fermented products as functional foods.
Prerequisite: Undergraduate survey course in microbiology (or instructor's consent).

NFSC 641 Nutritional Biochemistry I
Credits 3. 3 Lecture Hours.
Integration of the intermediary metabolism of glucose, amino acids and lipids with nutrition, physiology and pathophysiology in animals; regulation of metabolic pathways in cells, tissues and the whole body under normal and disease conditions; functions of vitamins and minerals in nutrient metabolism and health.
Prerequisite: BICH 411 or BICH 604. Offered during the fall semester.

NFSC 642 Nutritional Biochemistry II
Credits 3. 3 Lecture Hours.
Integration of nutrition, biochemistry and other life sciences focusing on nutrients and their needs in healthy and unhealthy individuals; macronutrients and their metabolism and the pertinent regulation; nutrient sensing and signaling pathways; nutritional and hormonal regulation of gene expression; commonly used nutritional and biochemical assays.
Prerequisites: NFSC 475, BICH 410 or equivalent.

NFSC 644 Disease Mechanisms of Foodborne Pathogens
Credits 3. 3 Lecture Hours.
Principles of pathogenicity of foodborne bacteria; mechanisms used by disease-causing bacteria leading to human illness; basic principles of immunology and human and bacterial physiology; investigation of bacterial virulence factors and effects of stress response, quorum sensing and other external factors.
Prerequisite: NFSC 326/ANSC 326 or BIOL 351, or approval of instructor.

NFSC 645/POSC 645 Nutrition and Metabolism of Vitamins
Credits 3. 3 Lecture Hours.
Chemistry and metabolism of the fat soluble and water soluble vitamins and their roles in animals; integrates cellular biochemistry and metabolism of the vitamins in vertebrate animals.
Prerequisites: POSC 411 or ANSC 303/NFSC 303; BICH 410 or BICH 603.
Cross Listing: POSC 645/NFSC 645.

NFSC 646 Fundamentals of Space Life Sciences
Credits 3. 3 Lecture Hours.
Integrates nutrition, physiology, and radiation biology to define major biological problems in long duration space flight; provide an overview of the problems of bone loss, muscle wasting, and radiation-enhanced carcinogenesis along with potential countermeasures; focus on nutritional interventions and exercise protocols.
Cross Listing: NUEN 646 and KINE 646.

NFSC 647/ANSC 647 Technology of Meat Processing and Distribution
Credits 3. 3 Lecture Hours.
Quantitative and qualitative characteristics of meat and meat products as related to food technology processing operations; manufacturing, preservation, packaging and merchandising.
Cross Listing: ANSC 647/NFSC 647.

NFSC 650/POSC 650 Nutrition and Metabolism of Minerals
Credits 3. 3 Lecture Hours.
Nutritional significance of minerals in animal metabolism; chemical, biochemical and physiological role of minerals and homeostatic control in animal metabolism.
Prerequisites: POSC 411 or ANSC 303/NFSC 303; BICH 410 or BICH 603.
Cross Listing: POSC 650/NFSC 650.

NFSC 651/WFSC 647 Nutritional Biochemistry of Fishes
Credits 3. 3 Lecture Hours.
Principles of nutritional biochemistry including nutrient metabolism and biochemical energetics with special emphasis on finfish and shell fish.
Prerequisite: BICH 410 or equivalent.
Cross Listing: WFSC 647/NFSC 651.

NFSC 655 Nutrition and Healthy Aging
Credits 3. 3 Lecture Hours.
Fusion of biology of aging and geriatric nutrition; different aging theories, pathophysiology of aging and age-related diseases, nutritional needs of older adults, nutritional impacts on lifespan and healthspan and nutritional interventions for healthy aging.
Prerequisite: Graduate classification.
NFSC 657/ANSC 657 Hazard Analysis and Critical Control Point System
Credits 3. 3 Lecture Hours.
Examination of the Hazard Analysis and Critical Control Point (HACCP) principles specifically related to meat and poultry; microbiological and process overviews; good manufacturing practices (GMP) and standard operating procedures (SOP) development; team-building and implementation into industry operations. This class is designed for the production of food and fulfills the training requirements of USDA's HACCP regulation for meat and poultry (9 CFR Part 417), and FDA's HACCP regulations for fish and fishery products (21 CFR Part 123 and 1240) and for juice (21 CFR Part 120).
Cross Listing: ANSC 657/NFSC 657.

NFSC 667/ANSC 667 Industrial Processed Meat Operations
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of scientific principles and business practices to manufactured meat products; interrelationships among marketing, manufacturing, product development, regulatory compliance and quality assurance in commercial processed meat operations.
Prerequisite: Approval of instructor.
Cross Listing: ANSC 667/NFSC 667.

NFSC 669 Experimental Nutrition & Food Science Laboratory
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Experimental Nutrition & Food Science Laboratory. Nutritional intervention in animal models of metabolic or emotional disorders; genetic modifications or pathogens in food products; analyses of gene expression and behavior.
Prerequisite: BICH 432/GENE 432 or GENE 432/BICH 432 recommended; graduate in nutrition or related major.

NFSC 670/ANSC 670 Quality Assurance for the Food Industry
Credits 3. 3 Lecture Hours.
Principles of food system process control; statistical process control (SPC); tools required to assure uniform communication and understanding of quality assurance systems.
Prerequisite: Graduate classification.
Cross Listing: ANSC 670/NFSC 670.

NFSC 671 Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews
Credits 3. 3 Lecture Hours.
Evaluation of scientific literature, research methods within the literature, and the quality of scientific studies to produce an evidence-based review in areas specific to nutrition and food science.
Prerequisites: NFSC 202 or NFSC 203; STAT 302; knowledge of nutrition, statistics, and technical writing helpful.

NFSC 679/POSC 679 Lipoproteins in Health and Disease
Credits 3. 3 Lecture Hours.
Understanding of lipoprotein biology as it relates to nutrient delivery and disease development; emphasis on understanding how structure influences the function of different lipoprotein particles in human and avian systems; opportunity to study individual lipoprotein profiles or those of animals by modern imaging techniques; background in basic lipid biochemistry helpful.
Cross Listing: POSC 679/NFSC 679.

NFSC 681 Seminar
Credits 0-1. 0-1 Other Hours.
Oral reports and discussions of current research and developments in nutrition and food science designed to broaden understanding of problems and to stimulate research.

NFSC 684 Professional Internship
Credits 0 to 16. 0 to 16 Other Hours.
Experience in application of formal training to a commercial operation under supervision of operations manager and designated faculty member; investigation of matter of mutual interest and report results in a professional paper approved by the graduate committee.

NFSC 685 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed study of selected problems emphasizing recent developments in research techniques.

NFSC 687/ANSC 687 Sensory Evaluation of Foods
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of sensory science principles and practices to food systems including an understanding of discriminative, descriptive and consumer sensory techniques.
Prerequisite: CHEM 222 or CHEM 228.
Cross Listing: ANSC 687/NFSC 687.

NFSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Special topics in an identified area of nutrition and food science. May be repeated for credit.

NFSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Investigations leading to thesis or dissertation in various areas of nutrition and food science.

NFSC 697/ANSC 697 Applied Microbiology for Foods of Animal Origin: Processing, Sanitation and Sanitary Design
Credits 3. 3 Lecture Hours.
Application of basic food microbiology knowledge and principles to food production processes and products; sources of microbiological contamination and their impact on food safety and spoilage; application of sanitary design and validation; testing and auditing to monitor and trouble-shoot the process.
Prerequisites: DASC 326 or NFSC 326/ANSC 326, or NFSC 606/DASC 606, or equivalent.
Cross Listing: ANSC 697/NFSC 697.