

Descriptions—Women's Studies of Courses

404. Women and the Law in the United States

Fall of odd years. Spring of odd years. 3(3-0) P: (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.

405. Feminist Analyses of Education in the United States

Fall of odd years. 3(3-0) Interdepartmental with Teacher Education. P: (WS 201 Or WS 202 Or WS 203) R: Not open to freshmen or sophomores.

Feminist perspectives on the role of gender in structuring educational experiences in elementary and secondary school.

413. Families in Historical Perspective

Fall. 3(3-0) Interdepartmental with History. Administered by History. R: Not open to freshmen. Family forms and socio-economic change in Europe and the United States. Gender, childhood, courtship, sexual relations, marriage, divorce, childbearing, and old age in peasant, industrial, and postindustrial society. War, welfare state, and the family. The marginalized: vagrants, foundlings, immigrants, and single mothers.

420. History of Sexuality since the 18th Century

Fall, Spring. 3(3-0) Interdepartmental with History. Administered by History. R: Not open to freshmen

Changing gender roles, sex in the Victorian era, prostitution, pornography, birth control, emergence of homo- and heterosexuality, sex under fascism, the sexual revolution, contemporary conflicts.

425. Women and Criminal Justice

Spring of even years. 3(3-0) Interdepartmental with Criminal Justice. Administered by Criminal Justice. P: (CJ 220 Or WS 201) R: Open only to juniors or seniors.

Theories on women's victimization and criminality. Women's experiences as victims, offenders, and criminal justice employees. Laws and their effects on the rights of women in the criminal justice system.

453. Women and Work: Issues and Policy Analysis

Spring. 3(3-0) Interdepartmental with Public Resource Management; and Economics. Administered by Public Resource Management. P: EC 201 or EC 202 or PRM 201 or concurrently. R: Not open to freshmen and sophomores.

Current and past quantity and quality of women's participation in the labor force. Gender differentials in earnings, and occupations. Employment discrimination. Laws, especially affirmative action laws. Social policy effects. International issues.

482. Theory and Practice of Feminist Literary Criticism

Spring. 3(3-0) Interdepartmental with English. Administered by English. P: (ENG 353 or ENG 379 or WS 202) and completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of English or Women's Studies Program or English disciplinary minor.

Feminist literary critical theory and its implications for reading and studying literature.

490. Independent Study

Fall, Spring. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: (WS 201 or WS 202 or WS 203) R: Open only to juniors or seniors; approval of program.

Individual reading and research on women and gender.

491. Special Topics

Fall, Spring. 3 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: (WS 201 Or WS 202 Or WS 203) R: Not open to freshmen or sophomores.

In-depth study of special topic emphasizing women and gender.

492. Women's Studies Senior Seminar (W)

Spring. 4(4-0) P: (WS 201 and WS 203) and completion of Tier I writing requirement. R: Not open to freshmen or sophomores.

Synthesis and elaboration of ideas and perspectives central to women's studies. Current areas of interest and research in feminist scholarship.

493. Internship

Fall, Spring, Summer. 2 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. P: (WS 201 or WS 202 or WS 203) R: Not open to freshmen or sophomores. Approval of program.

Integration of feminist knowledge through work experience related to women's concerns. Experience in legislative, community, or educational settings.

890. Individual Reading

Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of program.

Faculty supervised graduate level reading in special topics.

ZOOLOGY

ZOL

Department of Zoology College of Natural Science

111L. Cell and Molecular Biology Laboratory

Fall, Spring, Summer. 2(1-3) Interdepartmental with Biological Science; Microbiology; and Botany and Plant Pathology. Administered by Biological Science. P: BS 111 or concurrently

Principles and applications of common techniques used in cell and molecular biology.

141. Introductory Human Genetics

Spring. 3(3-0) R: Not open to students in the Biochemistry or Botany and Plant Pathology or Entomology or Medical Technology or Clinical Laboratory Sciences or Physiology or Zoology or Microbiology or Biological Science-Interdepartmental major or 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.

306. Invertebrate Biology

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

309. Laboratory in Behavioral Neuroscience

Fall. 4(2-4) Interdepartmental with Psychology. Administered by Psychology. P: (PSY 209 or ZOL 402) and (PSY 295 or concurrently or STT 201)

Theory and laboratory experience in the study of behavioral neuroscience. Focus on relationship among hormones, brain, and behavior.

313. Animal Behavior

Fall, Spring. 3(3-0) P: (BS 110 or LBS 144 or LBS 148H) R: Not open to freshmen.

Development, physiological mediation, adaptive significance and evolution of behavior. SA: ZOL 213

316. General Parasitology

Spring. 3(3-0) P: (BS 110 or LBS 144 or LBS 148H)

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 freshman

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; Botany and Plant Pathology; Geological Sciences; and Sociology. Administered by Entomology. P: 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) P: (BS 110 or LBS 144 or LBS 148H) and (BS 111 or LBS 145 or LBS 149H)

Principles of development, emphasizing vertebrates. Illustrations from morphological and experimental investigations. SA: ZOL 220

328. Comparative Anatomy and Biology of Vertebrates

Spring. 4(3-3) P: (BS 110 or LBS 144 or LBS 148H) and completion of Tier I writing requirement.

Comparative morphology and natural history of vertebrates. Dissection of representatives of most vertebrate classes. SA: ZOL 228

341. Fundamental Genetics

Fall, Spring, Summer. 4(4-0) Interdepartmental with Botany and Plant Pathology. P: (BS 111 or LBS 145 or LBS 149H)

Principles of heredity in animals, plants and microorganisms. Classical and molecular methods in the study of gene structure, transmission, expression and evolution.

342. Advanced Genetics

Spring. 3(3-0) P: (ZOL 341) and completion of Tier I writing requirement.
Advanced topics in classical and molecular genetics including various forms of genetic mapping.

343. Genetics Laboratory

Spring. 2(0-4) P: (ZOL 341 or concurrently) and completion of Tier I writing requirement.
Experiments involving genetics of *Drosophila* and other eucaryotic organisms.

344. Human Genetics

Spring. 3(3-0) P: (ZOL 341) R: Not open to freshmen.

Inheritance of human traits. Medical, physiological and forensic applications. Biochemical and molecular genetics of human disease. Chromosomal disorders and their consequences. Prenatal and pre-symptomatic diagnosis. Legal and ethnical considerations.

353. Marine Biology

Fall. 4(4-0) P: (BS 110 or LBS 144 or LBS 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, Summer. 3(3-0) Interdepartmental with Botany and Plant Pathology. P: (BS 110 or LBS 144 or LBS 148H)

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.

SA: ZOL 250

355L. Ecology Laboratory

Fall, Summer. 1(0-3) Interdepartmental with Botany and Plant Pathology. P: (ZOL 355 or concurrently or BOT 355 or concurrently) and 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

Spring. 4(3-3) P: (BS 110 or LBS 144 or LBS 148H)

The behavior, ecology, evolution, and systematics of birds with emphasis on biodiversity. Laboratories emphasize diversity of form and function, life history patterns, and identification.

361. Michigan Birds

Summer. 4(3-3) Summer: Given only at W.K. Kellogg Biological Station. P: (BS 110 or LBS 144 or LBS 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

Fall. 4(3-3) P: (BS 110 or LBS 144 or LBS 148H)

Analysis of the behavior, ecology, evolution, and systematics of mammals. Laboratories emphasize diversity of form and function, life history patterns, and identification. Field trips required.

366. Biology of Great Lakes Mammals

Summer. 4(3-3) Summer: Given only at W.K. Kellogg Biological Station. P: (BS 110 or LBS 144 or LBS 148H)

Diversity, ecology, and behavior of mammals. Laboratory and field studies emphasizing systematics, life-history and field techniques.

369. Introduction to Zoo and Aquarium Science

Spring. 3(3-0) Interdepartmental with Landscape Architecture; Fisheries and Wildlife; and Veterinary Medicine. P: (BS 110 or LBS 144 or LBS 148H)

Fundamentals of zoo and aquarium operations including research, interpretation, design, nutrition, captive breeding, conservation, ethics and management.

384. Biology of Amphibians and Reptiles

Fall of odd years. 4(3-3) P: (BS 110 or LBS 144 or LBS 148H)

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 the department.

Honors work on a topic in zoology.

402. Neurobiology

Fall. 3(3-0) P: (BS 110 or LBS 144 or LBS 148H) and (BS 111 or LBS 145 or LBS 149H) R: Not open to freshmen or sophomores.

Structure and function of nerve cells and nervous systems.

408. Histology

Fall. 4(3-3) P: (BS 111 or LBS 145 or LBS 149H)

Structure of cells and their interactions to form tissues.

SA: ZOL 350

415. Ecological Aspects of Animal Behavior

Spring. 3(3-0) P: (ZOL 313) and completion of Tier I writing requirement.

Advanced topics in the ecology and evolution of animal behavior.

417. Advanced Developmental Biology

Spring. 3(3-0) P: (ZOL 350 or ZOL 408) R: Not open to freshmen or sophomores.

Multidisciplinary approaches to major current concepts. Historic perspectives, analyses from molecular to organismal level, and practical applications.

SA: ZOL 417H

419. Advanced Earth System Science

Spring. 3(2-2) Interdepartmental with Entomology; Botany and Plant Pathology; Geological Sciences; and Sociology. Administered by Entomology. P: ENT 319

Systems science theory applied to analysis of the biological, geological, physical, and social causes and consequences of global changes. Issues of sustaining the Earth system.

420. Stream Ecology

Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (BS 110) (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)

Biology, ecology and systematics of aquatic insects in streams, rivers and lakes. Field trips and aquatic insect collection required.

SA: ENT 420

425. Cells and Development

Spring. 4(3-3) P: (BS 111 and BS 111L) or (LBS 145) or (LBS 149H) and completion of Tier I writing requirement.

The role of cells in growth, differentiation and development of animals from protozoa to mammals.

SA: ZOL 221

426. Biogeochemistry

Summer. 3 credits. Given only at W.K. Kellogg Biological Station. Interdepartmental with Microbiology; Crop and Soil Sciences; and Geological Sciences. Administered by Microbiology. P: (BS 110 Or LBS 144 Or LBS 148H Or BS 111 Or LBS 145 Or LBS 149H) And (CEM 143 Or CEM 251)

Integration of the principles of ecology, microbiology, geochemistry, and environmental chemistry. Societal applications of research in aquatic and terrestrial habitats.

427. Protozoology

Spring. 3(3-0) P: (BS 110 or LBS 144 or LBS 148H) and (BS 111 or LBS 145 or LBS 149H)

Structure and function of animal-like, eukaryotic microorganisms. Evolutionary relationships with other protists and higher organisms. Their interaction with other organisms and use in applied areas of biology.

431. Comparative Limnology

Summer. 4(2-6) Given only at W.K. Kellogg Biological Station. Interdepartmental with Botany and Plant Pathology; and Fisheries and Wildlife. P: (CEM 141 or CEM 151) and (ZOL 355) Not open to students with credit in FW 472.

Physical, chemical, and biological aspects of lakes and streams. Introduction to freshwater biology, and population and community ecology.

433. Vertebrate Paleontology

Fall of even years. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. P: (ZOL 328)

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. P: (BS 110 Or GLG 202 Or LBS 144 Or LBS 148H)

Patterns and processes of evolution known from the fossil record including speciation, phylogeny, extinction, heterochrony and biogeography.

SA: ZOL 434

Descriptions—Zoology of Courses

440. Field Ecology and Evolution

Summer. 4 credits. Given only at W.K. Kellogg Biological Station. Interdepartmental with Botany and Plant Pathology. 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 Fisheries and Wildlife; and Biosystems Engineering. Administered by Fisheries and Wildlife. P: (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

Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (BS 110) 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

Fall. 3(3-0) Interdepartmental with Botany and Plant Pathology. P: (ZOL 341) and completion of Tier I writing requirement. R: Not open to freshmen.

Processes of evolutionary change in animals, plants. Microbes. Population genetics, microevolution, speciation, adaptive radiation, macroevolution. Origin of Homo sapiens. SA: ZOL 345

446. Environmental Issues and Public Policy

Spring. 3(3-0) Interdepartmental with Resource Development. R: Not open to freshmen or sophomores.

The interrelationship of science and public policy in resolving environmental issues. Technical, social, economic, and legal influences. Case study approach.

450. Cancer Biology

Spring. 3(3-0) P: (BCH 200 or BCH 401 or ZOL 425) or (BCH 461 and BCH 462)

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

Spring. 3(3-0) P: (BS 110 or LBS 144 or LBS 148H) and completion of Tier I writing requirement.

Reading and discussion of original works in evolutionary biology which have shaped modern evolutionary thought.

460. The Biology of Molluscs

Spring. 3(3-0) P: (ZOL 306) or approval of department.

Biology, economic importance, and role of molluscs in biological research.

471. Ichthyology

Fall. 4(3-3) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (BS 110) and completion of Tier I writing requirement.

Fish morphology, physiology. Development, behavior, evolution and ecology. World fishes with emphasis on freshwater fishes.

472. Limnology

Fall. 3(3-0) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (CEM 141 and ZOL 355) Not open to students with credit in BOT 431 or FW 431 or ZOL 431.

Ecology of lakes with emphasis on interacting physical, chemical, and biological factors affecting their structure and function.

474. Limnological and Fisheries Techniques

Fall. 3(1-6) Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife. P: (FW 472 or concurrently)

Field and laboratory investigations of physical, chemical, and biological parameters of lakes and streams. Field trips required.

482. Cytochemistry

Spring. 4(3-3) P: (BS 111) and completion of Tier I writing requirement.

Principles of microscopy, microtomy. Cells and organelles. Localization of lipids, carbohydrates, proteins, nucleic acids and enzymes using cytochemical, immunological and autoradiographic methods.

483. Environmental Physiology

Spring. 4(4-0) Interdepartmental with Physiology. P: (BS 110 or LBS 144 or LBS 148H) and (BS 111 or LBS 145 or LBS 149H) and (CEM 141 or CEM 151 or CEM 181H or LBS 165) and completion of Tier I writing requirement.

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 Botany and Plant Pathology; and Entomology. 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 Park, Recreation and Tourism Resources; Fisheries and Wildlife; and Landscape Architecture. 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.

491. Seminar in Marine Biology

Fall, Spring. 1(1-0) RB: (ZOL 355 Or ZOL 353 Or GLG 303) R: Open only to seniors in the Department of Zoology.

Reading and discussion of articles relating to current developments in marine biology and the economic, social and environmental impact of these discoveries.

494. Independent Study

Fall. 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. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only 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. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Fisheries and Wildlife; and Landscape Architecture. R: Open only to juniors or seniors. Approval of department.

Experience in applying zoological experience in a zoo or aquarium setting outside the university.

499. Undergraduate Thesis

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 only to seniors. Approval of department.

Laboratory research culminating in the preparation and defense of an undergraduate thesis.

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.

Chemical and environmental factors controlling the distribution of organic and inorganic chemicals in air, water, and soil. Environmental monitoring.

SA: FW 814

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. P: ZOL 415. R: Open only to graduate students.

Critical analysis through seminar-discussions of the primary research literature.

826. Tropical Biology: An Ecological Approach

Spring, Summer. 8 credits. Interdepartmental with Botany and Plant Pathology. Administered by Botany and Plant Pathology. R: Approval of department; application required.

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. Advanced Neurobiology

Fall. 4(4-0) Interdepartmental with Pharmacology and Toxicology; and Physiology. Administered by Pharmacology and Toxicology.

Nervous system function at the cellular level: membrane biophysics and potentials, synaptic transmission.

830. Neuroendocrine Aspects of Behavior

Spring of even years. 3(3-0) P: ZOL 402.

Neural mechanisms by which hormones influence the reproductive, parental, and aggressive behavior of vertebrates. Plasticity.

831. Quantitative Paleobiology

Spring of even years. 3(2-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. P: GLG 431 or ZOL 345.

Analysis of paleobiological problems using quantitative techniques such as cladistics, morphometrics, ordination, and stereology.

841. Chromosome Structure and Genetics

Spring of even years. 3(3-0) Interdepartmental with Genetics. R: Approval of department.

Classical and molecular genetics of chromosome structure and behavior in mitosis and meiosis. Synapsis and disjunction, exchange, centromeres, euchromatin, heterochromatin and transposable elements.

842. Application of Ecological Principles

Spring. 2 credits. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Botany and Plant Pathology. Administered by Botany and Plant Pathology.

Workshops and discussions with experts from industry, regulatory agencies, conservation groups, and academe on application of basic ecology and evolutionary biology to real-world problems.

849. Evolutionary Biology

Spring. 3(3-0) Interdepartmental with Botany and Plant Pathology. Administered by Botany and Plant Pathology. P: ZOL 341, STT 422 or concurrently.

Major conceptual, theoretical and empirical questions in evolutionary biology. Readings and lectures are synthesized in student discussions and on paper.

851. Quantitative Methods in Ecology and Evolution

Fall. 3(3-0) Interdepartmental with Botany and Plant Pathology. 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 Fisheries and Wildlife; Biosystems Engineering; Forestry; and Resource Development. Administered by Fisheries and Wildlife. P: FW 820 or BE 486 or ZOL 851 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 Botany and Plant Pathology; and Microbiology. RB: (ZOL 341 Or ZOL 445)

Current techniques used to characterize and compare genes and genomes. Types of genetic variation, assays of variation. Emphasis on data analysis, and computer use to conduct a phylogenetic analysis to compare organisms and infer relationships.

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.

Techniques for assessing acute and chronic effects of toxicants on biochemical, physiological, organismal, population, community, and ecosystem levels of organization.

SA: FW 831

878. Dynamics of Trace Contaminants in Aquatic Systems

Spring of even years. 3(3-0) 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.

Chemical and environmental parameters controlling movement and disposition of trace contaminants in aquatic environments. Fate models.

SA: FW 878

888. Molecular and Cellular Aspects of Development

Spring. 4(4-0) R: Approval of department.

Current research topics in developmental biology. Cell interactions. Molecular regulation of cellular function in fertilization, morphogenesis, differentiation, oncogenesis, terato-genesis and regeneration.

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 credit. Given only at W.K. Kellogg Biological Station. A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Botany and Plant Pathology; and Crop and Soil Sciences.

Presentation and critical evaluation of theoretical and empirical developments by visiting scientists.

892. Biodiversity

Spring. 2(2-0) A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Fisheries and Wildlife. P: ZOL 250.

Status of world biota and factors in the decline and extinction of major groups of plants and animals. Theory and design of natural reserves. Assessment and ecological meaning of diversity. Management for global and local diversity.

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 Botany and Plant Pathology.

Population dynamics of animals and plants utilizing life tables and projection matrices. Species interaction. Life history theory. Structure and dynamics of communities. Succession.

897. Community and Ecosystem Ecology

Spring. 4(4-0) Interdepartmental with Botany and Plant Pathology; and Fisheries and Wildlife.

Structure and function of natural communities and ecosystems. Community analysis along environmental gradients. Succession, food web analysis, energy flow, nutrient cycling, and effects of human activities on ecosystems.

899. Master's Thesis Research

Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course.

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.