BIOLOGY

Department of Biological Sciences

Werner Wieland, *Chair*
Stephen W. Fuller, *Career Advisor, Allied Health Sciences*
Lynn O. Lewis, *Career Advisor, Pre Veterinary*
Kathryn E. Loesser-Casey, *Career Advisor, Pre Medical/Dental*
Deborah, O'Dell, *Career Advisor, Pre Physical Therapy/Occupational Therapy*
Alan Griffith, *Career Advisor, Biology*

Faculty

Professors
Rosemary Barra
Stephen W. Fuller
Stephen G. Gallik
Joella C. Killian
Lynn O. Lewis
Werner Wieland

Associate Professors
Kathryn E. Loesser-Casey
Deborah A. O'Dell

Assistant Professors
Andrew Dolby
Alan B. Griffith
David C. Jarrell

Lecturer
Michael D. Killian

The Biology Program

Biology encompasses the study of all living things and their interaction with the environment. The Department faculty is dedicated to providing students with a strong undergraduate education in the fundamental principles of biology, while encouraging and offering opportunities for students to pursue specialized areas of interest.

The biology major prepares students for future careers in basic life sciences research, teaching, medicine, dentistry, and allied health professions. Many graduates pursue advanced degrees in specialized areas such as biochemistry, physiology, immunology, entomology, microbiology, ecology, and environmental engineering. The biology curriculum is designed to ensure that majors have a balanced background in cell and molecular biology, organismal biology, and population biology. The wide variety of courses offered provides laboratory and field experiences to reinforce the student's grasp of basic concepts, to develop an appreciation and working knowledge of the scientific method, to teach basic experimental techniques, and to promote further development of quantitative and analytical skills.

These goals are incorporated into laboratory-based courses beginning with the freshman experience in Biological Concepts and extending to more advanced courses in specialized areas.

All of the equipment and facilities in the department are available for student use. Collections of microscope slides, vertebrate and invertebrate specimens and an herbarium are available to enhance learning. The department also maintains a computer pod, with specialized software available for use in specific courses where data analysis and presentation are required.

Outstanding junior and senior biology majors have the opportunity to participate in the undergraduate research program. Working with a faculty mentor, the student explores the literature, defines an original research problem, and utilizes the appropriate research and analytical techniques to investigate the problem. On many occasions this work results in presentations at scientific meetings. Research students who meet minimum requirements (3.0 overall GPA and a 3.25 average in biology) may pursue Honors in Biology by writing and defending a thesis on their research project. Financial support for student research is available.

The internship program also offers students an opportunity to gain valuable career related experience. Internship credits do not count towards the biology major, but many biology majors have taken advantage of this program to gain experience and to confirm their career objectives.

Requirements for the Biology Major

Thirty six credits (36) in Biology. These must include, 210, 211, 341, and 451; one course dealing specifically with plants (231, 311, or 312); and one course designated as Field Experience (231, 311, 321, 322, 323, 411, 422, 424, 425, 426, 427, 434, and certain 471 courses).

Biology 121, 122 and Chemistry 111, 112 are prerequisites to Biology 210, 211 and most upper-level courses and should be taken in the student's first year. The core courses of Biology 210, 211, and 341 are also prerequisites for various upper-level courses and should be completed during the second year of study. Biology 210, 211, and 341 must be completed before students register for Biology 451, which can be taken only during the senior year. All graduating students must participate in the assessment of the major.

Biology Course Offerings

121, 122 – Biological Concepts I, II (4, 4)
An introduction to biological principles and a survey of organisms. Includes discussions of current topics including environmental and ethical issues. Laboratory. Does not count toward biology major.

203 – Science in Perspective (3)
Prerequisites: Biology 121,122; Chem 105, 106; Chem 111, 112; Geol 111, 112; Phys 101, 102; or Phys 105, 106. Designed to fulfill the need for non-science majors to have a clear understanding and appreciation of natural and scientific phenomenon. Topics will be presented in a manner that will challenge students to reason, make appropriate connections between various science disciplines and to effectively communicate and apply scientific principles. The course will consist of lecture/discussions and student presentations. In addition, emphasis will be placed on reading and understanding current scientific literature. Does not count toward biology major.

204 – Nutrition (3)
A survey of current information related to human nutritional needs in health and disease, demographic factors, food additives and special diets. Does not count toward biology major.

210 – Introduction to Ecology (3)
Prerequisites: Biology 121, 122 and Chemistry 111, 112. Introduction to ecological principles and the study of interactions of plants, animals, and microbes with each other and with their environment.

211 – Cellular Biology (4)
Prerequisites: Biology 121, 122 and Chemistry 111, 112. Study of cell structure and function. Laboratory.

231 – Botany (4)
Prerequisites: Biology 121, 122. Survey of the organisms traditionally placed in the plant kingdom emphasizing morphogenetic descriptions, life histories, and evolutionary relationships. Laboratory.

250 – Bioethics (3)
Prerequisites: Biology 121, 122. Selected topics considered from the standpoint of their biological consequences and ethical implications for man. Does not count toward biology major.

251 – History of Biology (3)
Prerequisites: Biology 121, 122. Chronological development of selected biological theories and their impact on contemporary biology.

271 – Special Topics (2-4)
Prerequisites: Will be determined for each specific course. Courses on particular topics in biology that are of current interest to students and faculty.

301 – Anatomy of the Chordates (4)
Prerequisites: Biology 121, 122. The anatomy of selected Chordates with special emphasis on the Vertebrates. Lecture also examines the evolution of the organ systems of vertebrates. Laboratory. Students may not count both 301 and 384 toward the major.

302 – Developmental Biology (4)
Prerequisite: Biology 341. An examination of

the cellular and genetic mechanisms which control the formation of multicellular organisms during reproduction. Experimental laboratory exercises are combined with examination of developmental anatomy. Laboratory.

311 – Plant Ecology (4)
Prerequisite: Biology 210. Ecological principles as applied to plants, including major biomes, population dynamics, environmental parameters, and biodiversity. Laboratory.

312 – Plant Physiology (4)
Prerequisite: Biology 211. Experimental and theoretical treatment of the functional mechanisms in plants. Laboratory.

321 – Invertebrate Zoology (4)
Prerequisite: Biology 211. Survey of invertebrate phyla emphasizing structural characteristics, life histories, and evolutionary relationships. Laboratory.

322 – Animal Ecology (4)
Prerequisite: Biology 210. Introduction to sample design, population demographics, regulatory mechanisms, and survival strategies of animals. Exercises in data collection, analysis and communication of results. Laboratory.

323 – Entomology (4)
Prerequisite: Biology 211. Introduction to structure, function and ecology of insects. Students prepare insect collections. Laboratory.

331 – Histology (4)
Prerequisite: Biology 211. The anatomy and physiology of vertebrate tissues, with an emphasis on human tissues. Laboratory.

334 – Exercise Physiology (3)
Prerequisite: Biology 211. A study of the physiologic responses of the metabolic, cardiovascular, respiratory, muscular, and skeletal systems to acute and chronic exercise in the human.

341 – General Genetics (4)
Prerequisite: Biology 211. Structure, function, and transmission of genetic material using examples from viruses, bacteria, and eukaryotic organisms. Application of these principles to human inheritance. Laboratory.

351 – Laboratory Techniques (4)
Prerequisite: Biology 341. Introduction to instrumentation used in biological research. The scientific method and experimental design are discussed and used. Laboratory.

363 – Environmental Physiology (4)
Prerequisites: Biology 121, 122 and Chemistry 111, 112. Experimental and theoretical treatment of environmental factors in the physiology of organisms. Laboratory.

364 – Animal Physiology (4)
Prerequisite: Biology 211. A comparative study of physiological systems in animals. Laboratory.

371 – Microbiology (4)
Prerequisites: Biology 121, 122 and Chemistry 111, 112. Emphasis is placed on bacteria, their morphology, physiology, nutrition, and ecology. Laboratory.

372 – Parasitology (4)
Prerequisite: Biology 211. The structure, life histories, and host relationships of invertebrate parasitic forms. Laboratory.

384 – Human Anatomy (4)
Prerequisites: Biology 121, 122. The structure of the human body at the cell, tissue, organ, and system levels of organization. Laboratory. Students may not count both Biology 301 and Biology 384 toward the major.

385 – Human Physiology (4)
Prerequisites: Biology 211 and 301 or 384. A systematic study of the physiology of the nervous system, circulation, respiration, digestion, kidney function, muscle function, integument system, homeostasis, hormonal

control, and reproduction
in the human body. Laboratory.

391 – Immunology (4)
Prerequisite: Biology 341. Introduction to the principles and theories of host defense with emphasis on humoral and cell mediated responses. Laboratory.

410 – Neurobiology (4)
Prerequisite: Biology 341. Examines the structure and function of neurons, neural networks and nervous systems. The laboratory includes physiological experimentation and basic human neuroanatomy. Laboratory.

411 – Animal Behavior (4)
Prerequisite: Biology 210. Integrative survey of the biology of animal behavior. Includes observations of animal behavior in laboratory and field settings. Laboratory.

412 – Endocrinology (4)
Prerequisites: Biology 211. A study of the Structure and function of mammalian hormone systems, including the cellular and molecular mechanisms mediating hormone action and control. Laboratory.

422 – Marine Ecology (4)
Prerequisite: Biology 210. A general introduction to the marine environment with emphasis on the biological, chemical, and physical aspects of various marine communities. Laboratory.

424 – Tropical Ecology (4)
Prerequisite: Biology 210. Study of selected tropical ecosystems; exploration of these in a tropical setting; consideration of some problems, uses, and interesting facets of these ecosystems. Field Trip to Puerto Rico or other tropical locality.

425 – Vertebrate Zoology (4)
Prerequisite: Biology 210. A survey of the vertebrates including their natural history, evolution and taxonomy. The student will become familiar with the biological species concept, speciation and nomenclature as they apply to the vertebrates. Laboratory.

426 – Biology of Fishes (4)
Prerequisite: Biology 210. A survey of the fishes, including their anatomy, physiology, natural history, and systematics. The laboratory includes the collection and identification of local species. Each student will be required to develop and complete an independent project. Laboratory.

427 – Ornithology (4)
Prerequisite: Biology 210. Comprehensive survey of the anatomy, physiology, behavior, ecology, and evolution of birds. Laboratory emphasizes field identification and taxonomy of local birds. Laboratory.

430 – Molecular Biology of the Gene (4)
Prerequisite: Biology 341. An examination of the principles and techniques used in the molecular study of genes with an emphasis on the prokaryotic genome. Laboratory.

432 – Virology (4)
Prerequisite: Biology 341. The study of viruses and their life cycles; the laboratory emphasizes techniques used specifically in the study of viruses. Laboratory.

434 – Physiological Adaptations (4)
Prerequisites: Biology 210 and 211. A study of the adaptations of physiological systems in animals that have evolved in diverse environments. Laboratory emphasizes hypothesis-testing and experimental design. Laboratory.

440 – Biology of Cancer (3)
Prerequisite: Biology 341. Lectures and discussions focused on various aspects of cancer including epidemiology, cellular and molecular characteristics of cancer cells, carcinogenesis, treatment and prevention.

442 – Evolution (3)
Prerequisite: Biology 341. The history and development of modern evolutionary thought.

451 – Seminar (2)
Prerequisites: Biology 210, 211, and 341. Preparation and presentation of an oral report on a topic in the biological sciences.

Each seminar section will focus on a particular area of biology. Open only to senior biology majors.

471 – Topics in Biology (2–4)
Prerequisites: Biology 121, 122; additional prerequisites as appropriate to specific topic. Specialized topics not offered on a regular basis, e.g., Conservation biology, biochemistry of proteins. Laboratory included with certain topics.

481 – Readings in the Biological Sciences (1)
Readings in biological literature selected by the student, who is guided by a staff member. Open to second semester sophomores, juniors, or seniors by permission of Department.

491 – Special Problems in Biology (1–3)
Prerequisite: Biology 481. Individual laboratory or field investigation supervised by a staff member. Open to junior and senior majors by permission of Department.

499 – Internship (Credits variable)
Prerequisite: Junior or senior major in good academic standing. Supervised off-campus experience, developed in consultation with the Department. Does not count toward biology major.