FISHERIES AND WILDLIFE FW

Department of Fisheries and Wildlife
College of Agriculture and Natural Resources

101 Fundamentals of Fisheries and Wildlife Ecology and Management
Fall, Spring. 3(3-0) SA: FW 100, FW 205
Ecological and sociological concepts of fisheries and wildlife ecology and management. Career opportunities.

101L Fundamentals of Fisheries and Wildlife Ecology and Management Lab
Fall. 2(0-4) P: FW 101 or concurrently R: Open to undergraduate students in the Fisheries and Wildlife major or in the Lyman Briggs Fisheries and Wildlife Coordinate major. Not open to students with credit in FW 284.
Natural history and ecology of primary terrestrial, wetland, and aquatic ecosystems. Species and communities in Michigan and the United States. Species identification in various ecosystem types. Impacts of disturbances on ecosystems. Field trips required.

110 Conservation and Management of Marine Resources
Spring. 3(3-0)
Marine environment, resource distribution, and human impacts on selected marine commercial fisheries. Conflicts in management goals between government and industry. Management goals and techniques in preserving and conserving marine resource biodiversity.

181 Introduction to Science, Technology, the Environment and Public Policy
Fall. 3(3-0) Interdepartmental with Lyman Briggs and James Madison College. Administered by Fisheries and Wildlife.
Relation of science and technology to ethics and public policy. Environmental law and public policy. Managing fish, water and wildlife resources at state, national, and international levels. Science and technology in developing countries. Impacts of military technology on environmental policy.

203 Resource Ecology
Fall, Spring. 3(3-0)
Basic concepts of ecology which provide a foundation for examining environmental problems and their solutions.

204 Energy Issues in Natural Resource Management
Spring. 3(3-0) Interdepartmental with Community, Agriculture, Recreation and Resource Studies. Administered by Fisheries and Wildlife. RB: FW 101 or FW 203 or ESA 200 or ESA 201 or FOR 202
Energy issues and their relationship to natural resource management. Global warming. Fossil fuels, solar and wind power, biofuels, fuel cells, and hybrids. Energy efficiency and environmental impacts.

207 Great Lakes: Biology and Management
Fall. 3(3-0) Interdepartmental with Environmental Studies and Applications. Administered by Fisheries and Wildlife.
Living aquatic resources of the Great Lakes, environmental history, and biological resources and their management. Policy issues.

208 Outdoor Preparedness for Natural Resources Professionals
Spring. 3(3-0)
Basic outdoor preparedness. Psychology of becoming lost or an accident victim. Basic wilderness and sea survival. Wilderness accident management. Backcountry and coastal navigation.

211 Introduction to Gender and Environmental Issues
Spring. 3(3-0) Interdepartmental with Environmental Economics and Policy and Environmental Studies and Applications and Forestry and Women's Studies. Administered by Fisheries and Wildlife. R: Not open to freshmen.
The concept of gender. Overview of environment and habitat. Historical gender roles in environmental management. Gender-based theoretical perspectives. Case studies on developing and developed countries. Environmental management with emphasis on fisheries, wildlife and wetlands. Women environmental professionals.

224 Introduction to Probability and Statistics for Ecologists
Spring. 3(2-2) Interdepartmental with Statistics and Probability. Administered by Statistics and Probability. P: MTH 103 or MTH 116 or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently) RB: BS 110 or BS 148H or LB 144 SA: FW 324 Not open to students with credit in STT 231.
Probability and statistics with computer applications for the analysis, interpretation and presentation of ecological data. Data analysis, probability models, random variables, estimation, confidence intervals, test of hypotheses, and simple linear regression with applications to ecology.

238 Introductory Fisheries and Wildlife Field Experience
Summer. 3(1-4) RB: Introductory Biology, Botany, Zoology, Forestry, Natural Resources, Plant Biology, Fisheries and Wildlife course R: Approval of department; application required.
Terrestrial and aquatic field research techniques and their application to current issues. Interaction with professionals. Field trips required.

284 Natural History and Conservation in Michigan
Fall. 3(2-3) R: Not open to undergraduate students in the Fisheries and Wildlife major. Not open to students with credit in FW 101L.
Identification, habitat requirements, and distribution of Michigan's flora and fauna. Interrelationships which influence natural resource use.

293 Undergraduate Seminar in Fisheries and Wildlife
Fall. 1(0-2) P: FW 101 or concurrently R: Open to undergraduate students in the Fisheries and Wildlife major or in the Lyman Briggs Fisheries and Wildlife Coordinate major.
Case studies highlighting the integrative nature of fisheries and wildlife management.

341 Writing Nature and the Nature of Writing
Fall of odd years. 3(3-0) Interdepartmental with Writing, Rhetoric and American Cultures. Administered by Writing, Rhetoric and American Cultures. P: Completion of Tier I writing requirement. R: Open to students in the College of Agriculture and Natural Resources or in the Professional Writing major or approval of department. SA: AL 341
Writing- and reading-intensive course focusing on the language of scientists, poets, essayists, naturalists, environmentalists, and biologists, and on their various responses to and representations of the natural environment.

364 Ecological Problem Solving
Spring. 3(2-2) P: ((MTH 124 or concurrently) or (MTH 132 or concurrently) or (LB 118 or concurrently)) and (STT 224 or STT 231 or STT 421) and (ZOL 355 or BE 230)
Application of ecological concepts and models to problems in natural resource and ecosystem management.

369 Introduction to Zoo and Aquarium Science
Spring. 3(3-0) Interdepartmental with Landscape Architecture and Veterinary Medicine and Zoology. Administered by Zoology. P: BS 162 or LB 144 or BS 182H
Fundamentals of zoo and aquarium operations including research, interpretation, design, nutrition, captive breeding, conservation, ethics and management.

370 Introduction to Zoogeography
Fall. 3(3-0) Interdepartmental with Geography and Zoology. Administered by Zoology. P: (ZOL 355)
Patterns of geographical distribution of animals and the ecological and historical processes leading to these patterns.

404 Women and the Law in the United States
Fall of odd years, Spring of odd years. 3(3-0) Interdepartmental with Women's Studies. Administered by Women's Studies. RB: WS 201 or WS 202 or WS 203 R: Not open to freshmen or sophomores.
Law in the United States as a vehicle for structuring and maintaining women's social roles, and for social change.

410 Upland Ecosystem Management
Spring. 3(2-3) P: (ZOL 355 or FOR 404) and completion of Tier I writing requirement.
Analysis and management of upland ecosystems to meet wildlife management and biodiversity objectives. Mitigation of human impact. Field trips required.

413 Wildlife Research and Management Techniques
Fall. 3(1-6) P: FW 101 and FW 101L
Field techniques used in collecting, analyzing, and communicating data on wild animal populations and their habitats. Field trips required.

414 Aquatic Ecosystem Management
Fall. 3(3-0) P: (ZOL 355) and completion of Tier I writing requirement.
Management of aquatic habitats and populations for ecological and socioeconomic objectives; human impacts on aquatic ecosystems. Field trips required.

416 Marine Ecosystem Management
Fall. 3(3-0) P: ZOL 355 RB: FW 110 or ZOL 353 or GLG 303
Management of marine ecosystems and populations for ecological and socio-economic objectives. Anthropogenic impacts, mitigation, and marine resource conservation strategies. Field trips required.

417 Wetland Ecology and Management
Fall. 3(2-3) P: (ZOL 355) and completion of Tier I Writing requirement SA: FW 412
Biological, physical, and chemical processes controlling wetland structure and function. Utilization, mitigation, and conservation of wetlands on a sustainable basis.

419 Applications of Geographic Information Systems to Natural Resources Management
Spring. 4(2-4) Interdepartmental with Community, Agriculture, Recreation and Resource Studies and Biosystems Engineering and Forestry and Geography. Administered by Fisheries and Wildlife. P: GEO 221
Application of geographic information systems, remote sensing, and global positioning systems to integrated planning and management for fish, wildlife, and related resources.

420 Stream Ecology
Fall. 3(3-0) Interdepartmental with Zoology. Administered by Fisheries and Wildlife. P: BS 110 or BS 148H or LB 144 RB: (CEM 141 and ZOL 355)
Biological and environmental factors determining structure and function of stream ecosystems.

422 Aquatic Entomology
Fall of odd years. 3(2-3) Interdepartmental with Entomology and Zoology. Administered by Entomology. P: BS 110 SA: ENT 420
Biology, ecology and systematics of aquatic insects in streams, rivers and lakes. Field trips and aquatic insect collection required.

423 Principles of Fish and Wildlife Disease
Spring of odd years. 3(3-0) Interdepartmental with Large Animal Clinical Sciences. Administered by Fisheries and Wildlife. P: BS 110 or BS 148H or LB 144 RB: Additional course work in ecology, zoology, microbiology or environmental science. R: Open to juniors or seniors or graduate students in the College of Agriculture and Natural Resources or in the College of Natural Science or in the College of Veterinary Medicine.
Diseases of fish and wildlife species. Disease detection and diagnosis. Ecological and epidemiological analysis and management of major classes of wildlife diseases. Threatened and endangered species, game species, and fish and wildlife species that serve as vectors or reservoirs of human and domestic animal diseases.

423L Principles of Fish and Wildlife Disease Laboratory
Spring of odd years. 1(0-3) Interdepartmental with Large Animal Clinical Sciences. Administered by Fisheries and Wildlife. RB: Additional laboratory course work in ecology, zoology, microbiology or environmental sciences. C: FW 423 concurrently.
Tools for diagnosis and assessment of disease in fish and wildlife populations. Field Trips required.

424 Population Analysis and Management
Fall. 4(3-2) P: ZOL 355 and (STT 224 or STT 231 or STT 421) and (MTH 124 or MTH 132 or LB 118)
Statistical, ecological and management concepts and methods needed to analyze and interpret demographic data and manage fish and wildlife populations.

431 Ecophysiology and Toxicology of Fishes
Spring of odd years. 3(3-0) P: (BS 161 or LB 145 or BS 181H) and ((BS 162 or LB 144 or BS 182H) and completion of Tier I writing requirement) R: Not open to freshmen or sophomores.
Physiological processes and the effect of anthropogenic stresses on fishes. Fate of contaminants in the environment and biota. Individual, population and community effects. Temporal, spatial and scaling issues. Modeling tools and environmental risk assessment.

434 Human Dimensions of Fisheries and Wildlife Management (W)
Spring. 3(2-2) P: (ZOL 355) and completion of Tier I writing requirement R: Open to juniors or seniors or approval of department.
Sociological implications of public policy and planning processes in fisheries and wildlife management.

435 Integrated Communications for the Fisheries and Wildlife Professional
Fall. 3(3-0) P: Completion of Tier I writing requirement. R: Open to juniors or seniors or graduate students.
Role and practical application of communications for fisheries and wildlife professionals, which integrates public and media relations, community relations, social marketing, and courtroom testimony using a variety of communication tools including news releases, direct mail, storyboards, and business writing.

438 Philosophy of Ecology (W)
Spring of even years. 3(3-0) Interdepartmental with Lyman Briggs. Administered by Fisheries and Wildlife. P: Completion of Tier I Writing Requirement RB: Additional coursework in ecology, natural resources, philosophy, or environmental sciences. R: Open to juniors or seniors or graduate students.
Conceptual issues in the science of ecology, including connections between ecology and environmental philosophy. Western and non-western perspectives.

439 Conservation Ethics
Spring of odd years. 3(3-0) P: Completion of Tier I Writing Requirement RB: Additional coursework in ecology, natural resources, philosophy, or environmental sciences. R: Open to juniors or seniors or graduate students.
Ethical concepts and arguments underlying natural resources.

443 Restoration Ecology
Spring. 3(2-2) Interdepartmental with Biosystems Engineering and Zoology. Administered by Fisheries and Wildlife. RB: (CSS 210 or BE 230) and (FOR 404 or FW 364 or ZOL 355)
Principles of ecological restoration of disturbed or damaged ecosystems. Design, implementation, and presentation of restoration plans. Field trips required.

444 Conservation Biology
Spring. 3(3-0) Interdepartmental with Zoology. Administered by Fisheries and Wildlife. P: (ZOL 355 or FOR 404) and completion of Tier I writing requirement.
Ecological theories and methodologies to manage species, communities and genetic diversity on a local and global scale.

445 Biodiversity Conservation Policy and Practice
Spring of even years. 3(3-0) Interdepartmental with James Madison College. Administered by Fisheries and Wildlife. P: (((EC 201 or concurrently) or (EC 202 or concurrently) or (EC 251H or concurrently) or (EC 252H or concurrently))or approval of department) and completion of Tier I writing requirement RB: Interest in Conservation Biology
Social, economic, and policy considerations. Approaches to conserve biodiversity.

450 International Environmental Law and Policy
Spring. 3(3-0) Interdepartmental with James Madison College. Administered by James Madison College. P: EC 201 or EC 202 RB: FW 181 and EC 340
Overview of concepts, actors, norms, laws, and institutions related to international environmental policy. Case studies on current global environmental issues.

452 Watershed Concepts
Fall, Spring, Summer. 3(3-0) Interdepartmental with Biosystems Engineering and Crop and Soil Sciences and Environmental Studies and Agriscience and Forestry. Administered by Environmental Studies and Agriscience. P: ESA 324 and ZOL 355 RB: organic chemistry SA: RD 452
Watershed hydrology and management. The hydrologic cycle, water quality, aquatic ecosystems, and social systems. Laws and institutions for managing water resources.

454 Environmental Hydrology for Watershed Management
Spring of odd years. 3(3-0) P: (MTH 124 or MTH 132 or LB 118) and ((PHY 183 or concurrently) or (PHY 231 or concurrently)) RB: ZOL 355 or concurrently
Effect of climate, topography, geology, soil, vegetation, and anthropogenic land uses on the amount, timing, and quality of water yield. Implications for fish and wildlife resource management. Field trips required.

463 Wildlife Disease Ecology
Spring of even years. 3(3-0) Interdepartmental with Large Animal Clinical Sciences. Administered by Fisheries and Wildlife. P: FW 423 or approval of department RB: Additional course work in ecology, zoology, microbiology and environmental sciences.
Role of wildlife disease in ecological interactions. Factors underlying pathogen emergence. Disease modeling. Conservation medicine.

466 Natural Resource Policy
Spring. 3(3-0) Interdepartmental with Forestry and Park, Recreation and Tourism Resources and Resource Development. Administered by Forestry. R: Not open to freshmen or sophomores.
Natural resources policy-making in the context of scientific, environmental, social, and legal-institutional factors. Historical evolution of policies and case studies of contemporary policy issues.

469 Biomonitoring of Streams and Rivers
Summer of even years. 3(2-3) Interdepartmental with Entomology. Administered by Entomology. P: BS 110
Practical field and lab rapid bioassessment methodologies used to sample and assess the biota of streams and rivers. Sampling and identification of fish, macroinvertebrates and other biota.

470 Fisheries Techniques
Spring. 3(2-3) P: ZOL 355 or concurrently
Theory, field, and laboratory techniques for studies of freshwater fishes. Field trips required.

471 Ichthyology
Spring. 4(3-3) Interdepartmental with Zoology. Administered by Fisheries and Wildlife. P: {(BS 162 and BS 172) or (BS 182H and BS 192H) or LB 144} and Completion of Tier I Writing Requirement
Fish morphology and physiology. Development, behavior, evolution, and ecology. World fishes with emphasis on freshwater fishes. Field trips required.

472 Limnology
Spring. 3(3-0) Interdepartmental with Zoology. Administered by Fisheries and Wildlife. P: (CEM 141 or LB 171) and ZOL 355
Ecology of lakes with emphasis on interacting physical, chemical, and biological factors affecting their structure and function.

474 Limnological Techniques
Fall. 3(2-3) Interdepartmental with Zoology. Administered by Fisheries and Wildlife. P: (FW 414 or concurrently) or (FW 420 or concurrently) or (FW 417 or concurrently) or (FW 416 or concurrently) or FW 472 or FW 479
Field and laboratory techniques for the investigation and analysis of lake and stream ecosystems and their biota. Field trips required.

475 Aquaculture
Spring. 3(3-0) Interdepartmental with Animal Science. Administered by Fisheries and Wildlife. RB: ANS 313 or ZOL 355
Propagation and rearing of aquatic organisms used for food, bait and recreational fisheries management. Culture principles and techniques for important aquatic species. Commercial potential.

477 Pest Management I: Pesticides in Management Systems
Fall of even years. 3(3-0) Interdepartmental with Crop and Soil Sciences and Entomology and Horticulture. Administered by Entomology. RB: (CEM 143 or CEM 251) and (PLP 405 and CSS 402) and (ENT 404 or ENT 470) R: Open to juniors or seniors or graduate students.
Chemistry, modes of action, and environmental fate of pesticides. Product development and regulation. Social aspects of pesticide use.

478 Pest Management II: Biological Components of Management Systems (W)
Spring of even years. 3(2-3) Interdepartmental with Crop and Soil Sciences and Entomology and Forestry and Horticulture. Administered by Entomology. P: (ENT 404 or ENT 470 or PLP 405 or CSS 402) and completion of Tier I writing requirement
Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

479 Fisheries Management
Spring. 3(2-2) P: ZOL 355
Quantitative analysis of fish populations. Case study of ecological interactions linking fish to aquatic ecosystems and the challenge of balancing multiple human values in managing fisheries resources. Field trips required.

480 International Studies in Fisheries and Wildlife
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: ZOL 355 R: Approval of department; application required.
Fisheries and wildlife ecology and management study in regions beyond the United States. Ecological, economic, social, and cultural influences on fisheries and wildlife resources.

481 Global Issues in Fisheries and Wildlife
Spring. 3(3-0) Interdepartmental with James Madison College. Administered by Fisheries and Wildlife. P: EC 201 or EC 202 R: Open to juniors or seniors or graduate students.
Global issues and their impacts on implications for the management of fisheries and wildlife resources.

485 Environmental Science Senior Seminar
Spring. 1(2-0) P: ESA 435 or concurrently R: Open to seniors.
Ecological principles, population growth, resource utilization and lifestyle choices.

489 Seminar in Zoo and Aquarium Science
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. Interdepartmental with Landscape Architecture and Park, Recreation and Tourism Resources and Zoology. Administered by Zoology. R: Approval of department.
Scientific writing and oral presentations related to zoo and aquarium studies.

490 Independent Study in Fisheries and Wildlife
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. RB: BS 162 R: Not open to sophomores or freshmen. Approval of department; application required.
Supervised individual research and study in fisheries and wildlife.

491 Special Topics in Fisheries and Wildlife
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Approval of department; application required.
Selected topics of current interest and importance in fisheries and wildlife.

493 Professional Internship in Fisheries and Wildlife
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, ESA 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PLP 493, and PRR 493. P: FW 101 and FW 101L R: Approval of department; application required.
Supervised professional experiences in agencies and businesses related to fisheries and wildlife professions.

498 Internship in Zoo and Aquarium Science
Fall, Spring, Summer. 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Landscape Architecture and Zoology. Administered by Zoology. R: Open to juniors or seniors. Approval of department.
Application of zoological experience in a zoo or aquarium setting outside the university.

499 Senior Thesis in Fisheries and Wildlife
Fall, Spring, Summer. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. R: Open to seniors in the Fisheries and Wildlife major. Approval of department.
Faculty-guided undergraduate research in Fisheries and Wildlife. Thesis required.

810 Human Dimensions Research in Fisheries and Wildlife
Spring of even years. 3(3-0)
Quantitative and qualitative methods of involving the public in fish and wildlife management. Human dimensions research and current case studies.

813 Democracy and Environment
Fall of odd years. 3(3-0) RB: Exposure to social science or legal approaches to the environment.
Relationship between democracy and environmental protection and management. Effects of democratic institutions on natural resource management.

821 Conservation Medicine
Fall of even years. 3(3-0) Interdepartmental with Large Animal Clinical Sciences. Administered by Fisheries and Wildlife. RB: Prior course work in vertebrate ecology, epidemiology and/or animal disease management. R: Open to graduate students or approval of department. SA: FW 823
Ecological and epidemiological principles of wildlife disease impacts and management. Critical review of selected case studies.

822 Aquatic Animal Medicine
Fall. 3(2-2) Interdepartmental with Pathobiology and Diagnostic Investigation and Veterinary Medicine. Administered by Fisheries and Wildlife. RB: (FW 423) or prior course work in animal ecology, microbiology, parasitology or pathology
Health management techniques and pathobiological processes relating to the etiology, diagnosis, and control of diseases affecting aquatic animal populations and communities.

824 Analysis of Wildlife Populations
Spring of even years. 3(2-3)
Statistical and ecological concepts, methods and computer techniques needed to analyze and interpret demographic data from fish and wildlife studies.

828 Conservation and Genetics
Fall of even years. 3(2-2) Interdepartmental with Plant Biology and Zoology. Administered by Fisheries and Wildlife. RB: ZOL 341 or CSS 350 or ANS 314
Population and evolutionary genetic principles applied to ecology, conservation, and management of fish and wildlife at the individual, population, and species level.

829 The Economics of Environmental Resources
Spring. 3(3-0) Interdepartmental with Community, Agriculture, Recreation and Resource Studies and Agricultural Economics and Economics and Forestry. Administered by Agricultural Economics.
Economic principles related to environmental conflicts and public policy alternatives. Applications to water quality, land use, fish and wildlife, conservation, development, and global environmental issues.

840 Landscape Ecology
Fall of even years. 3(2-2) RB: Knowledge or course work in the natural sciences, particularly ecological concepts, as well as exposure to GIS and data analysis.
Ecological patterns and processes. Spatial variation in landscapes at multiple scales as affected by natural causes and human activity. Landscape ecology in natural resource decision-making and management.

842 Population Genetics, Genealogy and Genomics
Fall. 3(3-0) Interdepartmental with Animal Science and Crop and Soil Sciences and Forestry and Genetics and Horticulture. Administered by Forestry. RB: Pre-calculus, basic genetics
Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.

845 Environmental Risk Perception and Decision-Making
Spring. 3(3-0) Interdepartmental with Criminal Justice and Environmental Science and Policy. Administered by Criminal Justice. R: Open to graduate students or approval of school.
Theoretical underpinnings of individual decision-making and risk perception processes. Case studies of the interplay of risk perception and decision-making in an environmental and or criminological context.

846 Corporate Environmental Crime and Risk
Spring. 3(3-0) Interdepartmental with Criminal Justice and Environmental Science and Policy. Administered by Criminal Justice. R: Open to graduate students or approval of school.
Theoretical accounts and multiple interventions relevant to corporate environmental crime and risk. Use of "Smart Regulation" principles to design interventions to match specific problems.

847 Global Risks, Conservation, and Criminology
Fall. 3(3-0) Interdepartmental with Criminal Justice and Environmental Science and Policy. Administered by Criminal Justice. R: Open to graduate students or approval of school.
Theories, actors, characteristics and legal instruments associated with risk, conservation, and criminology related to globalization. Current case studies in criminological conservation.

850 Applied Multivariate Statistical Methods
Spring of even years. 4(3-2) Interdepartmental with Statistics and Probability. Administered by Fisheries and Wildlife. RB: (STT 422 or concurrently) and MTH 314 SA: FOR 976
Application of multivariate methods to research problems. Hotelling's T-test, profile analysis, discriminant analysis, canonical correlation, principal components, principal coordinates, correspondence analysis, and cluster analysis.

852 Systems Modeling and Simulation
Fall of even years. 3(3-0) Interdepartmental with Biosystems Engineering and Forestry. Administered by Fisheries and Wildlife. RB: STT 422 or STT 442 or STT 464
General systems theory and concepts. Modeling and simulation methods. Applications of systems approach and techniques to natural resource management, and to ecological and agricultural research.

853 Applied Systems Modeling and Simulation for Natural Resource Management
Spring of odd years. 3(2-2) Interdepartmental with Biosystems Engineering and Forestry and Zoology. Administered by Fisheries and Wildlife. RB: (ZOL 851) or approval of department. R: Open to seniors or graduate students.
Mathematical models for evaluating resource management strategies. Stochastic and deterministic simulation for optimization. System control structures. Team modeling approach.

854 Adaptive Management of Natural Resource Systems
Fall of odd years. 3(2-2) RB: ZOL 355
Principles and practices of adaptive environmental assessment and management. Applications to ecosystem and natural resource management.

857 Theoretical Ecology
Spring of even years. 3(2-2) Interdepartmental with Plant Biology and Zoology. Administered by Fisheries and Wildlife. RB: One course in ecology and calculus. Programming experience helpful.
Theoretical ecology of animal behavior, population dynamics, and multispecies communities. Basic mathematical approaches and use of modeling software to perform mathematical functions and develop models.

858 Gender, Justice and Environmental Change : Issues and Concepts
Fall. 3(3-0) Interdepartmental with Anthropology and Forestry and Geography and Sociology. Administered by Fisheries and Wildlife. RB: Background in social science, environmental science, or natural resources.
Issues and concepts related to gender, ecology, and environmental studies. Key debates and theoretical approaches to addressing environmental issues from a gender and social justice perspective. Gender and environment issues and processes from a global perspective.

859 Gender, Justice, and Environmental Change: Methods and Application
Spring of even years. 3(3-0) Interdepartmental with Anthropology and Forestry and Geography and Resource Development and Sociology. Administered by Anthropology. RB: Background in social science, environmental science, or natural resources.
Methods and case studies related to gender, ecology, and environmental studies. Methodological and fieldwork issues from a feminist perspective in international and intercultural contexts. Qualitative and quantitative methods for integrating social and environmental data.

860 Wildlife Nutrition
Fall of even years. 3(2-2) R: Open to graduate students in the College of Agriculture and Natural Resources or in the College of Natural Science.
Nutritional ecology of wild species. Techniques for analyzing and improving nutritional qualities.

868 Water Policy and Management
Fall of odd years. 3(3-0) RB: Familiarity with biological and ecological science and environmental policy issues. SA: FW 468
Environmental policy issues associated with the use, management, and protection of water resources and aquatic ecosystems. Case studies in water science and management.

869 Community and Conservation
Fall of even years, Summer of even years. 3 credits. Interdepartmental with Resource Development and Sociology. Administered by Sociology. RB: Social Science methods, social science theory and environmental coursework.
Use of experiential, participatory, field-based mode of inquiry to develop understanding of social and cultural issues associated with conservation. Understanding of different social positions and perspectives.

877 Fish Population Dynamics
Fall of even years. 3(2-2) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Natural Science.
Quantitative analysis of fish populations. Evaluation, causes, and impacts of the rates of change in survival, growth, reproduction, and recruitment for fish populations and their yield.

879 Advanced Limnology
Spring of even years. 3(3-0) RB: FW 472 or ZOL 431
Theory and management of streams, rivers, lakes, reservoirs, and other deepwater habitats from ecosystem and landscape perspectives.

885 Leadership in Natural Resources and Environmental Management
Fall of even years. 3(3-0) Interdepartmental with Agricultural Economics and Forestry. Administered by Fisheries and Wildlife.
Theory and practice of leadership in natural resource and environmental management. Integration across disciplinary and jurisdictional divisions.

891 Advanced Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
In-depth study of advanced topics in fisheries and wildlife.

893 Seminar in Fisheries and Wildlife
Fall, Spring. 1(1-0) A student may earn a maximum of 15 credits in all enrollments for this course.
Study and research in advanced problems and current developments in fisheries and wildlife.

897 Ecosystem Ecology and Global Change
Spring of odd years. 4(4-0) Interdepartmental with Plant Biology and Zoology. Administered by Zoology.
Structure and function of natural ecosystems and their responses to global environmental change. Biogeochemical cycles, food webs, energy flow, nutrient cycling, and ecosystem management and restoration.

898 Master's Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to graduate students in the Fisheries and Wildlife major.
Master's degree Plan B research paper.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to graduate students in the Fisheries and Wildlife major.
Master's thesis research.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Fisheries and Wildlife.
Doctoral dissertation research.