Descriptions — Women’s Studies Program of Courses

409. Independent Study in Women’s Studies
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 8 credits. Juniors, approval of Women’s Studies Program. Interdepartmental with the colleges of Arts and Letters and Social Science. Individual reading and research on women and gender.

Winter. 3(3-0) Juniors or approval of department. Interdepartmental with and administered by the Department of Religious Studies. Writing and thought of contemporary Jewish and Christian feminist theologians; views on scripture, God-language, patriarchy, ministry, spirituality, ethics. Scriptural reinterpretations; overview of women’s role and place in world religions.

ZOLOGY

College of Human Medicine College of Natural Science

203. Resource Ecology (IDC 200.) Fall, Winter, Spring, Summer. 3(3-0) Interdepartmental with the departments of Fisheries and Wildlife, Forestry, Geography, and Resource Development. Administered by the Department of Fisheries and Wildlife. Basic concepts of ecology which are the unifying basis for resource management, conservation policy and the analysis of environmental quality. Extensive use of guest lecturers.

211. General Biology
Fall, Winter, Summer. 4(4-2) CEM 140 or high school chemistry. Not open to students with credit in LBS 242. Interdepartmental with the Biological Science Program and the Department of Botany and Plant Pathology. Administered by Biological Science Program. Principles of biological regulation and integration: genetics, development, and selected physiological topics.

212. General Biology
Winter, Spring, Summer. 4(4-2) Not open to students with credit in CEM 140. Interdepartmental with the Biological Science Program and the Department of Botany and Plant Pathology. Administered by Biological Science Program. Principles of biological diversity; taxonomy and systematics, comparative physiology, and ecology.

301. Nature and Homo Sapiens (N)
Spring. 4(4-0) Two terms of Natural Science; not open to zoology majors. A case study approach which explores the interaction of technical, social, economic and legal influences on the management of contemporary environmental issues in Michigan.

302. Vertebrate Life of the Past
Fall. 3(3-0) One course in physical or biological science or juniors. Interdepartmental with and administered by Geology. Fossil vertebrates from fish to humans.

304. Biology, Behavior and Humans
Spring. 3(3-0) Juniors; not open to zoology majors. Examines philosophical and biological issues which make the study of animal behavior relevant to humans. Emphasizes history of animal behavior, current theories, and experiments relating biological and environmental determinants of adaptive and non-adaptive behavior patterns.

306. Invertebrate Biology
Spring. 4(3-3) B S 213. Systematics, morphology, and natural history of invertebrate animals. Laboratory includes identification of live and preserved animals and recognition of morphological characteristics of selected groups.

307. Vertebrate Biology
Fall, Summer. Given at W. K. Kellogg Biological Station Summer term. Fall: 4(3-3) Summer: 4 credits. B S 212. Systematics, morphology and natural history of vertebrate animals. Laboratory includes identification of live and preserved animals and recognition of morphological characteristics of selected group.

313. Animal Behavior
Spring, Summer. Given at W. K. Kellogg Biological Station Summer term of odd-numbered years. Spring, Summer. 4(4-0) Summer of odd-numbered years: 4 credits. B S 211. Description of the known behavior of the various vertebrate and invertebrate phyla with emphasis upon adaptive significance. Thus, special attention will be given to mating, defensive, and nutritive behavior. The genetics and ontogeny of behavioral patterns will be presented where known. Behavior will be related to the ecology of various animal populations.

317. Principles of Development
Fall, Spring, Summer. 5(3-0) B S 211. Development of animals, especially vertebrates. Principles are illustrated by modern experimental studies of developmental problems.

318. Principles of Development Laboratory
Fall, Spring, 2(0-6) ZOL 317 or concurrently; B S 213. Principles of development illustrated by analysis of the ontogeny of selected organisms.

337. The Fossil Record of Organic Evolution
Spring. 3(3-0) One course in a natural science; Juniors. Interdepartmental with and administered by Geology. The direct evidence for organic evolution in the fossil record. Evolution of life from prebiological systems to humans. Impact of fossil discoveries on human thought.

341. Human Heredity
Fall, Winter. 4(4-0) Sophomores. Not open to zoology majors. Students may not receive credit in more than one of the following: ZOL 341, ZOL 441.

359. Animal Ecology
Winter, Summer. Given at W. K. Kellogg Biological Station Summer term. Winter. 4(3-4) Summer. 4 credits. B S 212 or concurrently.

400H. Honors Work
Fall, Winter, Spring. 1 to 5 credits. May reenroll for a maximum of 15 credits. Juniors; approval of department.

401. Comparative Physiology I
Fall. 4(4-0) PSL 240 or B S 212; CEM 131 or CEM 141. Interdepartmental with and administered by the Department of Physiology. A comparison of osmoregulation, digestion, respiration, and other physiological processes in a wide range of organisms.

402. Neurophysiology
Winter. 4(4-0) PSL 401 or BCH 401. Interdepartmental with the Department of Physiology. A comparison of sensory, motor, and other integrative mechanisms in animals.

409. Cellular Aspects of Development
Winter. 5(2-6) B S 210, B S 221. The role of cells in the growth, differentiation and morphogenesis of animals ranging from prototaxa to mammals.

412. Natural History of Selected Invertebrates
Summer. Given at W. K. Kellogg Biological Station. 4 credits. B S 212 or approval of department. Systematics and ecology of selected invertebrate phyla with emphasis on the local fauna. Extensive field and laboratory work with living animals.

414. Biological Mechanisms of Animal Behavior
Winter. 3(3-0) or 5(3-6) ZOL 313 recommended. Consideration of neurological and hormonal mechanisms controlling behavior. Emphasis will be upon mammalian systems, and will deal with the assumptions which underlie current concepts in the biology of behavior.

415. Ecological Aspects of Animal Behavior
Fall. 4(4-0) ZOL 313.

Consideration of orientation, navigation and homing behavior, food preferences, habitat selection, exploration, behavioral periodicity, communication, social organization and the embryology of behavior in both vertebrates and invertebrates.
416. General Parasitology  
Fall. Summer of odd-numbered years. Given at W. K. Kellogg Biological Station Summer of odd-numbered years. Fall: 3(3-0) SM 210, 4 credits. Interdepartmental with and administered by the Department of Microbiology and Public Health.

417. General Parasitology Laboratory (MPH 417)  
Fall. Summer of odd-numbered years. Given at W. K. Kellogg Biological Station Summer of odd-numbered years. Fall: 2(0-4) SM 211, 3 credits. B S 211, B S 212 or LBS 141. Interdepartmental with and administered by the Department of Microbiology and Public Health.

418. General Parasitology  
Fall. Summer of odd-numbered years. Given at W. K. Kellogg Biological Station Summer of odd-numbered years. Fall: 2(0-4) SM 210, 3 credits. Interdepartmental with and administered by the Department of Microbiology and Public Health.

421. Hormones and Development  
Winter. 4(4-0) ZOL 317. Interdepartmental with the Department of Physiology.

425. Morphology of the Chordates  
(314.) Winter. 5(3-6) S 521. Comparative and functional morphology of chordates. Laboratory includes dissection of representatives of most vertebrate classes.

430. Vertebrate Paleontology  
Winter. 4(3-0) ZOL 428, or approval of department. Interdepartmental with and administered by Geology.

431. Comparative Physical-Chemical Limnology  
Summer. Given at W. K. Kellogg Biological Station. 4 credits. One general chemistry course, one college level biology course. Interdepartmental with the Department of Botany and Plant Pathology.

432. Comparative Biological Limnology  
Summer. Given at W. K. Kellogg Biological Station. 4 credits. ZOL 431. Interdepartmental with the Department of Botany and Plant Pathology.

437A. Vertebrate Paleontology I  
(GLG 437.) Spring of even-numbered years. 4(2-4) GLG 437 or ZOL 306 or approval of department. Cannot receive credit in both GLG 437 and GLG 437A. Interdepartmental with and administered by Geology.

437B. Vertebrate Paleontology II  
Spring of odd-numbered years. 4(2-4) GLG 338 or ZOL 306 or approval of department. Cannot receive credit in both GLG 437 and GLG 437B. Interdepartmental with and administered by Geology.

438. Evolutionary Paleocology  
Winter. 4(3-4) GLG 338 or ZOL 389 or approval of department. Interdepartmental with and administered by Geology.

441. Fundamental Genetics  
Fall. Spring. 3(0-6) B S 211. Students may not receive credit in more than one of the following: ZOL 341, ZOL 441. Survey of principles of heredity in animals, plants, and microorganisms. Serves as single college level biology course with emphasis on field identification and natural history.

442. Advanced Genetics  
Winter. 3(0-6) ZOL 441 or approval of instructor. Classical and molecular examination of eight to ten advanced topics and recent discoveries in genetics.

443. Developmental Genetics  
Winter. 4(4-0) ZOL 441 and ZOL 317. Mechanisms of gene action. Role of genes in the embryology, morphology, and physiology of organisms.

445. Evolution  
Fall. 4(4-0) B S 211. Processes of evolutionary change including the origin of species and homo sapiens, fossils and the geological record, and applications in genetic engineering, agriculture, and medicine.

450. Comparative Histology  
Fall. 4(3-3) B S 212. The comparative structure of cells of selected vertebrate and invertebrate organisms and their interactions to form tissues.

453. Marine Ecology and Physiology  

454. Field Studies in Marine and Estuarine Biology  
Fall. 2 or 3 credits. May be reenrolled for a maximum of 5 credits. Approval of instructor.

456. Foundations of Developmental Biology  
Winter of even-numbered years. 3(3-0) ZOL 317, ZOL 457 recommended. Interdepartmental with the Department of Natural Science. Reading and discussion of original research which posed significant problems of modern developmental biology.

460. Ornithology for Teachers  
Summer. 3 credits. A course in biology or approval of department. Not open to Zoology majors. Given at W. K. Kellogg Biological Station. Interdepartmental with Biological Science. Introduction to birds including identification and natural history.

461. Ornithology  
Spring. Summer of even-numbered years. Given at W. K. Kellogg Biological Station Summer of even-numbered years. Spring: 5(3-4) ZOL 307 or ZOL 428. Principles of the evolution, behavior and ecology of birds. Laboratory studies of classification, morphology, field identification and natural history of local species. Field trips required.

471. Ichthyology  
Spring. 4(3-3) F W 301 or ZOL 307 or ZOL 428. Interdepartmental with and administered by the Department of Fisheries and Wildlife. Classification and natural history of fishes. Emphasis on food, game, and forage fishes.

476. Limnology  
Winter. 3(3-0) CEM 141B, CEM 161; BOT 450 or ZOL 389. Students may not receive credit for both F W 376 and F W 476. Interdepartmental with and administered by the Department of Fisheries and Wildlife. Ecology of lakes and streams with special reference to physical, chemical and biological factors affecting their productivity.

477. Limnological Methods  
Winter. 3(0-9) F W 476 concurrently; ENT 301, ENT 302 recommended. Interdepartmental with and administered by the Department of Fisheries and Wildlife. Methods and instruments of limnological field investigation on lakes and streams.

478. Stream Ecology  
Fall. 3(3-0) ENT 420, ZOL 389 or BOT 450 or F W 362 or approval of department. Interdepartmental with the departments of Entomology, and Fisheries and Wildlife. Administered by the Department of Fisheries and Wildlife. Biological, chemical, physical, and geological processes which determine the structure and function of stream ecosystems.

482. Biology of the Protozoa  
Winter. 3(3-0) or 5(3-6) B S 212. Structures and functions of animal-like, eukaryotic microorganisms.
Advertisements — Zoology of Courses

483. Environmental Physiology Winter. 4(3-2) B S 212. Interdepartmental with the Department of Physiology. Aspects of physiology that bear particularly on the interrelationships between animals and their environments.

484. Herpetology Spring. Summer of even-numbered years. Given at W. K. Kellogg Biological Station. Summer of even-numbered years. Spring. 3(5-6) Summer of even-numbered years: 5 credits. ZOL 307 or ZOL 428. Systematics and natural history of amphibians and reptiles with laboratory emphasis on Michigan species. Field trips required.

486. Mammalogy Fall. 4(3-6) ZOL 307 or ZOL 428. Classification distribution, natural history of mammals, with emphasis on Michigan species. Field studies, preparation of study specimens.

487. Experimental Field Ecology Spring. 4(2-6) Given at W. K. Kellogg Biological Station. ZOL 389, BOT 430. Experimental study of population dynamics, species interactions, community structure, and ecosystem function. All day Saturday field trips to the Kellogg Biological Station in addition to weekday lectures on campus.

489. Animal Distribution Fall. 3(3-0) ZOL 306 or ZOL 307. Principles and patterns of animal distribution. Emphasis on major faunal regions, centers of origins, and concepts relating to the distribution of modern vertebrates.

492. Cytochemistry Spring. 4(3-1) B S 212. General principles of microscopy, microtomy, fixation, embedding and sectioning of animal tissue, study of various cellular organelles and the localization of lipids, carbohydrates, proteins, nucleic acids and various hydrolytic enzymes in the cells.

495. Undergraduate Seminar Fall, Winter, Spring. 1(1-0) May reenroll for a maximum of 3 credits. Juniors, and approval of department. Reading and discussion of articles relating to economic, social, and environmental impact of new discoveries in biological sciences.


499. Undergraduate Thesis Fall, Winter, Spring. Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Juniors, written approval of instructor. Laboratory research culminating in the preparation and defense of an undergraduate thesis.

804A. Neuroscience Laboratory I Winter and Spring. 4(2-4) ZOL 817 and approval of instructor. Interdepartmental with the departments of Physiology and Psychology. Administered by the Department of Psychology. Development of skills in the methods, techniques and instrumentation necessary for research in a variety of areas concerned with neuroscience.

804B. Neuroscience Laboratory II Spring. 4(2-4) FSY 804A. Interdepartmental with the departments of Physiology and Psychology. Administered by the Department of Psychology. Continuation of ZOL 804A.

811. Advanced Cell Physiology (PSL 801.) Fall, Spring. 8(6-0) PSL 431, PSL 432 or PSL 401, PSL 402, BCH 453 or concurrently, or approval of department. Calculus rec. recommended. Interdepartmental with and administered by the Department of Physiology. Concepts in advanced cellular physiology, including bioenergetics, transport, regulation of metabolic reactions, and specialized cell functions including nervous, muscle, secretory, epithelial and lymphocyte.

817. Ecology of Zooplankton Summer. Odd-numbered years. 4 credits. Approval of department. Given at W. K. Kellogg Biological Station. Biology, distribution, and abundance of planktonic animals with special emphasis on life tables, filtering rates, food selection, production dynamics, fish predation, niche relationships and species diversity.

820. Behavior of Animal Populations Spring. 4(1-0) ZOL 313, written approval of department. Behavior on the ecological level. Characteristics of populations rather than individuals will be stressed. Evolution will be considered on the population level.

822. Topics in Ethology and Behavioral Ecology Spring. 3(3-0) ZOL 313 or approval of instructor. Current topics in ethology and behavioral ecology.

826. Tropical Biology: An Ecological Approach Winter, Summer. 12 credits. Approval of department and acceptance by Organization of Tropical Studies. Interdepartmental with and administered by the Department of Botany and Plant Pathology. 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. Neurobiology Fall. 4(4-0) Approval of department. Interdepartmental with the departments of Physiology and Psychology and Toxicology. Neural structure and function at cellular and intercellular levels. Membrane and synaptic potentials, receptor transduction, and intracellular transport with an introduction to comparative and evolutionary aspects.

830. Advanced Vertebrate Zoology Winter. 4(4-0) May reenroll for a maximum of 12 credits. ZOL 307, two years of undergraduate zoology, approval of department. Advanced vertebrate biology including systematic, ecology, distribution, morphology.

836. Evolutionary Paleobiology Fall, Spring. 3(3-0) ZOL 313 or approval of department. Interdepartmental with and administered by Geology. Selected topics in paleobiology, such as macroevolution, the importance of size and shape, the nature of development, morphometrics, phylogenetic systematics, paleoecology, or biogeography.

837. Advanced Invertebrate Paleontology Fall. Spring. 3(3-0) May reenroll for a maximum of 12 credits. GLG 338 or ZOL 306 or approval of department. Interdepartmental with and administered by Geology. Particular invertebrate phyla which are important in the fossil record including their functional morphology, systematics, taphonomy and evolutionary history.

839. Population Ecology Summer. Given at W. K. Kellogg Biological Station. 4 credits. Approval of department. Interdepartmental with the Department of Botany and Plant Pathology. A field and laboratory approach to the study of adaptations. Selected topics will deal with population growth, competition, predation, mutation, community structure and species abundance.

840. Patterns of Diversity in Fossil Groups Fall, Spring. 3(3-0) May reenroll for a maximum of 12 credits. GLG 338 or ZOL 453 or approval of department. Interdepartmental with and administered by Geology. Selected topics in the diversity of fossil organisms, for example, adaptive radiations, mass extinctions, patterns of clad replacement, biotic interactions and the dynamics of diversity.

843. Ecosystem Analysis, Design and Management Spring. 3(3-0) SYS 442. Interdepartmental with and administered by Systems Science. Groups of students from various biological and nonbiological disciplines will synthesize and analyze models of selected biological systems. Project should yield information relevant to solution of contemporary ecological problems.

844. Problems in Human Genetics Spring. 3(3-0) ZOL 441 or approval of department. Methods used in the study of human genetics and their application to medical, physiological and social problems. Laboratory consists of field trips and independent study selected by the student in consultation with the instructor.

845. Ecology and Evolution: the Interface Fall. 4(4-0) ZOL 445; ZOL 389 or BOT 450 or GLG 438. Conceptual and methodological issues common to both ecology and evolutionary biology.

846. Advanced Topics in Evolution Winter. 4(4-0) May reenroll for a maximum of 12 credits if different topics are taken. ZOL 445 or approval of instructor. Mechanistic and theoretical aspects of the evolutionary process. Topical will be drawn from the current literature and will deal with one of the following areas: microevolution, macroevolution, and speciation.
859. Analysis of Hormone Action
Spring, 4(4-0) ZOL 317 or approval of department. Interdepartmental with the Department of Physiology.
Discussion of recent work on the molecular and developmental aspects of hormone action in vertebrates and invertebrates. Selected topics to vary from year to year.

862. Animal Behavioral Ecology
Fall of even-numbered years, 4(4-0) ZOL 313, ZOL 389, ZOL 461.
Theory of habitat selection. Optimal foraging theory dealing with breadth of diet, patch utilization and sampling theory. Coloniality, cooperation and optimal group size, and refuging systems as they apply to avian populations.

871. Ecology of Fishes
Summer of even-numbered years, 4 credits. Approval of department. Given at W. K. Kellogg Biological Station. Interdepartmental with the Department of Fisheries and Wildlife.
Exploration of ecological problems with particular emphasis on growth, food and habitat selection, population biology and niche relations. Field and experimental investigations of fish communities.

881. Biology of the Arthropoda
Winter, 8(3-8) ZOL 308 or approval of department. Interdepartmental with the Department of Entomology.
Ecology, life cycles, morphology, taxonomy, and distribution of arthropoda other than insects.

882. Cellular Morphogenesis
Winter, 2(2-0) One course in biochemistry, approval of department. Selected topics on the structure, biological processes and differentiation of living cells.

885. Vertebrate Neural Systems I
Winter of odd-numbered years, 3(2-2) ANT 839 or approval of department. Interdepartmental with the departments of Anatomy, Physiology, and Psychology. Administered by the Department of Anatomy.
Structure and function of major component systems of vertebrate brains, their evolution, ontogeny, and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical and physiological studies.

886. Vertebrate Neural Systems II
Spring of odd-numbered years, 3(2-2) ANT 885. Interdepartmental with the departments of Anatomy, Physiology, and Psychology. Administered by the Department of Anatomy.
Continuation of ANT 885. Major component systems of vertebrate brains, their evolution, ontogeny, and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical, and physiological studies.

892. Dynamics of Biologic Populations
Winter, 3(4-3) One statistics course, 1 ecology course or approval of department.
Growth, regulation, competition, predator-prey, life history strategies and spatial dynamics of animal populations.

893. Fertilization and Early Embryogenesis
Fall of odd-numbered years, 3(3-0) Developmental biology, biochemistry, approval of department.
Developmental biology of early stages of animal life, emphasis on physiology and biochemistry of marine invertebrate eggs.

895. Seminar Topics
Fall, Winter, Spring. 1 credit per term. May reenroll for a maximum of 6 credits. Approval of department.
Graduate-level seminars on current research topics in biology.

896. Animal Community Ecology
Winter of even-numbered years, 4(4-0) ZOL 892, approval of instructor.
Patterns and processes in animal communities with emphasis on structure, species diversity and stability.

897. Ecosystem Ecology
Fall of even-numbered years, 4(4-0) ZOL 389 or BOT 450. Interdepartmental with the Department of Fisheries and Wildlife.
Concepts of ecosystem structure, energy flow, and nutrient cycling in representative terrestrial and aquatic ecosystems.

899. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
Research for the master's degree in genetics, morphology, mammalogy, wildlife management, ornithology, fisheries biology, limnology, quantitative biology, invertebrate, experimental embryology, animal behavior, herpetology.

999. Doctoral Dissertation Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
Research for the Ph.D. degree in genetics, morphology, mammalogy, wildlife management, ornithology, fisheries biology, limnology, quantitative biology, invertebrate, experimental embryology, animal behavior, herpetology.