Heather Hetrick (2019). Laboratory Specialist. B.S. and M.U.Ed., Union University

Mary (Meg) Nethery (2020) M.S. in Physical Therapy, University of Tennessee Health Science Center, Memphis; B.S., Union University

Robert Wamble (2011-2015, 2017). Laboratory Specialist, Director for Anatomical Services and Director for Plastination. B.S., University of Tennessee; D.V.M., Auburn University.

Laura Hailey (2020), Secretary, B.S., Union University

James Kerfoot, Jr. (2009). Professor of Biology. B.S. and M.S., Southern Illinois University Edwardsville; Ph.D., Florida Institute of Technology.

James Marcus Locke (2004). Professor of Biology. B.S. and M.S., Murray State University; Ph.D., University of Tennessee.

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

Tamara Popplewell (2008). Assistant Professor of Biology. B.S. and M.A.Ed., Union University; M.S., Mississippi State University.

Michael Schiebout (2012). Associate Professor of Biology. B.A., Dordt College; M.S. and Ph.D., University of Northern Colorado.

William Thierfelder (2014). Associate Professor of Biology and Director of the Hammons Center for Scientific Studies. Sc.B, Brown University; Ph.D., University of Pennsylvania; Additional study, St. Jude Children's Research Hospital.

Faith A. Zamamiri-Davis (2011). Associate Professor of Biology. B.S., Westmont College; Ph.D., Pennsylvania State University; Additional study, St. Jude Children's Research Hospital.

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 or other professions, or prepare for secondary-level science teaching. Students participate in independent or group research as well as specific courses.

Because contemporary biology leans heavily on mathematics and physical sciences, students majoring in biology should include mathematics, statistics, chemistry, and physics. In the freshman year students in BIO 112 will build a foundation for study of biological processes. Students can proceed to the first 200-level biology course during the second semester of the freshman year. In the sophomore year, students 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 as appropriate. Biology courses at the 300-400 level should be taken during the junior and senior years, with seminar reserved for the senior year. Students will examine in detail how organisms function and interact with their environment and each other.

General Biology, Botany, and Zoology majors are required to complete a minor and are encouraged to minor in chemistry. Conservation Biology and Cell and Molecular Biology majors are exempt from the minor requirement.

Conservation Biology Majors may meet the requirements to become a Certified Wildlife Biologist by taking twelve hours of communication. The General Core requirement for COM 112 and electives of COM 121 and COM 235 may be used to fulfill 9 hours of this requirement. The remaining hours may be selected in consultation with your assigned faculty advisor.

I. Major in General Biology42 hours
   1. BIO 112, 210, 211, 215, 315, 318 or 328 24 hours
   2. Four 300-level BIO courses 14 hours minimum
   3. BIO 425, 426, 437, 498 4 hours
   (Majors are required to take CHE 111 from Group A list of laboratory science options in the general core.)

II. Major in Zoology 43 44 hours
   1. BIO 112, 200, 210, 211, 301, 312, 316, 336 32 hours
   2. Select one from: BIO 304, 310, 315, 317, 323, 325, 326 4 hours
   3. Select one from: BIO 318 or 328, 324, 329, 356, 357 3 or 4 hours
   4. BIO 425, 426, 437, 498 4 hours
   (Majors are required to take CHE 111 from Group A list of laboratory science options in the general core.)

III. Major in Cell and Molecular Biology 72 73 hours
   1. BIO 112, 211; 210 or 215 12 hours
   2. BIO 315, 323, 325, 397 15 hours
   3. Three of BIO 307, 309, 310, 316, 317, 320, 324, 326 12 hours
   4. One 300-level BIO Elective 3 or 4 hours
   5. CHE 111, 112, 314, 315, 324, 326, 319, 329 26 hours
   6. BIO 425, 426, 437, 498 4 hours
   7. No minor is required

IV. Major in Conservation Biology 66 68 hours
   A. Prerequisites or Corequisites: CHE 111; 2 MAT courses 111 or higher
   B. BIO 112, 200, 210, 215; PHY 112 or higher 20 hours
   C. BIO 303, 304, 305, 318 or 328, 335, 355 20 hours
   D. BIO 425, 426, 437, 498 4 hours
   E. Two of BIO 337, 358, 359 8 hours
   Four of BIO 301, 312, 315, 316, 324, 329, 336, 356, 357 14 16 hours
   F. No minor is required.

V. Major in Botany 42-44 hours
   1. BIO 112, 211, 215, 329, 337, 358, 359 28 hours
   2. Select three electives (at least one from each group):
   Group A: BIO 304, 318 or 328, 355
   Group B: BIO 315, 323, 325
   3. BIO 425, 426, 437, 498 4 hours
   (Majors are required to take CHE 111 from Group A list of laboratory science options in the general core.)

VI. Teacher Licensure in Biology (Grades 6 12)
   A. Major requirements as shown above with General Biology Major to include 316 (or 307 and 309).
   B. Students will take BIO 419 and an additional 300-level elective applicable to biology major in place of BIO 425, 426, 437.
   C. Additional requirements: PHY 111 and 112; CHE 111 and 112; MAT 114 or 208 (in B.S. core); CSC 105; and membership in BIOME.
   D. Professional Education:
   1. Prior to Internship EDU 150, EDU 305, EDU 358,

Biology majors are required to take two terminal courses as a requirement for graduation: BIO 419, Research Experience for Educators or BIO 437 Research Experience; and BIO 498, Seminar. The Department may administer the Major Field Examination, or a Senior Exit Questionnaire to senior biology majors in BIO 419 and 437.

Biologists In Observation of 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.

Union s Biology department has formed a local chapter of Tri-Beta, which is an honorary society for students, particularly undergraduates, dedicated to improving the understanding and appreciation of biological study and extending boundaries of human knowledge through scientific research (*www.tri-beta.org*).

The Biology Research Award is given by the faculty of the Department of Biology to the student in BIO 437 who presents the best research paper of the year, based on an original piece of work.

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

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

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100. Survey of Biological Concepts (4) F, W, S
A course for non-science majors focused on the basic ideas to enable students to appreciate the living world and their relationship to it. Topics : the cell, genetic basis of life, biodiversity, survey of the 5 kingdoms of life, ecology, and the environment. Three hours lecture and 2 hours laboratory/ week. No credit toward BIO major/minor.

110. Global Biology (4) S
A course for non-science majors focused on global issues in biology, including global diversity, global health; agriculture and biotechnology; and the interactions between humans and nature. Three hours lecture and 2 hours laboratory/week. No credit toward BIO major/minor.

112. Principles of Biology (4) F, S
A study of the basic characteristics of organisms, dealing with structure, function, reproduction, and ecology. Three hours lecture and 3 hours laboratory/week.

200. Wildlife Biology (4) S
Prerequisite: BIO 100 or 112.
Biological concepts involved in fisheries and wildlife biology, their application in practice, and exploration of contemporary issues facing the organisms, habitats, and human consumers. Three

320. Immunology (4) F
Prerequisites: BIO 112, 211, and a 4 hour BIO course applicable to the BIO major; CHE 314/324 is recommended.
Structure and function of the immune system and some diseases related to the immune system. Laboratory will focus on a group research project. Three hours lecture and 3 hours laboratory/week.

322. Human Gross Anatomy (3) S
Prerequisites: BIO 221 and 222 or 210.
Cadaver anatomy and dissection for nursing, preprofessional, and physical education students to enhance understanding of anatomy and prepare for work on living humans.

323. Cell Biology (4) S
Prerequisite: BIO 112 and 8 hours of BIO courses applicable to the BIO major.
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. Three hours lecture and three hours laboratory/week.

324. Medical Parasitology (4) W As Needed
Prerequisite: BIO 112 and 8 hours of BIO courses applicable to the BIO major.
Parasitology is a course that will apply information learned in a variety of Biology courses to the study of parasites and parasitic diseases. Specifically, this course will address the ecology, epidemiology and biochemistry of parasites and diseases caused by parasites. The laboratory will focus on the

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355. Environmental Ethics (3) F Odd Years
Prerequisite: BIO 112 and 8 hours of BIO courses applicable to the BIO major.
This course will examine the relationship between humans and their natural environment; addressing the problems confronting the necessity to balance conservation with human need and the use of natural resources. Topics to be explored include an ethical consideration for the urban environment and of wilderness preservation, the interplay of local and global environmental ethics, and the ethics of sustainability. An overarching view of the scope of historical and modern bioethical issues will also enter into our discussions.

356. Marine Biology (3) W
Prerequisite: BIO 112 and 8 hours of BIO courses applicable to the BIO major.
Corequisite: BIO 357.
Lectures and labs on the nature of life in the ocean and in coastaw 6be explored

Lake Ecology and Management (4)
Field study of lakes and other freshwater systems with applications to planning and management. Investigates representative lakes, streams, and wetlands of the region and develops prescriptions for stewardship of these water resources.

Environmental Applications for Geographic Information Systems (4)
Theory and application of spatial analysis for applied social and ecological problem-solving. This course combines GPS field data collection; ArcGIS use for storage, processing, interpretation, and presentation of data; location and integration of existing source information; and remote sensing integration with GIS applications. The course is designed around an environmental project to apply GIS techniques for real-world problem-solving in protecting and restoring ecosystems.

Restoration Ecology (4)
Ecological and theoretical foundations for ecosysten-USoojation