

FOOD SCIENCE

433*. **Advanced Food Processing: Meat/Poultry/Fish**
 Fall of even-numbered years. 3(2-3)
 P: FSC 333 R: Juniors and above
 Scientific principles of processing animal tissues for food. Field trips required.
 QP: FSC 345 QA: FSC 445

436*. **Quality Assurance**
 Fall. 2(2-0)
 P: Two of the following: FSC 331, FSC 332, FSC 333, FSC 334; STT 201 R: Junior and above
 Theory and application of quality assurance programs for food processing industries.
 QP: STT 201 FSC 330 QA: FSC 457

440*. **Food Microbiology**
 Spring. 3(3-0) Interdepartmental with the Department(s) of Microbiology and Public Health.
 P: MPH 205 R: Juniors or above
 Major groups of microorganisms of importance to the food industry. Emphasis on ecological, physiological, and public health aspects.
 QP: MPH 200 ORMPH 301 QA: FSC 440 OR MPH 440

441*. **Food Microbiology Laboratory**
 Spring. 1(0-3) Interdepartmental with the Department(s) of Microbiology and Public Health.
 P: FSC 440 or concurrently, MPH 206 R: Juniors and above FSC; FTM; MPH; FE
 Methods for studying major groups of microorganisms of importance to the food industry. Isolation, enumeration, characterization, identification and utilization of microorganisms.
 QP: FSC 440 QA: FSC 441 OR MPH 441

455*. **Food Analysis**
 Fall. 3(2-3)
 P: BCH 200, CEM 262, FSC 401. R: Not open to freshmen and sophomores.
 Principles and application of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins and additives. Techniques include spectroscopy, fluorimetry, chromatography, electrophoresis, proximate composition.
 QP: CEM 162 CEM 241 FSC 333 QA: FSC 455 FSC 456

490*. **Special Problems in Food Science**
 Fall, Spring, Summer. 1 to 3 credits.
 May reenroll for a maximum of 6 credits.
 R: Not open to freshmen and sophomores.
 Approval of department; application required.
 Individual study of selected topics in food science. Supervised independent study.
 QA: FSC 480

492*. **Senior Seminar in Food Science**
 Spring. 1(1-0)
 R: Open only to seniors in Food Science.
 Critical study and discussion of contemporary issues related to the food industry.
 QA: FSC 490

801*. **Chemistry of Food Lipids**
 Spring. 2(2-0)
 P: FSC 401, 402, BCH 451 or approval of Department R: Level 6 or above None None None
 An in-depth course on composition and structure of lipids, and their physical and chemical properties in relation to their function in foods.
 QP: FSC 333 FSC 333LBCH 453 QA: FSC 952

840*. **Advanced Food Microbiology**
 Spring of odd-numbered years. 2(2-0)
 P: FSC 440, or approval of Department R: Level 6 or above None None None
 Recent advances in the microbiology of food production and processing including the detection, characterization, identification and enumeration of food associated pathogens; current/future applications and regulation of Food Biotechnology.
 QP: FSC 440 ORAPPROVALOF DEPT. QA: FSC 832

850*. **Analytical Techniques in Food Science**
 Summer of odd-numbered years. 2(2-4)
 R: Level 6 or above Agriculture and Natural Resources; Human Ecology Food Science or Human Nutrition
 Laboratory and recitation experience focused on recent advances in analytical methodologies with applications to food systems.
 QP: NONE QA: NONE

860*. **Processing Research in Food Science**
 Summer of odd-numbered years. 2(2-4)
 R: Level 6 or above None None None
 Laboratory and recitation experience focused on recent advances in basic research and current process technology in applied food research.
 QP: NONE QA: NONE

892*. **Food Science Seminar**
 Fall, Spring. 1(1-0) May reenroll for a maximum of 4 credits.
 P: Approval of Department R: Level 6 and above
 Oral presentation by students on current topics in Food Science.
 QP: APPROVALOF DEPT. QA: FSC 990

899*. **Master's Thesis Research**
 Fall, Spring, Summer. 1 to 4 credits.
 May reenroll for a maximum of 10 credits.
 P: Approval of department R: M.S. students in Food Science
 Individual research focused on the student's M.S. thesis.
 QP: APPROVALOF DEPT. QA: FSC 899

901*. **Food Proteins**
 Fall of even-numbered years. 2(2-0)
 P: BCH 461; FSC 401 or approval of Department R: Level 6 or above
 Utilization and application of proteins and enzymes in the food industry. Functional properties of proteins and enzymes in food systems.
 QP: BCH 452 FSC 333 QA: NONE

913*. **Advanced Food Toxicology**
 Fall of even-numbered years. 2(2-0)
 Interdepartmental with the Department(s) of Animal Science.
 P: Departmental approval R: Level 6 and above

Concepts in toxicology related to food safety. Metabolism of toxicants as influenced by food constituents, mutagenesis, chemical carcinogenesis; risk assessment.

951*. **Muscle Biochemistry**
 Spring of odd-numbered years. 2(2-0)
 P: BCH 452 R: Level 6 and above None None None
 Anatomical, physiological and biochemical properties of muscle. Structure and function of muscle proteins, regulation of muscle contraction, Biochemical changes post mortem, and meat protein functionality.
 QP: BCH 453 QA: FSC 951

999*. **Doctoral Dissertation Research**
 Fall, Spring, Summer. 1 to 6 credits.
 May reenroll for a maximum of 30 credits.
 P: Approval of Department R: Ph.D. students in Food Science
 Individualized research focused on student's doctoral dissertation.
 QP: APPROVALOF DEPT. QA: FSC 999

FOOD SYSTEMS ECONOMICS AND MANAGEMENT **FSM**

200. **Introduction to Food Systems Management**
 Fall. 3(3-0)
 Organization and operation of the industrialized food system: agricultural production, food processing, manufacturing, wholesaling, retailing and consumption. Application of economic and management principles to firms and the overall food system.
 QA: FSM 200

320. **Agribusiness and Food Sales**
 Spring. 3(3-0)
 P: FSM 200 or MTA 300. R: Not open to freshmen and sophomores.
 Selling processes and activities within agribusiness and food firms. Principles and techniques of sales. Operation of sales organizations.
 QP: FSM 200 MTA 300

325. **Agribusiness Labor and Personnel Management**
 Fall. 3(3-0)
 P: FSM 200 or MGT 302 or concurrently.
 R: Not open to freshmen and sophomores.
 Labor for farms and agribusinesses: planning, recruiting, training, scheduling, motivating, supervising, and evaluating. Labor regulations, compensation, and records.
 QP: FSM 200 ORMGT 302

330. **Form Business Management**
 Fall. 3(4-0)
 P: FSM 200. R: Not open to freshmen.
 Management, planning, and control of farm production, marketing and financial activities. Problems and evaluation of alternative solutions. Economic principles, budgeting, financial statements.
 QP: FSM 200 QA: FSM 330 FSM 430

412*. **Financial Management in the Food System**
 Spring. 3(3-0)
 P: FSM 330, FI 391. R: Not open to freshmen and sophomores.
 Analysis of agricultural business performance using financial statements. Capital budgeting of durable investments. Risk. Alternative methods to control capital asset services. Financial markets and credit institutions affecting agriculture.
 QP: FSM 330 QA: FSM 412 FSM 430

421*. **Public Policy Issues in Food and Agribusiness**
 Spring. 3(3-0)
 P: EC 201, FSM 200. R: Not open to freshmen and sophomores.
 Objectives, rationale, and consequences of public policy for food and agriculture. Analysis of economic implications for food and agribusinesses, farmers, consumers, and society.
 QP: EC 201 FSM 200 QA: FSM 421

FOOD SYSTEMS ECONOMICS AND MANAGEMENT

429*. Agribusiness Management
 Spring. 3(4-0)
 P: FSM 330. R: Open only to seniors and graduate students.
 Analysis of agribusiness management functions including planning, organizing, and controlling. Integration of production, marketing, and financial aspects of agribusiness. Solutions to agribusiness managerial problems.
 QP: FSM 200

441*. Commodity and Futures Marketing
 Spring. 3(3-0)
 P: FSM 200, STT 201, EC 201. R: Not open to freshmen and sophomores.
 Supply, demand and prices in commodity markets. Futures and options and their role in forward pricing. Agricultural and food markets.
 QP: STT 201 EC 201FSM 200 QA: FSM 441

443*. Food Industry and Cooperative Marketing
 Spring. 3(3-0)
 P: FSM 200. R: Not open to freshmen and sophomores.
 Multiple firm and cooperative marketing methods. Organization and operation of cooperatives, marketing orders, trade associations and other forms of group action in the food system.
 QP: FSM 200 QA: FSM 443

462*. Agricultural Development in Less Developed Countries
 Fall. 3(3-0)
 P: EC 201; PAM 260 recommended. R: Not open to freshmen and sophomores.
 Factors responsible for agricultural growth, as well as technical and institutional change. Sustainable strategies for increasing food production and rural incomes.
 QP: EC 201 QA: FSM 462

490*. Independent and Supervised Study
 Fall, Spring, Summer. 1 to 6 credits.
 May reenroll for a maximum of 7 credits.
 P: FSM 200; FSM 335 or FSM 330. R: Open only to FSM majors. Approval of department; application required.
 In-depth independent study of topics and issues affecting the food system. Complementary to previous coursework, adapted to career aspirations.
 QP: FSM 200 FSM 335ORFSM 330 QA: FSM 480

FORESTRY FOR

201*. Tenets of Forestry
 Fall. 1(1-0)
 R: Open only to Forestry majors. Completion of Tier I writing requirement.
 History, founding principles, and core concepts of forestry. Stewardship, conservation, professional ethics, and current forestry issues.

202. Introduction to Forestry
 Fall, Spring. 3(3-0)
 Historical development of forestry. Forest growth, protection, management, and products. Relationship of national and world economy and policy to forestry. Emphasis on multiple uses of forests.
 QA: FOR 202

204. Structure and Function of Woody Plants
 Fall. 4(3-2)
 Nomenclature, classification, and identification of woody plants. Tree structure as it relates to growth and ecosystem dynamics.

220. Plants and their Environment
 Spring. 3(3-0)
 Relationships between plants and fundamental climatic, edaphic, and biotic factors. Structure and function of different ecosystems in relation to environmental factors.

304*. Wood Technology
 Fall. 3(2-2)
 P: CEM 141, MTH 116, PHY 231. R: Not open to freshmen and sophomores.
 Structure and identification of wood. Physical and mechanical characteristics. Major industrial timber utilization processes including manufacture of lumber, furniture, composites, and paper.
 QP: PHY 237 CEM 141MTH 111 QA: FOR 209 FOR 430 FOR 431

306*. Forest Biometry
 Spring. 4(3-2)
 P: MTH 116 and FOR 201 and FOR 204
 R: Juniors and above
 Describing location and area of forest resources. Quantification of site, stand, and tree characteristics. Sampling and inventory. Predicting growth and yield.
 QP: MTH 111 QA: FOR 320 FOR 420

404. Forest and Agricultural Ecology
 Fall. 4(3-3) Interdepartmental with the Department(s) of Crop and Soil Sciences.
 P: CSS 210, BOT 105.
 Structure and function of ecosystems managed for crop and wood production. Productivity, nutrient cycling, community dynamics as affected by management intensity and natural disturbance. Dynamics of managed versus natural ecosystems.
 QA: FOR 304 CSS 412

406*. Silviculture
 Spring. 4(3-3)
 P: CSS 210, FOR 204. R: Not open to freshmen and sophomores.
 Ecophysiology of tree growth and reproduction. Stand structure, composition and growth. Intermediate stand treatments. Natural and artificial reproduction. Silvicultural techniques.
 QP: FOR 204 CSS 210 QA: FOR 305

408*. Forest Management
 Fall. 4(3-2)
 P: FOR 420.
 Management of forests for timber production in a multiple-use context. Yield projections, harvest scheduling, management prescriptions, project analysis and administration.
 QP: FOR 305 FOR 455 QA: FOR 458

409*. Watershed Hydrology
 Spring of odd-numbered years. 3(2-3)
 Interdepartmental with the Department(s) of Crop and Soil Sciences, Resource Development, Geography.
 P: CSS 210; MTH 116; CPS 100 or CPS 130 or CPS 131 R: Juniors and above
 Science and technology of the hydrologic cycle and water resources in forest, wildland, wetland and rural watersheds.
 QP: CSS 210 MTH 108CPS 100ORCPS 115 QA: FOR 409

420*. Forestry Field Studies
 Summer. 3(1-4)
 P: FOR 304 and FOR 306 and FOR 404 and FOR 406 R: Junior or senior CANN
 Major forest management concepts including forest ecology, silviculture, forest soils, biometry, timber harvesting and utilization, and forest protection. Field trips required.
 QP: FOR 209 FOR 320FOR 305FOR304FOR 204 QA: FOR 304 FOR 305 FOR 329 FOR 320

422*. Woody Plant Genetics
 Fall. 3(2-2)
 P: BOT 105, BOT 301, CSS 250
 Applications of plant breeding and genetic principles to achieve improvement of tree species and to preserve biological diversity in forest ecosystems for the benefit of mankind.
 QP: BOT 205 BOT 301 QA: FOR 410

450*. Forestry in International Development
 Fall. 4(3-2) Interdepartmental with the Department(s) of Sociology.
 P: FOR 404 or FOR 464 R: Seniors and above
 Basic biophysical, social and economic factors influencing design and implementation of farm, village and community level forestry and agroforestry projects.
 QA: FOR 464 FOR 474

460*. Arboriculture
 Fall. 3(2-2)
 P: BOT 105; FOR 204, or HRT 211. R: Not open to freshmen and sophomores.
 Tree selection and planting to fit climatic, space and edaphic conditions. Diagnosing tree abnormalities. Cultural practices used in the care and maintenance of shade and ornamental trees. Field trip required.
 QP: FOR 204 BOT 205 QA: FOR 460

461*. Urban Forestry
 Fall. 3(3-0)
 P: FOR 204 or HRT 211. R: Not open to freshmen and sophomores.
 Trees in improving the urban environment. Principles of urban forest management: legal, economic, organizational, and cultural. Street tree planning and inventory systems. Utility forestry and commercial arboriculture. Field trips required.
 QP: FOR 202 ORHRT 211 QA: FOR 461

464*. Natural Resource Economics and Social Science
 Fall. 3(2-2) Interdepartmental with the Department(s) of Park and Recreation Resources, Fisheries and Wildlife, Resource Development.
 P: One EC course at 200 level R: Juniors

and above
 Basic economic and social science principles and techniques that govern human consumption and production of natural resources, including benefit-cost analysis, regional impact analysis, and social impact assessment.
 QP: EC 201 OREC 202 QA: FOR 455

466*. Natural Resources Planning and Policy
 Spring. 3(2-2) Interdepartmental with the Department(s) of Fisheries and Wildlife, Park and Recreation Resources, Resource Development.
 P: FOR 408, 464 or FW 434 or FW 424, 472 or PRR 443 or RD 415 or RD 460 R: Seniors, graduate students ANR
 Planning and policy-making in the context of scientific, environmental, social and institutional factors. Focus on ecosystem-based planning & policy issues through development of a multiple-use plan and use of case studies.
 QP: FOR 455 ORRD 417 QA: FOR 466 FOR 491

490*. Independent Study in Forest and Wood Science
 Fall, Spring, Summer. 1 to 3 credits.
 May reenroll for a maximum of 8 credits.
 R: Open only to juniors and seniors.
 Approval of department.
 Special problems course for students qualified for advanced study in some phase of forestry or wood science
 QA: 465