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, complexometric and iodimetric techniques in food analysis.

456. *Food Analysis II*

Winter. 4(2-6) CEM 162 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) STT 201 or approval of department.

Organization of quality control within the food industry by case study. Use of control charts, sampling plans, flavor panel analyses.

480. *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.

490. *Seminar*

Fall. 1(1-0) Approval of department.

Preparation and presentation of reports on a specialized aspect of food science.

828. *Food Processing Concepts, Systems and Selected New Processes*

Winter. 3(3-0) 331, 332 or 440, or approval of department.

Concepts of and requirements for processing systems and continuous processes. Use of computers in food processing; microwave heating of foods; radiation preservation of foods and related processing methods.

830. *Thermal Processing of Food Products*

Winter. 4(3-3) 331; 332 or 440, or approval of department.

Heating and cooling characteristics of foods in containers, thermal resistance of microorganisms, and derivation of process times and temperatures for pasteurization and sterilization.

832. *Microbiology of Food Processing*

Fall. 3(2-3) 440 or approval of department.

Control of food spoilage and food poisoning microorganisms in food processing and the role of bacterial spores in process selection.

850. *Selected Topics in Food Science*

Fall of even-numbered years. Winter and Spring of odd-numbered years. 3(3-0) May re-enroll for a maximum of 9 credits if a different topic is taken. Approval of department.

Fall: advanced food plant management.

Winter: utilization, additives and new processing methods.

Spring: flavor and color evaluation and advanced statistical quality control.

880. *Special Problems in Food Science*

Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 12 credits. Approval of department.

Investigation of food science areas of special interest to individual graduate students.

899. *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.

Fall: electrophoresis, thin-layer chromatography and gel filtration microscopy, ultra centrifugation, and infra-red spectrometry.

Winter: chemical, microbiological and histological methods.

Spring: manometric and radioisotope techniques, spectrophotometry, electro and column chromatography.

950. *Advanced Topics in Food Science*

Fall, Spring. Winter of even-numbered years. 3(2-3) May re-enroll for a maximum of 15 credits if a different topic is taken. 333, BCH 401 or approval of department.

Fall of odd-numbered years: Advanced Chemical Concepts of Carbohydrates and Proteins.

Winter of even-numbered years: Lipids.

Spring of even-numbered years: Enzymatic Reactions.

Fall of even-numbered years: Chemistry of Plant Products.

Spring of odd-numbered years: Muscle Chemistry.

990. *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.

999. *Research*

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

FOODS AND NUTRITION F N

College of Home Economics

100. *Elementary Food Preparation*

Fall, Winter, Spring. 4(2-4)

Composition and properties of food related to quality characteristics; methods of preparation, evaluation of quality and use of selected foods.

102. *Nutrition for Man*

Fall, Winter, Spring. 3(3-0)

Fundamentals of nutrition with reference to diverse ways man provides for and attaches meaning to his food.

200. *Food Preparation*

Fall, Spring. 5(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) 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.

Analysis 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) PSL 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 16 credits. Seniors, approval of department.

403. *Experimental Foods I*

Fall. 4(2-6) 200 or FSC 211.

Colloidal properties of foods with special reference to protein 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(2-6) 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, racial and religious customs.

409. *Demonstrations in Foods and Nutrition*

Winter. 4(1-6) 403; 350 or 461; COM 101 or ATL 113; 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.

453. *Readings in Nutrition*

Winter. Summer of odd-numbered years. 3(3-0) 452 or approval of department.

A study of recent developments in research in human nutrition.

454. *Recent Advances in Foods*

Spring. 3(3-0) 403.

Critical analysis of recent developments in preparation, prefabrication and preservation of foods.

461. *Human Nutrition I*

Fall. 4(2-2) BCH 200; PSL 332 or 241.

Metabolism of protein, fats and carbohydrates, as applied to nutritional requirements and food supplies of people.

462. *Human Nutrition II*

Winter. 4(2-2) 461.

Metabolism of vitamins and minerals as applied to the nutritional requirements and food supplies of people.

463. *Human Nutrition III*

Spring. 4(3-2) 462.

Critical analysis of methods used in assessing human nutrition status; evaluation of nutritional problems of current interest.

464. *Diet Therapy*

Spring. 4(2-2) 462 or concurrently.

Dietary modifications necessary in pathological conditions, including dietary treatment of diabetes, gout, nephritis, and gastro-intestinal disorders.

800. *Seminar in Foods and Nutrition*

Fall, Winter, Spring. 1(1-0) 403 or 463.

805. *Experimental Foods III*

Spring. 4(1-9) 404 or approval of department.

Planning, executing, and reporting individual research project. Data collection, evaluation and interpretation to demonstrate understanding of research techniques and attitudes, and an awareness of significant problems in the field.

813A. *Special Studies in Nutrition*

Fall, Winter, Spring, Summer. Variable credit. 461.

813B. *Special Studies in Experimental Foods*

Fall, Winter, Spring. Summer of odd-numbered years. Variable credit. 404; BCH 200 or 803 and 804.

816. *Applied Human Nutrition*

Spring. 3(3-0) 462.

825. *Techniques in Nutrition Research*

Winter of odd-numbered years. 1 to 3 credits. CEM 333; approval of department. Interdepartmental with and administered by the Animal Husbandry Department.

Use of specialized instruments and techniques. Laboratory safety. Management of laboratory animals. Development of abilities in areas of particular interest to individual students.

899. *Research*

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

927. *Comparative Nutrition I*

Winter. 2 or 4 credits. BCH 402; PSL 502 or concurrently. Interdepartmental with the Animal Husbandry Department.

Mammalian nutrition based on biochemical and physiological phenomena. Proteins are studied in the first half of the term; carbohydrates, fats and macro-minerals in the last half.

928. *Comparative Nutrition II*

Spring. 2 or 4 credits. BCH 402; PSL 502. Interdepartmental with and administered by the Animal Husbandry Department.

Mammalian nutrition based on biochemical and physiological phenomena. Micro-minerals are studied in the first half of the term; vitamins in the last half.

999. *Research*

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

FOREIGN LANGUAGES

See German and Russian, Linguistics and Oriental and African Languages, and Romance Languages.

FORESTRY FOR

College of Agriculture and Natural Resources

200. *Resource Ecology and Man*

For course description, see **Interdisciplinary Courses.**

202. *Introduction to Forestry*

(101.) Fall. 3(3-0)

Forestry in its broadest sense, including: historic development, forest growth, protection and management, products, national and world economy and policy. Emphasis on multiple use concepts. One-day field trip required.

204. *Dendrology*

Spring. 6(4-6) BOT 301, 302, or approval of department.

Nomenclature, classification, and identification of important trees, shrubs, and herbaceous plants of forest and field.

220. *Plants and Their Environment*

Winter. 3(3-0)

Fundamental ecological relationships between various climatic, edaphic and biotic environmental factors of the ecosystem and plant response, including structure, function and evaluation of species.

302. *Forest Biometrics*

Fall. 5(4-3) 204; C E 251; MTH 112.

Principles of measurement, sampling methods, and statistical techniques used in forest management and research.

305. *Silvics and Silviculture*

Fall. 5(4-3) 204.

Interrelationships of trees of the forest community and the environment; plant succession; statistical methods of community analysis; natural and artificial forest reproduction methods; intermediate cuttings; field studies of silvicultural conditions.

306. *Forest Fire Protection and Use*

Spring. 3(3-0) Juniors or approval of department.

Causes and effects of forest fires. Combustion, fire behavior, and fire weather. Prevention and control planning and techniques. Use of fire in forest land management. One-day field trip required.

309. *Wood Technology*

(F P 309.) Winter. 4(2-6)

Structure of wood. Mechanical and physical properties of wood. Wood anatomy and relation to growth.

348. *Forest Regulation and Valuation*

Winter. 3(3-0) 302, 305.

Principles of organizing and regulating forest properties; basic forest valuation procedures.

409. *Forest Hydrology*

Winter. 3(3-0) SLS 210.

Hydrologic cycle, with emphasis on soil, water and ground water regimes; instrumentation and measurement of the various components. Effects of forest management on watersheds and water yields.

410. *Forest Tree Improvement*

Fall. 3(2-3)

Distribution of genetic variation in natural tree populations. Introduction, selection, progeny testing, species hybridization, and polyploidy to obtain superior tree populations.

411. *Tree Physiology*

Fall. 3(3-0) BOT 301.

The fundamental principles of plant physiology with particular reference to the growth and development of woody plants, and consideration of the influence of genetic and environmental factors on physiological processes in trees.

419. *Woodland Forestry*

Fall, Spring, Summer. 3(2-2) Not open to majors.

Management of small woodlands. Tree identification; forest planting; improvement cutting and harvesting methods; forest measurements; use and marketing of forest products; other uses. One-day field trip required.

424. *Forest Soils*

Spring. 4(3-3) 220; SLS 210. Interdepartmental with the Soil Science Department.

Interrelationships of forest site and the growth of forests. Classification and productivity of forest soils. Effects of silvicultural and forest management practices on the soil. Two-day field trip required.

430. *Lumber Processing*

(F P 310.) Fall. 3(3-0) 309.

Log and lumber grading. Sawing practices, mill layout. Planing mill. Planers and planing. Air and kiln drying of lumber; kiln schedules. Two field trips required.

431. *Fiber and Laminated Wood Processing*

(F P 410.) Spring. 3(3-0) 309.

Wood adhesives. Gluing of wood. Technology and manufacture of plywood, laminated structural members, particleboard and fiberboards. Pulp and paper products. One two-day field trip required.

446. *Range Management*

Winter. 4(3-3) 220 or approval of department.

Development of range industry; grazing regions and reconnaissance; planning multiple-use management on forest range and watershed.

449. *Field Studies in Forestry*

Fall. 5 credits. 348.

Intensive study of multiple use forest resource management in various forest regions. Three-week field trip required.