424. **Wildlife Population Analyses**

Fall. 4(3-2) 305 or approval of department.

Population menuration; reproductive and survival rates; sex and age determination; handling and marking methods.

425. **Wildlife Habitat Analyses**

Spring. 3-4 BOT 450 or ZOL 399 or FOR 220.

Evaluation of environmental factors affecting wildlife species; food and cover measurements. Determination of limiting factors.

426. **Migratory Wildlife**

Fall. 4(2-4) 424 or approval of department.

Biological and management of doves, waterfowl and marsh birds.

427. **Resident Wildlife Resources**

Winter. 4(2-4) 424 or approval of department.

Ecology and management of resident wildlife on farms, forest and range lands.

429. **Natural Resource Administration**

Fall, Winter. 4(4-0) Interdepartmental with the Forestry, Park and Recreation Resources, and Resource Development Department and administered by the Forestry Department.

Concepts and methods of economics and administration and application of techniques to management of wildlife.

431. **Ichthyology**

Spring. 3(2-3) ZOL 205 or 315. Interdepartmental with and administered by the Zoology Department.

Classification and natural history of fishes. Emphasis on food, game, and forage fishes.

432. **Fishery Biology and Management**

Fall. 4(3-0) ZOL 471.

Special reference to distribution and natural history, and application of this knowledge to problems of obtaining maximum return from fishery resources.

433. **Limnology**

Winter. 3(3-0) B S 212. Interdepartmental with the Zoology Department.

Ecology of lakes and streams with special reference to physical, chemical, and biological factors affecting their productivity.

434. **Limnological Methods**

Winter. 3(0-9) 475 concurrently; ZOL 481; ENS 301, 302 recommended. Interdepartmental with the Zoology Department.

Methods and instruments of limnological field investigation on lakes and streams.

484. **Advanced Conservation Education**

Fall of odd-numbered years. 4(3-2) Approval of department.

Designed for secondary teachers. Areas of outdoor education, school camping, recreation, biology teaching and summer counseling. This course will offer both content and methods applicable to people working in specified types of jobs.

501. **Seminar in Fisheries and Wildlife**

Fall, Winter. 1(1-0)

Graduate problems and current developments of importance.

802. **Advanced Topics**

Fall. Winter. Spring. 1 to 6 credits. May re-enroll for a maximum of 15 credits. Approval of department.

Study of selected advanced topics in detail and depth.

899. **Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

900. **Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

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**FOOD SCIENCE**

**College of Agriculture and Natural Resources**

**211. Introduction to Food Science**

Spring. 3(3-0)

Modern food processing, world food problems, and the basic characteristics of processed foods.

**242. Meats, Poultry and Fishery Products I**

Fall. 3(2-2) Interdepartmental with the Animal Husbandry Department.

Principles of evaluation and nutritive value. Identification of grades and cuts of beef, pork, lamb and poultry products.

**300. Dairy Products I**

Spring. 3(2-2) For non-agricultural students.

Composition, use, classification and market grades, methods of storage and factors affecting keeping quality of dairy products.

**311. Food Processing I: Physical Principles**

Fall. 4(3-3) 211; MTH 109; PHY 239 or approval of department.

Food preservation by heat, low-temperature dehydration and radiation.

**322. Food Processing II: Biological Principles**

Winter. 4(3-3) 211; MPH 200 or approval of department.

Sanitation and control of microbiological problems involved in processing and storage of foods.

**333. Food Processing III: Chemical Principles**

Spring. 4(3-3) 211 and CEM 241 or approval of department.

Chemical changes in foods that affect the texture, color, flavor, odor, stability, and nutritive quality during processing and storage.

**348. Meat, Poultry and Fishery Products II**

Winter of odd-numbered years. 3(1-6)

Selection and utilization of meat, poultry and fishery products for institutional use.

**400. Dairy Products II**

Fall. 4(3-3) CEM 133 or approval of department.

The fluid milk industry. Composition, quality, sanitation, nutritive value, processing, packaging and distribution of milk and milk products.

**401. Industrial Food Fermentations**

Spring. 3(0-0) 440 and organic chemistry or approval of department.

Physical, microbiological and chemical procedures in utilizing microbial cultures in controlled fermentations of foods and food constituents.

**402. Processing of LIPIDS**

Winter. 3(2-3) 333 or CEM 241 or approval of department.

Refining, hydrogenation, and interesterification of fats and oils. Processing of margarines, butter, shortenings and salad oils. Control of rancidity and other quality factors.

**404. Dehydrated Foods**

Spring. 3(2-3) 331; 333 concurrently or approval of department.

Concentration and dehydration of foods by roller, spray, and freeze-drying and foam, puff and tunnel drying. Stability and nutritional aspects of dehydrated foods.

**405. Dairy Products III**

Winter. 3(2-3) May re-enroll for a maximum of 6 credits if a different topic is taken. 400 or approval of department.

Physical, chemical and microbiological factors in the processing of dairy products. Ice cream, sherbets, ice milks and special frozen desserts are studied in odd-numbered years; cheese, and related dairy products in even-numbered years.

**421. Food Plant Management**

Spring. 3(2-3) Seniors or approval of department.

Efficiency concepts, merchandising, personnel utilization and organization.

**440. Food Microbiology**

(MPH 271.) Spring. 4(2-6) MPH 200 or MPH 401, or approval of department. Interdepartmental with the Microbiology and Public Health Department.

Major groups of microorganisms of importance to the food industry are studied with emphasis on ecological, physiological, and public health aspects.

**445. Meat, Poultry and Fishery Products III**

Spring. 3(1-6) 333 or approval of department.

Processing, formulation and quality control.

**448. Fruit, Vegetable and Cereal Products I**

Fall. 4(3-3) 331 or approval of department.

Quality factors involved in canning, sugar and salt preservation and milling.

**449. Fruit, Vegetable and Cereal Products II**

Winter. 4(3-3) 331 or approval of department.

Quality factors involved in cooling, freezing and other preservation procedures.
455. **Food Analysis I**  
Fall, 4(2-6) CEM 132 and 162 or approval of department.  
Modern methods of analysis for fat, protein, moisture and other macroconstituents of food. Application of spectrophotometry in determination of microconstituents; use of dye-binding, complextometric, and isodimetric techniques in food analysis.

456. **Food Analysis II**  
Winter, 4(2-6) CEM 182 and 241 or approval of department.  
Use of colorimetry and spectrophotometry, chromatographic methods and other techniques for the analysis of food constituents and additives.

457. **Quality Control in the Food Industry**  
Winter of even-numbered years. 3(3-0) SIT 201 or approval of department.  
Organization of quality control within the food industry by case study. Use of control charts, sampling plans, flavor panel analyizers.

458. **Special Problems in Food Science**  
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 9 credits.  
Advanced undergraduates may select research work in food chemistry, food microbiology, food engineering, food plant management, processing dairy products, meat, poultry and fishery products, fruits and vegetables, cereals or beverages.

460. **Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

931. **Research Techniques and Instrumentation**  
Fall, Winter, Spring. 3(1-6) May re-enroll for a maximum of 9 credits if a different topic is taken. 455 or 456 or approval of department.

950. **Advanced Topics in Food Science**  
Fall, Winter, Spring. Winter of even-numbered years: Lipids.  
Spring of even-numbered years: Enzymatic Reactions.  
Fall of even-numbered years: Chemistry of Plant Products.  
Spring of even-numbered years: Muscle Chemistry.

955. **Food Science Seminar**  
Fall, Winter, Spring. 1(1-0) May re-enroll for a maximum of 3 credits toward M.S. and 6 credits toward the Ph.D. Approval of department.  
Preparation and presentation of reports on a specialized aspect of research findings in food science.

990. **Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

800. **Food Preparation**  
Fall, Spring. 3(2-6) CEM 132.  
Scientific principles of food preparation with special emphasis on the physical and chemical changes involved.

200A. **Lectures in Foods**  
Fall, Spring. 1(2-0) M. 100; CEM 132.  
Lecture part of 200. Completion of this course, 100 and CEM 132 constitutes substitution for 200.

220. **Meal Management**  
Fall, Winter, Spring. 5(3-4) Sophomores.  
Application of factors that influence family meals; family food behavior, resources, and family goals and values. Emphasis on the use of the money resource. Survey of patterns for meal service. Study of food laws.

350. **Fundamental Principles of Nutrition**  
Winter, Spring. 4(3-2) FSL 331 or BCH 200 or concurrently.  
Identification, function, metabolism and food sources of specific nutrients required by man for normal growth and development.

400H. **Honors Work**  
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 12 credits. Seniors, approval of department.

403. **Experimental Foods I**  
Fall. 4(3-6) 200 or FSC 211.  
College-level foods with special reference to proteins in food preparation. Objective and subjective evaluation of effect of ingredient proportion, manipulation, temperatures, etc. on quality characteristics. Simple statistical treatment and interpretation of data.

404. **Experimental Foods II**  
Winter. 4(3-6) 200 or FSC 211.  
Continuation of 403 with focus on chemical and physical properties of fats and carbohydrates as they affect food preparation and preservation.

406. **Cultural Aspects of Food**  
Spring. 3(3-0) Juniors.  
A cross cultural investigation of food and its consumption. Factors such as history, religion, food sources and socio-economic status are considered.

406L. **Laboratory—Cultural Aspects of Food**  
Spring. 1(0-3) 100 or 200; 406 or concurrently.  
Art and science of cookery in relation to historical, national, regional, social and religious customs.

409. **Demonstrations in Foods and Nutrition**  
Winter. 4(1-6) 403; 350 or 481; COM 101 or ATL 112; or approval of department.  
Principles and techniques of demonstration as applied to teaching or promotional work.

452. **Patterns of Food Selection**  
Fall. Summer of even-numbered years. 3(3-0) 350 or equivalent credit in nutrition and chemistry; teaching or extension experience.  
Factors influencing food choices. Evaluation of dietary habits in relation to nutritional needs of individuals.