ZOOLOGY ZOL

Department of Zoology
College of Natural Science

101 Preview of Zoology
Fall, Spring. 1(1-0) R: Open only to freshmen in the Zoology major.
Zoology as a discipline. Availability of diverse career options. Integration of human and technical skills in scientific problem solving.

111L Cell and Molecular Biology Laboratory
Fall, Spring, Summer. 2(1-3) Interdepartmental with Biological Science and Microbiology and Molecular Genetics and Plant Biology. Administered by Biological Science. P: BS111 or concurrently Not open to students with credit in LBS 159H.
Principles and applications of common techniques used in cell and molecular biology.

141 Introductory Human Genetics
Fall, Spring. 3(3-0) R: Not open to students in the Biochemistry and Molecular Biology major or Plant Biology major or Entomology major or Medical Technology major or Clinical Laboratory Sciences major or Physiology major or Zoology major or Microbiology and Molecular Genetics major or Biological Science-Interdepartmental major or Human Biology major. Not open to students in the corresponding Lyman Briggs School coordinate majors or to students in the Lyman Briggs School Biology field of concentration. Not open to students with credit in ZOL 341 or ZOL 344.
Inheritance of human traits. Impact of genetic technology on society. Ethical and legal issues. Risks and benefits of genetic technology.

303 Oceanography
Fall. 4(4-0) Interdepartmental with Geological Sciences. Administered by Zoology. P: (CEM 141 or CEM 142 or CEM 151 or CEM 152 or CEM 181H or CEM 182H or LB 171 or LB 172) and (PHY 183 or PHY 183B or PHY 193H or PHY 231 or PHY 231B or PHY 231C or LB 271)
Physical, chemical, biological, and geological aspects of oceanography: ocean circulation, waves, tides, air-sea interactions, chemical properties of ocean water, ocean productivity, shoreline processes, and sediments.

306 Invertebrate Biology
Fall. 4(3-3) P: BS 110 or LB 144 or BS 148H
Systematics, morphology, and natural history of invertebrate animals. Identification of live and preserved specimens. Recognition of selected groups.

310 Psychology and Biology of Human Sexuality
Spring of odd years. 3(3-0) Interdepartmental with Psychology. Administered by Psychology. P: (PSY 101 or concurrently) and ((BS 110 or concurrently) or (BS 111 or concurrently) or (LBS 144 or concurrently) or (LBS 145 or concurrently) or (LBS 148H or concurrently) or (LBS 149H or concurrently)) Not open to students with credit in FCE 445.
Sexual behavior from biological, psychological and neuroscience perspectives. Sexual differentiation of the body. Role of hormones in development and reproduction in humans and other animals. Human sexual orientation. Fertility and contraception. Sexual disorders. Sexually transmitted diseases.

313 Animal Behavior
Fall, Spring. 3(3-0) P: BS 110 or LBS 144 or LBS 148H R: Not open to freshmen. SA: ZOL 213
Development, physiological mediation, adaptive significance and evolution of behavior.

316 General Parasitology
Spring. 3(3-0) P: (LB 144 or LB 145 or BS 110 or BS 148H or BS 149H) or (BS 111 and BS 111L)
Identification, life history, host-parasite relationships, and epidemiology of protozoan, helminth, acanthocephalan, copepod, and arthropod parasites of animals and humans.

316L General Parasitology Laboratory
Spring. 1(0-2) P: ZOL 316 or concurrently R: Not open to freshmen.
Laboratory diagnosis of protozoans, helminths, acanthocephalans, copepods, and arthropods that infect humans and animals. Animal necropsy.

319 Introduction to Earth System Science
Fall. 3(3-0) Interdepartmental with Entomology and Geological Sciences and Plant Biology and Sociology. Administered by Entomology. RB: Completion of one course in biological or physical science.
Systems approach to Earth as an integration of geochemical, geophysical, biological and social components. Global dynamics at a variety of spatio-temporal scales. Sustainability of the Earth system.

320 Developmental Biology
Fall. 4(3-3) Interdepartmental with . Administered by Zoology. P: (BS 110 or LBS 144 or LBS 148H) and (BS 111 or LBS 145 or LBS 149H) SA: ZOL 220
Principles of development, emphasizing vertebrates. Illustrations from morphological and experimental investigations.

328 Comparative Anatomy and Biology of Vertebrates (W)
Spring. 4(3-3) P: (BS 110 or LB 144 or BS 148H) and completion of Tier I writing requirement SA: ZOL 228
Comparative morphology and natural history of vertebrates. Dissection of representatives of most vertebrate classes.

341 Fundamental Genetics
Fall, Spring, Summer. 4(4-0) Interdepartmental with Plant Biology. Administered by Zoology. P: BS 111 or LB 145 or BS 149H
Principles of heredity in animals, plants and microorganisms. Classical and molecular methods in the study of gene structure, transmission, expression and evolution.

343 Genetics Laboratory
Spring. 3(0-6) P: (ZOL 341 or concurrently) and completion of Tier I writing requirement
Experiments involving genetics of Drosophila and other eucaryotic organisms.

353 Marine Biology (W)
Fall. 4(4-0) P: (BS 110 or LB 144 or BS 148H) and completion of Tier I writing requirement
Analysis of marine and estuarine systems. Integration of biology, chemistry, and physics. Life histories of marine organisms. Biology of special marine habitats including rocky intertidal zones, upwellings, coral reefs and deep sea.

355 Ecology
Fall, Spring, Summer. 3(3-0) Interdepartmental with Plant Biology. Administered by Zoology. P: BS 110 or LB 144 or BS 148H SA: ZOL 250
Plant and animal ecology. Interrelationships of plants and animals with the environment. Principles of population, community, and ecosystem ecology. Application of ecological principles to global sustainability.

355L Ecology Laboratory (W)
Fall, Spring, Summer. 1(0-3) Interdepartmental with Plant Biology. Administered by Zoology. P: (ZOL 355 or concurrently) or completion of Tier I writing requirement
Population, community, and ecosystem ecology, utilizing plant and animal examples to demonstrate general field principles.

360 Biology of Birds
Fall. 4(3-3) P: BS 110 or LB 144 or BS 148H
Behavior, ecology, evolution, and systematics of birds; biodiversity. Laboratories emphasize diversity of form and function, life history patterns, and identification.

361 Michigan Birds
Summer. 4(3-3) P: BS 110 or LB 144 or BS 148H Not open to students with credit in ZOL 360.
Field study of avian diversity, ecology, and behavior using current systematics and habitat identification techniques.

365 Biology of Mammals
Spring. 4(3-3) P: BS 110 or LB 144 or BS 148H
Analysis of the behavior, ecology, evolution, and systematics of mammals. Laboratories emphasize diversity of form and function, life history patterns, and identification.

369 Introduction to Zoo and Aquarium Science
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife and Landscape Architecture and Veterinary Medicine. Administered by Zoology. P: BS 110 or LB 144 or BS 148H
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 Fisheries and Wildlife and Geography. Administered by Zoology. P: (ZOL 355)
Patterns of geographical distribution of animals and the ecological and historical processes leading to these patterns.

384 Biology of Amphibians and Reptiles (W)
Fall. 4(3-3) P: (BS 110 or LB 144 or LB 148H) and completion of Tier I writing requirement
The evolution, systematics, ecology, and behavior of amphibians and reptiles. Laboratory emphasizes diversity and identification of families and Great Lakes species. Field trips may be required.

400H Honors Work
Fall, Spring. 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.
Honors work on a topic in zoology.

402 Neurobiology
Fall, Spring. 3(3-0) P: (BS 110 or LB 144 or BS 148H) and (BS 111 or LB 145 or BS 149H) R: Not open to freshmen or sophomores.
Structure and function of nerve cells and nervous systems.

403 Integrative Neurobiology
Spring of odd years. 3(3-0) P: ZOL 402 or PSY 209 RB: Junior or Senior level
How the nervous system has evolved mechanisms to determine the location and significance of physical and social sensory information. Epigenetic factors that guide nervous system development.

404 Human Genetics
Spring. 3(3-0) P: (ZOL 341) and (BMB 401 or concurrently or BMB 461 or concurrently) and completion of Tier I writing requirement. SA: ZOL 344
Inheritance of human traits. Medical, molecular, physiological and forensic applications. Biochemical, clinical, and molecular genetics of human disease. Prenatal, pre-symptomatic, and clinical diagnosis. Ethical, legal and social considerations.

408 Histology
Fall. 4(3-3) P: BS 111 or LB 145 or BS 149H SA: ZOL 350
Structure of cells and their interactions to form tissues.

413 Laboratory in Behavioral Neuroscience (W)
Fall. 4(2-4) Interdepartmental with Psychology. Administered by Psychology. P: ((PSY 209 or ZOL 402) and completion of Tier I writing requirement) and ((PSY 295 or concurrently) or STT 201) SA: PSY 309
Theory and laboratory experience in the study of behavioral neuroscience. Relationship among hormones, brain, and behavior.

415 Ecological Aspects of Animal Behavior (W)
Spring. 3(3-0) P: (ZOL 313) and completion of Tier I writing requirement
Advanced topics in the ecology and evolution of animal behavior.

420 Stream Ecology
Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife. 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 Fisheries and Wildlife. 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.

424 Algal Biology
Fall of even years, Summer of odd years. 4(2-4) Interdepartmental with Plant Biology. Administered by Plant Biology. P: (BS 110 or LB 144 or BS 148H) and completion of Tier I writing requirement RB: ZOL 355 and ZOL 355L SA: BOT 424
Algal taxonomy, systematics, physiology, ecology, and environmental assessment. Lab focus on identification of freshwater algal genera collected from regional habitats.

425 Cells and Development (W)
Spring. 4(3-3) P: (BS 111 and BS 111L) or ((LBS 145 or LBS 149H) and completion of Tier I writing requirement) SA: ZOL 221
The role of cells in growth, differentiation and development of animals from protozoa to mammals.

426 Biogeochemistry
Summer. 3 credits. Interdepartmental with Crop and Soil Sciences and Geological Sciences and Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. RB: (BS 110 or LBS 144 or LBS 148H or BS 111 or LBS 145 or LBS 149H) and (CEM 143 or CEM 251) SA: MPH 426
Integration of the principles of ecology, microbiology, geochemistry, and environmental chemistry. Societal applications of research in aquatic and terrestrial habitats.

430 Neuroendocrine Aspects of Behavior
Spring of odd years. 3(3-0) P: ZOL 313 and ZOL 402 R: Open only to juniors or seniors in the Psychology or Zoology major. SA: ZOL 830
Neural mechanisms by which hormones influence the reproductive, parental, aggressive and social behavior of vertebrates. Plasticity.

433 Vertebrate Paleontology
Fall of even years. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. P: ZOL 328 or GLG 304
Fossil vertebrates with emphasis on evolution and interrelationships of major groups. Modern techniques of identification and interpretation of fossils.

434 Evolutionary Paleobiology
Fall. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. RB: BS 110 or GLG 304 or LB 144 or BS 148H
Patterns and processes of evolution known from the fossil record including speciation, phylogeny, extinction, heterochrony and biogeography.

440 Field Ecology and Evolution
Summer. 4 credits. Interdepartmental with Plant Biology. Administered by Zoology. P: ZOL 355
Solving conceptual and practical research problems in ecology and evolution under field conditions.

443 Restoration Ecology
Spring. 3(2-2) Interdepartmental with Biosystems Engineering and Fisheries and Wildlife. 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.

444 Conservation Biology
Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife. 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 Evolution (W)
Fall. 3(3-0) Interdepartmental with Plant Biology. Administered by Zoology. P: (ZOL 341) and completion of Tier I writing requirement R: Not open to freshmen. SA: ZOL 345
Processes of evolutionary change in animals, plants. Microbes. Population genetics, microevolution, speciation, adaptive radiation, macroevolution. Origin of Homo sapiens.

445L Evolution Laboratory
Spring. 1(0-3) P: ZOL 445 or concurrently
Computer, laboratory and field based studies of evolution, utilizing plant, animal and microbiological examples to demonstrate general evolutionary principles.

446 Environmental Issues and Public Policy
Fall, Spring. 3(3-0) Interdepartmental with Environmental Studies and Agriscience. Administered by Zoology. R: Not open to freshmen or sophomores.
Interrelationship of science and public policy in resolving environmental issues. Technical, social, economic, and legal influences. Case study approach.

448 Evolutionary Developmental Biology
Spring. 2(2-0) P: ZOL 445 RB: ZOL 320 or ZOL 425 or ZOL 341
Genetic and developmental basis for evolutionary change. Synthesis of molecular and developmental genetics with evolutionary biology.

450 Cancer Biology (W)
Spring. 3(3-0) P: (BMB 200 or BMB 401 or ZOL 425) or (BMB 461 and BMB 462) and completion of Tier I writing requirement.
Cancer biology: cellular and molecular aspects. Applications of modern biotechnology to cancer research. Causes, treatment, and prevention of cancer. World distribution and risk factors of cancer.

453 Field Studies in Marine and Estuarine Biology
Spring. 2 to 3 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Approval of department.
Marine and estuarine communities emphasizing ecology, life histories, behavior, identification, morphology, and resource ecology of the organisms present. Field trip to sea coast.

457 Foundations of Evolutionary Biology (W)
Spring. 3(3-0) P: (BS 110 or LB 144 or BS 148H) and completion of Tier I writing requirement
Reading and discussion of original works in evolutionary biology which have shaped modern evolutionary thought.

471 Ichthyology
Fall. 4(3-3) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (BS 110 or BS 148H 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 Fisheries and Wildlife. 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 Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (FW 414 or concurrently) or (FW 420 or concurrently) or FW 472
Field and laboratory techniques for the investigation and analysis of lake and stream ecosystems and their biota. Field trips required.

483 Environmental Physiology (W)
Spring. 4(4-0) Interdepartmental with Physiology. Administered by Zoology. P: ((BS 110 or LB 144 or BS 148H) and completion of Tier I writing requirement) and (BS 111 or LB 145 or BS 149H) and (CEM 141 or CEM 151 or CEM 181H or LB 171)
Aspects of physiology important to the environmental relations of vertebrates and invertebrates: energetics, thermal relations, osmotic-ionic relations, and exercise physiology.

485 Tropical Biology
Spring. 3(3-0) Interdepartmental with Entomology and Plant Biology. Administered by Zoology. P: ZOL 355 R: Open only to juniors or seniors.
Tropical biota emphasizing evolutionary and ecological principles compared across tropical ecosystems.

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 Fisheries and Wildlife and Landscape Architecture and Park, Recreation and Tourism Resources. Administered by Zoology. R: Approval of department.
Scientific writing and oral presentations related to zoo and aquarium studies.

490 Overseas Study in Zoology
Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: BS 110 and BS 111 R: Open only to juniors or seniors or graduate students. Approval of department.
Topical problems course in Zoology or coordinated by Zoology faculty in foreign countries.

494 Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.
Supervised research on a topic not normally covered in the classroom.

495 Undergraduate Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to senior Zoology majors.
Economic, social and environmental impact of current developments in Zoology.

496 Internship in Zoology
Fall, Spring, Summer. 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open to seniors. Approval of department.
Practical experience applying zoology training in a setting outside the University.

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 Fisheries and Wildlife and Landscape Architecture. 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 Undergraduate Thesis (W)
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: Completion of Tier I writing requirement. R: Open to seniors. Approval of department.
Laboratory research culminating in the preparation and defense of an undergraduate thesis.

801 Professional Development
Fall. 1(2-0) R: Open only to graduate students in the Department of Zoology.
Ethical conduct in research. Selecting research topics and approaches. Scientific writing, grantsmanship, and publication. Career paths inside and outside academia.

804 Molecular and Developmental Neurobiology
Fall. 3(3-0) Interdepartmental with Neuroscience and Pathobiology and Diagnostic Investigation and Pharmacology and Toxicology and Psychology. Administered by Neuroscience. RB: Bachelor's degree in a Biological Science or Psychology. R: Open to graduate students in Neuroscience major.
Nervous system specific gene transcription and translation. Maturation, degeneration, plasticity, and repair in the nervous system.

805 Animal Welfare Assessment
Fall, Spring. 3(3-0) Interdepartmental with Animal Science. Administered by Animal Science. RB: (ANS 305 or ZOL 313) or background in animal science or zoology including exposure to topics such as animal behavior, physiology, management, and husbandry
Multidisciplinary online computer-based instruction in animal welfare science and related issues including physiology, behavior, human-animal interactions, suffering and pain, ethics, health, assessment and standards, and economics.

814 Environmental Chemodynamics
Spring of even years. 4(4-0) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Human Medicine or College of Natural Science or College of Osteopathic Medicine or College of Veterinary Medicine. SA: FW 814
Chemical and environmental factors controlling the distribution of organic and inorganic chemicals in air, water, and soil. Environmental monitoring.

822 Topics in Ethology and Behavioral Ecology
Spring of odd years. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: ZOL 415 R: Open only to graduate students.
Critical analysis through seminar-discussions of the primary research literature.

824 Stable Isotope Biogeochemistry
Spring of even years. 2(1-2) Interdepartmental with Geological Sciences. Administered by Zoology. RB: CEM 142 or CEM 152 or CEM 182H or LB 171
Principles of stable isotope chemistry applied to biogeochemical problems: climate change, ecology, contaminants, oceanography, limnology, and paleobiology.

825 Molecular and Biochemical Bases of Human Disease
Spring. 3(3-0) Interdepartmental with Genetics. Administered by Zoology. RB: (ZOL 341) or equivalent general genetics course.
Medical genetics. Molecular, biochemical, and diagnostic issues related to human disease. Disease pathophysiology. Ethical, legal, and social issues related to human genetics research.

826 Tropical Biology: An Ecological Approach
Spring, Summer. 8 credits. Interdepartmental with Plant Biology. Administered by Plant Biology. R: Approval of department; application required. SA: BOT 826
Principles of tropical ecology at the population, community, and ecosystem levels. Given at various sites in Costa Rica by the Organization for Tropical Studies.

827 Physiology and Pharmacology of Excitable Cells
Fall. 4(4-0) Interdepartmental with Neuroscience and Pharmacology and Toxicology and Physiology. Administered by Pharmacology and Toxicology. RB: PSL 431 or PSL 432 or BMB 401 or BMB 461 or ZOL 402
Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.

828 Conservation and Genetics
Fall of even years. 3(2-2) Interdepartmental with Fisheries and Wildlife and Plant Biology. 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.

831 Quantitative Paleobiology
Spring of odd years. 3(2-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. RB: GLG 431
Analysis of paleobiological problems using quantitative techniques such as cladistics, morphometrics, ordination, and stereology.

839 Systems Neuroscience
Spring. 4(4-0) Interdepartmental with Human Anatomy and Neuroscience and Pharmacology and Toxicology and Physiology and Psychology. Administered by Neuroscience. R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Agriculture and Natural Resources, Natural Science, Social Science, and Veterinary Medicine. SA: ANT 839
Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.

848 Current Topics in Evolutionary Development Biology
Spring. 3(3-0) RB: (ZOL 445 or ZOL 320 or ZOL 425 or ZOL 341) or background in evolutionary biology or developmental biology.
Genetic and developmental basis for evolutionary change. Synthesis of molecular and developmental genetics with evolutionary biology. Discussion of primary literature in evolutionary development.

849 Evolutionary Biology
Spring. 3(3-0) Interdepartmental with Plant Biology. Administered by Plant Biology. RB: ZOL 341 and (STT 422 or concurrently) SA: BOT 849
Major conceptual, theoretical and empirical questions in evolutionary biology. Readings and lectures are synthesized in student discussions and papers.

851 Quantitative Methods in Ecology and Evolution
Fall. 3(3-0) Interdepartmental with Plant Biology. Administered by Zoology. RB: STT 465
Interpretation and analysis of ecological and evolutionary biology data. Statistical computer software.

853 Applied Systems Modeling and Simulation for Natural Resource Management
Spring of odd years. 3(2-2) Interdepartmental with Biosystems Engineering and Forestry and Fisheries and Wildlife and Resource Development. Administered by Fisheries and Wildlife. RB: (FW 820 or BE 486 or ZOL 851) or or approval of department. R: Open only to seniors and graduate students
Mathematical models for evaluating resource management strategies. Stochastic and deterministic simulation for optimization. System control structures. Team modelling approach.

855 Molecular Evolution: Principles and Techniques
Fall of odd years. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics and Plant Biology. Administered by Zoology. RB: ZOL 341 or ZOL 445
Current techniques used to characterize and compare genes and genomes. Genetic variation, assays of variation. Data analysis and computer use to conduct a phylogenetic analysis to compare organisms and infer relationships.

857 Theoretical Ecology
Spring of even years. 3(2-2) Interdepartmental with Fisheries and Wildlife and Plant Biology. 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.

867 Nature and Practice of Cognitive Science
Spring. 3(3-0) Interdepartmental with Computer Science and Engineering and Linguistics and Philosophy and Psychology. Administered by Zoology. RB: Undergraduate course work in behavioral biology, cognitive psychology, philosophy, linguistics, or artificial intelligence.
Survey of how different disciplines explore the cognitive processes underlying intelligent behavior.

868 Aquatic Toxicology
Spring of odd years. 4(3-2) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Human Medicine or College of Natural Science or College of Osteopathic Medicine or College of Veterinary Medicine. SA: FW 831
Techniques for assessing acute and chronic effects of toxicants on biochemical, physiological, organismal, population, community, and ecosystem levels of organization.

890 Special Problems
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Approval of department.
Current problems in Zoology.

891 Current Topics in Ecology and Evolution
Summer. 1 to 2 credits. A student may earn a maximum of 10 credits in all enrollments for this course. Interdepartmental with Crop and Soil Sciences and Plant Biology. Administered by Zoology.
Presentation and critical evaluation of theoretical and empirical developments in ecology and evolutionary biology by visiting scientists.

895 Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 6 credits in all enrollments for this course.
Graduate seminar on current research topics in Zoology.

896 Population and Community Ecology
Fall. 4(4-0) Interdepartmental with Plant Biology. Administered by Zoology.
Population dynamics of animals and plants utilizing life tables and projection matrices. Species interaction. Life history theory. Structure and dynamics of communities. Succession.

897 Ecosystem Ecology
Spring. 4(4-0) Interdepartmental with Fisheries and Wildlife and Plant Biology. Administered by Zoology.
Structure and function of natural ecosystems. Succession, food web analysis, energy flow, nutrient cycling, and effects of human activities on ecosystems. Global environmental change. Ecosystem management and restoration.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 36 credits in all enrollments for this course.
Master's thesis research.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 120 credits in all enrollments for this course.
Doctoral dissertation researc