

Biology

Faculty

E. Dale Kennedy, chair, professor and A. Merton Chickering Professor of Biology.
B.A., 1975, College of Wooster; M.A., 1979, University of North Carolina, Chapel Hill; Ph.D., 1989, Rutgers University. Appointed 1994.

Roger J. Albertson, assistant professor.
B.S., 1997, University of Colorado at Denver; Ph.D., 2003, University of Oregon. Appointed 2008.

Jeffrey C. Carrier, professor and William W. Diehl Trustees' Professor.
B.S., 1971, M.S., 1973, Ph.D., 1974, University of Miami. Appointed 1979.

Sheila Lyons-Sobaski, assistant professor.
B.S., 1989, University of Illinois, Urbana-Champaign; M.S., 1994, Kansas State University; Ph.D., 2003, University of Illinois, Urbana-Champaign. Appointed 2005.

Dean G. McCurdy, associate professor.
B.Sc.(H), 1995, Acadia University; Ph.D., 2000, Carleton University. Appointed 2001.

Ola Olapade, assistant professor.
B.Sc., 1990, M.Sc., 1995, Obafemi Awolowo University (Nigeria); M.S., 1998, Millersville University; Ph.D., 2004, Kent State University. Appointed 2006.

Kenneth J. Saville, professor.
B.S., 1985, Western Michigan University; Ph.D., 1992, Syracuse University. Appointed 1995.

Ruth E. Schmitter, associate professor.
B.S., 1964, Michigan State University; M.Sc., 1966, University of Edinburgh; Ph.D., 1973, Harvard University. Appointed 1982.

J. Dan Skean, Jr., professor.
B.S., 1980, Western Kentucky University; M.S., 1982, North Carolina State University; Ph.D., 1989, University of Florida. Appointed 1988.

Douglas W. White, adjunct assistant professor.
B.S., 1976, Pennsylvania State University; M.S., 1978, University of Tennessee; Ph.D., 1989, Rutgers University. Appointed 1995.

Introduction

The Biology Department's mission is to provide students with an understanding of, and an appreciation for, the living world, including the fundamental mechanisms that underlie all life. Students should understand the ways in which they are affected by living organisms and how their lives in turn have an impact on other living organisms and the biosphere. They should become proficient in the methods of science and aware of the processes that lead to discoveries in science. In course work, they should develop observational, analytical and communication skills, regardless of their chosen career path. Ultimately, biology is best understood by active involvement with organisms and the systems of life in laboratory and field settings, and in collaborative student-faculty research.

[Biology Department Web site](#)

Career Opportunities

Albion's biology program prepares students for employment or advanced studies in the health sciences (medicine, dentistry, veterinary medicine, physical therapy, etc.), environmental fields, biotechnology, teaching and many areas of research (academic, governmental, industrial, medical, etc.). Biology majors can also pursue an environmental sciences concentration or a neuroscience concentration.

Research Opportunities

Students have numerous opportunities for individual research projects. Many of these projects result in honors theses, publications in professional journals and in presentations at professional meetings. Some projects are in collaboration with faculty; others are more independent. Courses in the Biology Department equip students with scientific skills and materials they need to do research. Outstanding students participate in nationally competitive summer research programs at major universities and research institutes.

Special Features

The department also invites outstanding students to serve as laboratory teaching assistants. Advanced equipment in the biology facilities of Kresge Hall and in the Dow Analytical Laboratory in the Norris Science Center provides unique opportunities for undergraduate laboratory studies and research, just as the 144-acre Whitehouse Nature Center adjacent to the campus provides opportunity for fieldwork.

Requirements for Major

- Eight units in biology, of which at least six must include a laboratory.
 Biol 195: Ecology, Evolution and Biodiversity
 Biol 210: Cell and Molecular Biology (requires Chemistry 121 as a prerequisite or corequisite).

At least one course from each of the following three lists:

LIST I

Biol 215: Aquatic Botany
 Biol 216: Vascular Plants
 Biol 225: Invertebrate Zoology
 Biol 227: Vertebrate Zoology
 Biol 237: Ecology
 Biol 248: Ornithology

LIST II

Biol 301: Cell Biology
 Biol 306: Functional Neuroanatomy
 Biol 310: Evolution
 Biol 314: Comparative Anatomy
 Biol 317: Genetics
 Biol 321: Medical Microanatomy
 Biol 324: Developmental Biology
 Biol 332: Microbiology
 Biol 341: General Physiology

LIST III

Biol 362: Molecular Biology
 Biol 363: Neurobiology
 Biol 365: Environmental Microbiology
 Biol 366: Endocrinology
 Biol 367: Virology
 Biol 368: Behavioral Ecology
 Biol 401 or 402: Seminar
 Biol 411 or 412: Directed Study
 Note: Requirement is for one course.

- Two units of chemistry unless a substitution is approved in advance by the staff. The biology

faculty strongly recommends that Chemistry 121 and Chemistry 211 be taken to satisfy this requirement. Chemistry 101, 107 and 200 do not fulfill this requirement.

Further study in chemistry, physics, geology and mathematics is recommended and encouraged.

- All biology courses and cognate courses must be taken for a numerical grade, except those offered only on a credit/no credit basis.
- No more than one unit of internship credit (391, 392) can count toward the major. No more than one unit of seminar (401, 402) and no more than one unit of directed study (411, 412) credit can count toward the major.
- Neither Biology 111 nor Biology 190 (given only for AP credit) can count toward the major.
- A senior examination must be taken for assessment purposes.
- It is expected that six of the eight units in biology be taken at Albion College. Other arrangements will be made for bona fide transfer students and students in approved off-campus programs.

Information on Minors

- The minor in cell and molecular biology and the minor in environmental biology are not open to biology majors.
- Students may not choose more than one minor in the Biology Department.
- All courses for a biology minor must be taken for a numerical grade, except those offered only on a credit/no credit basis.
- Neither Biology 111 nor Biology 190 (given only for AP credit) can count toward any minor in biology.
- A senior examination must be taken for assessment purposes.

Requirements for Minor in Cell and Molecular Biology

- Five units in biology, including the following: Biology 195, 210 (requires Chemistry 121 as prerequisite or corequisite) Any three of the following, of which at least two must include a laboratory: 301, 317, 321, 324, 332, 337 (may be taken as Chemistry 337), 341, 362, 363, 365, 367

Requirements for Minor in Environmental Biology

- Five units in biology, including the following:
Biology 195
Four of the following, including:
At least two from 215, 216, 225, 227, 248
At least one from 206, 210 (requires Chemistry 121 as prerequisite or co-requisite), 237, 365, 368 (365 and 368 require Biology 210 as prerequisite)

Requirements for Major with Secondary Education Certification

- Eight units in biology, including the following: 195, 210; one unit (200-level or above) "animal" course; one unit (200-level or above) "plant" course. Of the latter two courses, one must be from List I. In addition, one unit in the major must be from List II. At least six of these courses must include a laboratory.
- Two units in chemistry unless a substitution is approved in advance by the staff. The biology faculty strongly recommends that Chemistry 121 and Chemistry 211 be taken to satisfy this requirement. Chemistry 101, 107, and 200 do not fulfill this requirement.
- One unit chosen from the following laboratory cognates: Geology 101 (lab required), 103 (lab required), Physics 115 (lab required).
- Completion of all other requirements for teacher certification. Students will design their program of study in consultation with the biology faculty and must obtain written approval of the Biology

Department chair, preferably no later than the beginning of the second semester of the junior year.

Requirements for Minor with Secondary Education Certification

- Five units in biology, including the following:
 - Biology 195, 210 (requires Chemistry 121 as prerequisite)
 - One of the following: 215, 216
 - One of the following: 225, 227, 248, 314
 - One unit (200-level or above, with laboratory) selected in consultation with the biology faculty and with written approval of the Biology Department chair.
- Completion of all other requirements for teacher certification.

Courses

The courses listed below count toward the biology major or minors unless otherwise noted. Some courses in the department are offered in alternate years and are so designated below. Please consult with the instructor or with the Class Schedule, available online or at the Registrar's Office, to determine when a course will next be offered.

111 First-Year Colloquium in Biology (1/4)

Prerequisites: First-year standing and invitation of instructor.

Seminar in which selected topics and research papers are reviewed and discussed. Offered on credit/no credit basis. Does not count toward the biology major or minors. Two-hour discussion. *Staff*.

195 Ecology, Evolution and Biodiversity (1)

Focuses on whole organisms and their evolutionary and ecological relationships. Evolutionary processes, biological diversity, conservation biology and human impacts on ecology and biodiversity are major themes. Skills introduced are hypothesis testing, experimental design, use of primary literature in writing assignments and basic statistics. Lecture and laboratory. *Staff*.

206 Tropical Forest and Reef Biology (1)

Prerequisites: Biology 195 and permission of instructors.

An introduction to rain forests, mangrove islands and coral reefs of the neotropics. Students meet weekly throughout the semester and must spend spring break in Belize, Central America, where intensive field trips and individual projects are conducted. Counts as an elective toward the biology major, but does not satisfy the field work or seminar requirements. Lecture/discussion. Offered in alternate years. *Team-taught*.

207 Biology of Subtropical Florida (1)

Prerequisite: Biology 195 and permission of instructors.

An introduction to the ecosystems of subtropical Florida. Students meet weekly throughout the semester and must spend spring break in Florida, where intensive field trips and individual projects are conducted. Counts as an elective toward the biology major, but does not satisfy the field work or seminar requirements. Lecture/discussion. Offered in alternate years. *Team-taught*.

210 Cell and Molecular Biology (1)

Prerequisite: Biology 195. Prerequisite or corequisite: Chemistry 121.

Focuses on organisms at the cellular and molecular levels, including biological chemistry, bioenergetics and metabolism, Mendelian and molecular genetics, cellular communication and the molecular control of the cell cycle. Builds upon skills from Biology 195 to expand abilities in hypothesis testing and experimental design to produce an individual research paper, and to carry out more advanced statistical analyses. Lecture and laboratory. *Staff*.

211 Sophomore Research (1/2)

Prerequisites: Sophomore standing and invitation of instructor.
Independent research projects for invited sophomores. *Staff*.

215 Aquatic Botany (1)

Prerequisite: Biology 195.

A study of representative algae, aquatic fungi and bryophytes, emphasizing the relationships of structure and function. Reproductive strategies and environmental physiology are discussed. Taxonomy is based upon current hypotheses of evolutionary relationships. Lecture and laboratory. Offered in alternate years. *Schmitter*.

216 Vascular Plants (1)

Prerequisite: Biology 195.

Morphology, taxonomy and distribution of vascular plants. Representatives of local flora receive special attention in laboratory and field studies. Lecture and laboratory. *Skean*.

225 Invertebrate Zoology (1)

Prerequisite: Biology 195.

Field-oriented course emphasizing evolution, classification, ecology, behavior and natural history of invertebrate animals. Class involves field trips and use of the Whitehouse Nature Center. Lecture and laboratory. *McCurdy*.

227 Vertebrate Zoology (1)

Prerequisite: Biology 195.

Classification, behavior, ecology and evolution of the vertebrates. Mammals and birds are emphasized more than other groups. Lecture and laboratory. *Kennedy*.

236 Ecology for K-8 Pre-service Teachers (1)

Prerequisite: Admission to the elementary teacher certification program.

A field-based ecology course on topics including ecosystems, energy flow, evolution, population dynamics, community ecology and human impacts on the environment. Specific focus on the Michigan Science Curriculum Standards and Benchmarks. Taught at the Pierce Cedar Creek Institute near Hastings, Michigan. Lecture/discussion and laboratory. *Skean*.

237 Ecology (1)

Prerequisite: Biology 195.

A study of interactions between organisms and their environment including adaptation, competition, parasitism, population and community dynamics and the ecosystem concept. Class involves field trips and use of the Whitehouse Nature Center. Lecture and laboratory. *Staff*.

240 Conservation Biology (1)

Presents concepts and issues concerning the causes and consequences of the loss of biodiversity.

Emphasizes the science of conservation biology including the evolutionary potential of populations and species, as well as the history of the field, international efforts to conserve species, and the current status of policies such as the U.S. Endangered Species Act. Includes a conservation-related outreach project. *Lyons-Sobaski*.

248 Ornithology (1)

Prerequisite: Biology 195.

The biology of birds with emphasis on evolution, behavior, ecology and conservation. Field experience in identification, population studies, bird banding, song recording and analysis, and carrying out a research project. Students will learn to critically evaluate the ornithological literature. Lecture and laboratory. *Kennedy*.

288, 289 Selected Topics (1/2, 1)

Prerequisite: Biology 195.

Specialized topics, each suitably subtitled. *Staff*.

301 Cell Biology (1)

Prerequisite: Biology 210.

An in-depth investigation of biological systems at the cellular, subcellular and molecular levels. Studies of a variety of cell types and energy relations within cells. Lecture emphasizes metabolism, metabolic regulation and cellular diversity. Laboratory emphasizes measurement and analysis of subcellular features. Offered in alternate years. *Schmitter*.

306 Functional Neuroanatomy (1)

Prerequisite: Biology 210.

An introduction to the anatomical organization of the human nervous system. Covers the development, histology, structure, organization and function of sensory and motor systems; interneuronal organization and relationships of these systems; and clinical applications of these relationships. *Moore*.

309 Vertebrate Paleontology (1)

Must be taken as Biology 309 for credit toward the major. Lecture and laboratory.

Same as Geology 309. *Bartels*.

310 Evolution (1)

Prerequisite: Biology 210.

A study of the course and processes of organic evolution. Topics include the history of ideas of evolution, population genetics, population ecology, speciation, adaptation, coevolution, evolutionary rates, evolutionary convergences, mass extinctions and biogeography. Lecture and laboratory. Offered in alternate years. *McCurdy*.

314 Comparative Anatomy (1)

Prerequisite: Biology 210.

Comparative anatomical study of vertebrate organ systems, their development and evolution. Lecture and laboratory. *Kennedy*.

317 Genetics (1)

Prerequisite: Biology 210; Chemistry 211 recommended.

Mechanisms of inheritance, and of gene structure and function in living organisms. Both classical and molecular genetics are considered as they relate to function. Lecture and laboratory. *Staff*.

321 Medical Microanatomy (1)

Prerequisite: Biology 210.

Microanatomy of primate cells and tissues as depicted by light and electron microscopy. Relationships of structure and function are stressed, as are medical conditions resulting from cell or tissue damage. Lecture and laboratory. *Schmitter*.

324 Developmental Biology (1)

Prerequisite: Biology 210.

The genetic, molecular and cellular mechanisms underlying early development of multicellular organisms. Potential topics include fertilization and early development, gene regulation during development, neural pathfinding, cell signaling, cell division and growth, organogenesis, limb development, metamorphosis, regeneration, sex determination, the evolution of development, genomics, and stem cell research. Lecture and laboratory. *Albertson*.

332 Microbiology (1)

Prerequisite: Biology 210; Chemistry 211 recommended.

Introduction to the microbial world. Explores the morphology, physiology, genetics and diversity of microorganisms. Stresses the relationships among microbes and other organisms, including humans. Lecture and laboratory. *Olapade*.

337 Biochemistry (1)

Prerequisites: Chemistry 211 or permission of instructor.

Same as Chemistry 337. Must be taken as Biology 337 for credit toward the major. Lecture. *Rohlman*.

341 General Physiology (1)

Prerequisites: Biology 210, one year of chemistry. Chemistry 211 is strongly recommended.

The processes which contribute to the maintenance of dynamic equilibria of cells and how those processes relate to the organismal level of plants and animals. Lecture and laboratory. *Carrier*.

362 Molecular Biology (1)

Prerequisite: One of the following--Biology 301, 317, 332 or 337.

The theory and practice of modern molecular genetics will be explored. Techniques potentially considered include: DNA cloning, DNA hybridization, the polymerase chain reaction, DNA sequencing, and the expression of cloned genes in bacteria. Lecture/discussion and laboratory. Offered in alternate years. *Saville*.

363 Neurobiology (1)

Prerequisite: Biology 210.

Provides a general overview of neurobiology as well as an opportunity to explore some of the most exciting current topics in the field of neurobiology in greater detail. Topics include sensory and motor systems, learning, memory, behavior, CNS development, neural evolution, neurobiological disorders and therapies. Uses recent scientific papers as the basis for student-led discussions. Lecture and laboratory. Offered in alternate years. *Staff*.

365 Environmental Microbiology (1)

Prerequisite: Biology 210

Microbes in action: bioremediation, biodegradation, cycling of nutrients and energy flow, biopesticides and phytopathogens, spread of antibiotic resistance, molecular ecology of infectious diseases, microbial symbionts and extremophiles. Explores these and other topics through discussions, field trips and experimental work. Lecture and laboratory. Offered in alternate years. *Olapade*.

366 Endocrinology (1/2)

Prerequisites: Biology 341 or 210 and Chemistry 211.

Examination of the evolution of endocrinological systems, and the modes of action, mechanisms of control, and interactions of selected hormonal systems. Discussion. Offered in alternate years. *Carrier*.

367 Virology (1)

Prerequisite: Biology 210

Are viruses living organisms or not? Addresses this and many more questions in molecular architecture, replication strategies, transmission modes, pathogenicity, carcinogenicity and usefulness of viruses. Lecture and discussion. lecture and laboratory. Offered in alternate years. *Olapade*.

368 Behavioral Ecology (1)

Prerequisite: Biology 210.

Patterns and functions of behavior examined from an ecological-evolutionary perspective. Topics include history of animal behavior, behavioral genetics, habitat selection, foraging, antipredator behavior, cooperation and altruism, communication, sexual selection, mating systems, parental behavior and optimality models. Independent field studies of living animals. Lecture and laboratory. Offered in alternate years. *McCurdy*.

388, 389 Selected Topics (1/2, 1)

Prerequisites: Biology 210, permission of instructor and other as indicated.

Specialized, advanced topics or topics of interest to special groups. Each section offered will be suitably subtitled (Conservation Biology, Entomology, Cell Signalling, Neurobiology, etc.) *Staff*.

391, 392 Internships (1/2, 1)

Prerequisites: Junior or senior standing and permission of department. No more than one unit may be counted toward the major. Offered on a credit/no credit basis. *Staff*.

401, 402 Seminar (1/2, 1)

Prerequisites: Junior or senior standing, permission of instructor and other as indicated.

Topics in diverse areas of biology. Recent topics have included genes and cancer, literature and medicine, conservation biology, and biology of sharks and their relatives. Discussion. *Staff*.

411, 412 Directed Study (1/2, 1)

Prerequisites: Junior or senior standing and approval by both the faculty sponsor and department chair of a research proposal prior to registration. Independent research by an individual student under the direction of a staff member. A detailed summary research paper or other appropriate evidence is required at the end of the work. *Staff*.