Wildlife Biology Program (BS)

Wildlife biology is a continuously expanding field, in which individuals will have the opportunity to study the dynamics of animal and plant communities of terrestrial and aquatic environments. The program provides students with a rigorous curriculum designed to prepare them for a career in this exciting area of biology. Students in this program will be exposed to wildlife management methods, field techniques and theoretical studies of wildlife species, populations and communities. Wildlife biologists will ultimately be responsible for the study and management of animal and plant populations within state, national and possibly international borders. Wildlife biologists may also be responsible for the study and management of non-game, endangered species or game animals and plants. This program is intended to prepare students for entry-level positions with state and federal agencies and private companies, and for the pursuit of higher academic degrees. The Program in Wildlife Biology is designed to produce well-rounded students; thus, we require our students to enroll in disciplines such as mathematics and statistics, chemistry, physics, communications, social sciences, and humanities. By using specifically identified coursework areas and mentoring, we will aid students in developing their intellectual capabilities in working with natural resources and people within that discipline.

Requirements.

A. All requirements of the Bachelor of Science degree of the College of Arts and Sciences (CAS), including General Education requirements.

B. At least 40 credits in Biology, including BIO 111; BIO 113; BIO 301; BIO 326; BIO 327; BIO 328; BIO 423; BIO 427; BIO 480

C. Two writing courses from: BIO 421, BIO 453, BIO 456, BIO 460 or BIO 477; one must be a capstone course (BIO 453 or BIO 477).

D. Additional courses from wildlife biology electives: BIO 373, BIO 421, BIO 446, BIO 453, BIO 455, BIO 456, BIO 460, BIO 483, BIO 484, BIO 487, BIO 491.

E. Non-biological natural sciences: CHM 260; CHM 261; CHM 262; CHM 263 *or* CHM 265; CHM 220 *or* CHM 330; GEO 203; MTH 120; PHY 143 *or* PHY 243*;* RPL 370. For advanced science degrees, it is recommended that students take CHM 330 and CHM 332 instead of CHM 220, and take PHY 145 *or* PHY 245 in addition to PHY 143.

F. Electives to complete a **minimum of 124 credits**.

G. A cumulative grade point average of 2.0 or better in biology and in all work completed at the University of Michigan-Flint.

H. Grades of C- or better in all biology core courses used as prerequisites.

Example Curricular Plan for the Wildlife Biology Program (BS)

Semester					**Credit hrs.**
Fall	BIO 111 (4) *N* Organismal Bio.	UNV 100 (3) First-Year Experience.	ENG 111 (3) College Rhetoric	MTH 090 OR MTH 111 (3) College Algebra	13
Winter	BIO 113 (4) Principles of Bio.	ENG 112 (3) English Comp.	MTH 120 (4) *FQ* Pre-calculus	General Ed (3) *H* Humanities	14
Spring	PHY 143 (4) College Physics I				4
Summer					
Fall	BIO 301 (4) Biostatistics	CHM 260 & 261 (4) Inorganic Chem. I	GEO 203 (3) *T* Spatial Analysis	General Ed. (3) *F* Fine Arts	14
Winter	BIO 327 (4) Ecology	CHM 262 & 263 (4) Inorganic Chem. II	General Ed (3) *S* Social Science	General Ed. (3) *GS* Global Studies	14
Spring	BIO 480 (5) Field Biology				5
Summer					
Fall	BIO 423 (4) Wildlife Ecology & Management	BIO Elective (4)	RPL 370 (4) Geo Info Systems	BIO 326 (4) Cell Biology	16
Winter	BIO Elective (4)	BIO 328 (4) Genetics	CHM 330 (3) Organic Chemistry	General Ed. (3) *HW* Health and Well Being	14
Spring	BIO elective (4)				4
Summer					
Fall	BIO 453 (4) *CAP* Evolution & Adaptation	BIO elective (4)	BIO 427 (4) Forest Vegetation ID		12
Winter	General Ed (3) *H* Humanities	General Ed (3) *S* Social Science	BIO elective (4)	BIO elective (4)	14
				Total credit hrs.	**124**

Wildlife Biology Core Courses (37 credit hours):

111. Organismal Biology. *(4)n.* Introduction to basic principles of biology relating to biodiversity. Survey of microorganisms, fungi, plants and animals, including aspects of classification, development, structure (anatomy) and function (physiology). Lecture and laboratory emphasizing guided discovery and critical thinking.

113. Principles of Biology. *CHM 140 or equivalent. (4).* Introduction to basic principles of biology relating to cell structure and function, cell reproduction and mechanisms underlying patterns of inheritance, ecology and evolution. Lecture and laboratory emphasizing guided discovery and critical thinking.

301. Biostatistics. *Strong preparation in high school or college algebra and eight credits of biology. (4).* Analysis of quantitative data from biological sources, using basic statistical procedures to elucidate biological phenomena. Mathematical derivations and probabilistic theory not stressed; emphasis on the selection and interpretation of statistical tests commonly used by biologists. Prior knowledge of statistics not necessary. Lecture and discussion. *Also listed as PHS 302.*

326. Cell Biology. *BIO 111, 113; CHM 140 or its equivalent; or consent of instructor. (4)n.* Biological systems from molecular to gross cell structure: such concepts as energy conversion, organization, growth, homeostasis, and cellular interactions. Examples from both animal and plant kingdoms. Lecture and laboratory.

327. Ecology. *BIO 111, 113; or consent of instructor. (4)n.* Study of the ecological interactions that determine the distribution and abundance of organisms. Includes evolutionary principles, abiotic and biotic limiting factors, population growth and regulation, community structure and change, and energy flow and nutrient cycling. Lecture and laboratory.

328. Genetics. *BIO 111, 113; CHM 140 or its equivalent; or consent of instructor. (4).* Principles of inheritance from molecular through population levels. Gene action, cytoplasmic inheritance, parthenogenesis, mutation, and homeostasis. Lecture and discussion.

423. Wildlife Ecology and Management. *BIO 111, 113, 327. (4).* Application of basic ecological knowledge to populations of animals and their plant and animal associates. Dynamics of animal and plant populations and communities; management of animal populations (including introduced, game, non-game and endangered species) and ecosystems that support these populations; the need to balance the welfare of managed populations with the needs of people. Lecture and discussion.

427. Forest Vegetation Identification. *BIO 327; or consent of instructor. (4).* Focus on identification of trees, shrubs, and community composition, as well as important ecological components for the major forest types found in Michigan. Students meet for field-based labs at parks and recreation areas throughout Genesee, Lapeer, and Oakland counties. Includes a required weekend (Friday-Sunday) trip to explore forest types throughout Michigan.

480. Field Biology. *BIO 111, 113, 327; consent of instructor. (5).* Studies of individuals, populations and communities of the Great Lakes area with emphasis on field identification of vascular plants, amphibians, reptiles and birds. Organismal adaptations, habitat preferences, behavior, life history and biotic interactions; introduction to the biology/ecology of amphibians and reptiles. Classes consist of day-long field trips, one evening field experience and a term-ending weeklong field excursion to Michigan's upper peninsula.

Two Writing Courses (One must be a capstone) (3-4 credit hours) from:

421. Mammalogy. *BIO 111, 113, 327; or consent of instructor. (4).* Study of the major groups of mammals; natural history, physiology, anatomy, and systematics of all living orders; North American mammals classified to family. Students are responsible for species identification from field and skull characters of most Michigan mammals. Lecture and laboratory. Laboratories in the field encompassing techniques commonly used in mammalogy; required trip to Detroit Zoo.

453. Evolution and Adaptation. *BIO 111, 113, 327, 328; or consent of instructor. (4) CAP.* Fundamentals of plant and animal evolution. Includes genetics of populations, selection models, geographic variation, adaptation, population structure, mating systems, species concepts, and molecular evolution. Emphasis on evolutionary mechanisms in populations. *Lecture, laboratory, and some Saturday field trips.*

456. Herpetology. *BIO 111, BIO 113, BIO 327 with a grades of C- (1.7) or better. (4).* Aspects of taxonomy, evolution, morphology, anatomy, physiology, ecology, behavior and conservation for amphibians and reptiles; identification of families and selected species.

460. Conservation Biology. *BIO 111, 113, 327. (4).* Examination of the principles underlying attempts to conserve biodiversity. Conservation values and ethics, global biodiversity, species conservation, community level conservation, and management and design of reserves. Lecture.

477. Biology Senior Seminar. *Biology major, senior standing; or consent of instructor. (3) CAP.* Critical analysis of current biological research. Students learn to communicate biological concepts to other scientists and to the public using written (papers and posters) and oral (presentation) formats.

Wildlife Biology Elective Courses from:

373. Biogeography. *GEO 150; BIO 111, BIO 113; or consent of instructor. (3).* Geographic distribution of plants and animals, past and present, as influenced by geological, biological, geographical, human, and other factors. Mass extinctions, geographic diffusion, major biomes, human evolution, environmental issues, biogeographical mapping techniques. *Also listed as GEO 372 and INT 372.*

421. Mammalogy. *BIO 111, 113, 327; or consent of instructor. (4).* Study of the major groups of mammals; natural history, physiology, anatomy, and systematics of all living orders; North American mammals classified to family. Students are responsible for species identification from field and skull characters of most Michigan mammals. Lecture and laboratory. Laboratories in the field encompassing techniques commonly used in mammalogy; required trip to Detroit Zoo.

446. Animal Behavior. *BIO 327 with grade of C- (1.7) or better; or consent of instructor. (4).* Animal behavior studies through the use of comparative and ethological methods. Discussion of species-specific behaviors, ontogeny of behavior, motivation, perceptual processes, learning, social behavior, communication, and evolution. *Lecture and laboratory.*

453. Evolution and Adaptation. *BIO 111, 113, 327, 328; or consent of instructor. (4) CAP.* Fundamentals of plant and animal evolution. Includes genetics of populations, selection models, geographic variation, adaptation, population structure, mating systems, species concepts, and molecular evolution. Emphasis on evolutionary mechanisms in populations. *Lecture, laboratory, and some Saturday field trips.*

455. Biology, Ecology and Management of Fishes. *BIO 111, 113, and 327 or equivalent. (4).* Introduction to ichthyology covering, behavior, ecology, evolution, and physiology of fishes. A presentation of how ecology and management concepts are used by fishery managers to meet a variety of objectives, including the sustainable management of fisheries. Laboratory activities will involve identification of the fishes of Michigan and a survey of fishes of the world; identifications will be based on observation of external features and the use of dichotomous keys. Additionally, laboratory activities will include familiarizing students with basic analytic and modeling techniques required to manage fish populations. Field trips to local freshwater habitats will demonstrate collection techniques and field identification of fishes. *Lecture, laboratory, and some Saturday field trips.*

456. Herpetology. *BIO 111, BIO 113, BIO 327 with a grades of C- (1.7) or better. (4).* Aspects of taxonomy, evolution, morphology, anatomy, physiology, ecology, behavior and conservation for amphibians and reptiles; identification of families and selected species.

460. Conservation Biology. *BIO 111, BIO 113, BIO 327. (4).* Examination of the principles underlying attempts to conserve biodiversity. Conservation values and ethics, global biodiversity, species conservation, community level conservation, and management and design of reserves. *Lecture, laboratory, and some Saturday field trips.*

483. Special Topics. *Consent of instructor. (1-4).* In-depth examination of selected topics of special interest to biologists. Course content, format and prerequisites vary with the topic presented. Lecture.

484. Biology of Birds. *BIO 111, 113, and 327 or equivalent, and consent of instructor. (5).* Introduction to ornithology with emphasis on field identification of the birds of southern Michigan. Field trips to a variety of habitats in the region. Laboratory study of morphology; additional identification using 35 mm slides and recorded bird songs. Lectures and readings on aspects of the anatomy, physiology, evolution, ecology and behavior of birds.

487. Forest Ecology. *BIO 327; BIO 427 recommended. (4).* Exploration of the role environmental factors (sun, soil, water, etc.) and wildlife and humans have on the establishment, growth and development of forest communities. Forest structure, ecosystem function. Field-based.

491. Independent Study. *Consent of instructor. (1-4).* Individual work for qualified students involving search of original sources in the literature, preparation of abstracts, and examination of material. Problems may involve special techniques, field problems, and morphological or physiological studies. *May be reelected to a maximum of 4 credits. Graded ABCDE/Y.*

Cognate Course Titles:

CHM 220 Fundamentals of Organic Chemistry (3)

CHM 260 Principles of Chemistry I (3)

CHM 261 General Chemistry Laboratory (1)

CHM 262 Principles of Chemistry II (3)

CHM 263 Intro Quantitative Analysis Lab (1)

CHM 265 Intro Quantitative Analysis Lab-Honors (1)

CHM 330 Organic Chemistry I (3)

CHM 332 Organic Chemistry II (3)

GEO 203 Introduction to Spatial Analysis (3)

MTH 120 Pre-Calculus Mathematics (4)

PHY 143 College Physics I (4)

PHY 145 College Physics II (4)

PHY 243 Principles of Physics I (5)

PHY 245 Principles of Physics II (5)

RPL 370 Geographic Information Systems I (4)