

Department of Biology

College of Arts and Sciences

Faculty

James A. Huggins (1987). University Professor of Biology and Department Chair. B.S.A. and M.S., Arkansas State University; Ph.D., University of Memphis; Additional study, University of Tennessee at Memphis, Mid-America Baptist Theological Seminary, and University of Memphis.

Chereyl Crossett (1992). Assistant Professor of Biology Laboratories. B.S., Union University; M.A., Western Kentucky University; Additional study, Boston University, Portland State University and University of Memphis.

Andy Madison (2002). Assistant Professor of Biology. B.S., University of Tennessee; M.S., University of Kentucky; Ph.D., Kansas State University.

Michael L. McMahan (1980). University Professor of Biology. B.S. and M.S., University of Mississippi; Ph.D., Louisiana State University.

Elsie Y. Smith (1962). Associate Professor of Biology. B.S., Union University; M.S., University of Illinois; Additional study in Radiation Biology, University of Tennessee at Memphis.

Carol Weaver (1998). Associate Professor of Biology. B.S., Union University; M.S., University of Missouri–St. Louis; Ph.D., St. Louis University.

Wayne Wofford (1987). Professor of Biology and Director of the Edward P. Hammons Center for Scientific Studies. B.S., Union University; M.S. and Ph.D., Texas A & M University.

The curriculum in biology is designed to acquaint students with living organisms as whole, functioning entities that, in their diversity, share many common features. In addition to providing the scientific background required of all educated citizens, the courses provide a foundation upon which the student may build a graduate program, undertake training in health-related professions, or prepare for secondary-level science teaching. Students may participate in independent research as well as specific courses.

Major in Biology

Because contemporary biology leans heavily on mathematics and physical sciences, students majoring in biology should include introductory mathematics and chemistry in the freshman year. The beginning course will be BIO 112 where the student will build a foundation for future study of biological processes. With this preparation, students can proceed to the first 200-level biology course during the second semester of the freshman year. In the sophomore year, the student will continue the survey of the kingdoms of life by taking additional 200-level biology courses. Students should strengthen their understanding of mathematics and obtain a background in organic chemistry during that year. Biology courses at the 300-400 level should be taken during the junior and senior years, with seminar reserved for the senior year. In these courses students will examine in detail how organisms function, as well as how they interact with their environment and each other. Biology majors are encouraged to minor in chemistry.

Upper-level students may enroll in marine biology courses at the Gulf Coast Research Laboratory during the Summer. For information, see the Department Chair.

- I. **Major in Biology—39 hours**
 - A. BIO 112, 211, 213, 214, and 215
 - B. Four 300 level BIO courses including BIO 302 and 315 and excluding 395.
 - C. BIO 425, 426, 427, and 498
 - D. Biology elective 4 hours (221 and 222 apply only together)
- II. **Teacher Licensure In Biology (Grades 7-12)**
 - A. Major requirements as shown above to include BIO 221, 222, and 318.
 - B. Additional requirements: PHY 112; PHY 213 & 214 (or 231 & 232)
 - C. Professional Education: EDU 150, 250, 326, 418, 433; PSY 213, 318; SE 225
 - D. Completion of applicable portions of the Praxis II.
 - E. For additional information, see the Director of Teacher Education.
- III. **Minor in Biology—23 hours**
 - A. BIO 112
 - B. Two 200-level BIO courses
 - C. Three 300-level BIO courses

Assessment of Majors

Biology majors are required to take two terminal courses as a requirement for graduation, BIO 427, Research Presentation, and BIO 498, Seminar. The Biology Department also administers the Major Field Examination in Biology to senior biology majors.

Student Organizations

Sigma Zeta is a national honorary science society for those who have completed 15 hours in natural science and mathematics and who have a minimum GPA of 3.0 in these courses. Membership advantages include recognition for academic achievements by the Sigma Zeta Honor Award, participation in nationally recognized research projects, and a means of cooperation in similar areas by students of different colleges.

Biologists Into Observing the Master's Earth, BIOME, serves students interested in exploring the world of biology beyond the classroom. BIOME is designed primarily for biology majors and minors but is open to anyone with an interest in biology. An ongoing project of BIOME is to provide mentors to all introductory biology students.

Student Awards

The Academic Excellence Medal is awarded to the graduating senior with the highest average in the major provided the average is not less than 3.5. Before Awards Day, the student must have completed at least 15 credit hours in the major at Union University, exclusive of pass/fail courses. If no major is eligible, the medal will be given to the minor meeting the minimum requirements.

The Biology Research Award is given by the faculty of the Department of Biology to the student who presents the best research paper of the year. The research must have been an original piece of work and must have been presented at a state, regional, or national professional biology meeting prior to graduation.

Whiteaker Freshman Biology Award. The Biology Department selects a freshman biology major or minor to receive this award based on outstanding scholastic achievement, financial need, Christian service, and school spirit.

Course Offerings in Biology (BIO)

() Hours Credit: F-Fall; W-Winter; S-Spring; Su-Summer

100. Survey of Biological Concepts (4) F, W, S

A course designed for non-science majors focused on the basic ideas to enable students to appreciate the living world and their relationship to it. Topics include the cell, genetic basis of life, biodiversity, a survey of the five kingdoms of life, ecology, and the environment. Three hours of lecture and 2 hours of laboratory per week. No credit toward BIO majors/minors.

112. Principles of Biology (4) F, S

A study of the basic characteristics of organisms, dealing with structure, function, reproduction, and ecology. Three hours of lecture and 2 hours of laboratory per week.

121. Human Biology (4) S

A survey of the structure and function of the human body with emphasis on the normal operations of each organ system and the role of homeostasis. Attention will be given to selected diseases and disorders of each organ system. Three hours lecture and 2 hours lab per week. Credit cannot be earned after having earned either BIO 221 or 222. No credit toward BIO major/minor.

200. Wildlife Biology (4) F—Even Years

Prerequisites: BIO 100 or 112.

The biological concepts involved in fisheries and wildlife biology, their application in practice, and the exploration of contemporary issues facing the organisms, habitats and human consumers. The course will address the needs of the casual student of the environment as well as those preparing for careers in wildlife management, parks and recreation, veterinary science, vertebrate zoology and allied fields.

211. Microbiology (4) F, S

Prerequisite: CHE 105 or 111, or PHY 111 and BIO 112. Nursing students must meet requirements of nursing program.

Classification, morphology, physiology, and ecology of bacteria and viruses, with special emphasis on bacteria. Three hours of lecture and 3 hours of laboratory per week.

213. Invertebrate Zoology (4) F

Prerequisite: BIO 112.

Classification, morphology, physiology, and ecology of the invertebrate animals. Three hours of lecture and 3 hours of laboratory per week.

214. Vertebrate Zoology (4) S

Prerequisite: BIO 112.

Classification, morphology, physiology, and ecology of the vertebrate animals. Three hours of lecture and 3 hours of laboratory per week.

215. Botany (4) F

Prerequisite: BIO 112 and CHE 111.

Classification, morphology, physiology, and ecology of the algae, fungi, bryophytes, and vascular plants. Three hours of lecture and 3 hours of laboratory per week.

221. Human Anatomy and Physiology (4) F, Su

A 2-semester course designed for nursing, physical education, and allied health students. Body systems studied include the integumentary, cardiovascular, lymphatic, skeletal, and muscular. Three hours of lecture and 2 hours of laboratory per week. No credit toward BIO minor.

222. Human Anatomy and Physiology (4) S, Su

A continuation of BIO 221. Systems studied include: urinary, nervous, endocrine, digestive, and respiratory. No credit toward a BIO minor.

300. Pathophysiology (3) S

Prerequisite: BIO 221 and 211. Corequisite: BIO 222.

The various states of altered health. Topics include stress, shock, altered acid-base balance, altered fluid and electrolyte balance, neoplasia, hypertension, immunodeficiency, genetic disorders, altered cardiac rhythms, renal failure and uremia. No credit toward BIO major/minor.

302. Seminar Attendance (0) F, S

Prerequisites: 12 hours of biology. Graded on a pass/fail basis.

Students are required to attend all seminar presentations made by students enrolled in BIO 498 during the semester. Must be taken before enrolling in BIO 498.

312. Comparative Vertebrate Anatomy (4) S—Odd Years

Prerequisite: BIO 112 and 214, plus four additional hours of BIO, excluding BIO 221-2.

A study of the similarities of anatomy and early development of the vertebrates, complemented by dissection of representative adults. Three hours of lecture and 3 hours of laboratory per week.

315. Genetics (4) S

Prerequisite: 12 hours of biology, excluding BIO 221 or BIO 222.

A study of the principles of heredity including both classical and molecular genetics. Three hours of lecture and 3 hours of laboratory per week.

316. Physiology (4) S

Prerequisite: 12 BIO hours, excluding BIO 221-22, and CHE 106 or 314. Zoology is recommended.

A study of the principles of physiology, emphasizing metabolic processes common to many organisms. Three hours of lecture and 3 hours of laboratory per week.

317. Developmental Biology (4) F—Odd Years

Prerequisite: 12 BIO hours, excluding BIO 221-22. Zoology is recommended.

A study of development in organisms, including both classical, descriptive embryology and contemporary investigations of processes involved in morphogenesis and differentiation. Three hours of lecture and 3 hours of laboratory per week.

318. Ecology (4) S—Even years

Prerequisite: 12 hours of biology, excluding BIO 221-22.

A study of the interactions between organisms and their biological and physical environments. Three hours of lecture and 3 hours of laboratory per week.

320. Immunology (4) F

Prerequisite: BIO 211, CHE 314, and 8 additional BIO hours, excluding BIO 221-2.

A fundamental course dealing with principles of immunity and the mechanism of the immune response. Laboratory emphasis is on serology and transplantation immunology. Three hours of lecture and 3 hours of laboratory per week.

321. Ecotoxicology (4) F—Even Years

Prerequisites: 12 hours of BIO, excluding 221-2, and CHE 111-2.

A comprehensive overview of the ecological consequences of environmental pollution, the effects of toxic substances on the ecosystem as a whole and on individuals with that ecosystem and the methodology of assessing pollutant damage.

322. Human Gross Anatomy (3) Su

Prerequisite: BIO 221 & 222 or 214 or 312.

Cadaver anatomy and dissection for nursing, preprofessional, and physical education students to enhance understanding of anatomy and prepare them for work on living humans.

323. Cell Biology (4) W—Even Years

Prerequisites: 12 BIO hours excluding BIO 221-2.

A study of biological systems at the cellular and subcellular levels emphasizing functional aspects such as protein procession and sorting, membrane systems, energy generation in mitochondria and chloroplasts, and cell signaling.

325. Molecular Biology (4) W—Odd Years

Prerequisites: BIO 211, 315; CHE 314 and 324.

Basic principles of molecular biology focusing on recombinant DNA methods as applied to a variety of biological questions. Students will learn basic research laboratory skills through a wide range of methods from gel electrophoresis to subcloning.

180-280-380-480. Study Abroad Programs (1-4) As Needed

All courses and their application must be defined and approved prior to travel.

195-6-7. Special Studies (1-4) On Demand

Lower-level group studies that do not appear in the regular departmental offerings.

395-6-7. Special Studies (1-4) On Demand

Upper-level group studies that do not appear in the regular departmental offerings.

425. Introduction to Research (1) F, S

Prerequisites: Junior standing, 20 hours toward BIO major, minimum BIO GPA of 2.0.

An introduction to the skills necessary to conduct scientific research, prepare a manuscript and make a presentation at a scientific meeting. Each student will develop and submit a research proposal for approval and attend all presentations in BIO 427.

426. Research Experience (1) F, S, Su

Prerequisite: BIO 425, minimum BIO GPA of 2.0.

Individual research in accordance with the proposal developed and approved in 425. Students will attend all student presentations in BIO 427.

427. Research Presentation (1) F, S

Prerequisite: BIO 426, minimum BIO GPA of 2.0.

Presentation of results of 426 as a publishable manuscript and oral presentation.

495-6-7. Independent Study (1-4) On Demand

Individual research under the guidance of a faculty member(s).

498. Biology Seminar (1) F, S

Prerequisite: 28 hours toward BIO major, a minimum BIO GPA of 2.0, senior standing.

The writing and oral presentation of a library research paper in addition to weekly discussions of current biological research. May be modified at the discretion of the department.