

BIOLOGY

Students come to Lawrence with varied interests in the life sciences. A pre-medical or pre-dental student may want preparation an oceanographer or forester does not need. A botanist is more excited about some experimental techniques than is a zoologist. Ecologists look at problems that a molecular or a neurobiologist would find less appealing. One individual may wish to be specialized, another to be a generalist with a broader background. To accommodate this heterogeneity, the biology department at Lawrence has designed its program to provide as much flexibility as possible.

Through lab and field work, lectures, small seminars, one-on-one tutorials, and independent study projects, you will learn to appreciate the diversity of living systems, to pose and solve biological questions, and to understand the physical and chemical properties of living organisms. In addition, your ability to write and speak clearly will be honed through the biology curriculum.

Lawrence biology graduates become field biologists, medical researchers, ecologists, physiologists, marine biologists, immunologists, and plant pathologists. Also, many Lawrence students become doctors – contrast the 65% medical school acceptance rate at Lawrence with the national average of 30%.

Every member of the biology faculty is engaged in original research. Professor Nicholas Maravolo is researching the role of hormones and polyamines in aging. Professor Nancy Wall is investigating the role of growth factors in development and patterning of the vertebrate embryo. Professor Bradford Rence is an authority on the neurobiology of insect biological clocks. Professor Jodi Sedlock is a terrestrial vertebrate ecologist who specializes in the ecology and conservation of tropical mammals. Professor William Perreault is applying recombinant DNA technology to investigate chromosome functions. Using the tools of molecular biology and genetics, Professor Elizabeth DeStasio is investigating the mechanisms by which nerves coordinate the contraction of muscle, as well as how muscle is assembled and organized. Professor Bart DeStasio studies the ecology of freshwater and saltwater habitats combining field studies with computer simulations to examine the effects of invasions of exotic species on the biology and water quality of aquatic systems.

CURRICULUM – *The Biology Major*

At Lawrence, there is not a uniform, lockstep sequence of courses in biology. After you have completed three basic courses, *Principles of Biology*, *Introductory Botany*, and *General Zoology*, you will be free to choose the remaining eight required biology

courses from a wide selection of upper-division offerings.

You may ask a professor to arrange a one-on-one tutorial to explore one of your special interests, or you might begin independent study to give yourself time for a significant research project.

You also will take at least two chemistry courses, and, as a senior, you will participate in the “Recent Advances in Biology” seminar course. This program features Lawrence graduates now working in biology or related areas, as well as other prominent biologists.

The Biology Minor

Students who wish to pursue a minor in biology are required, like the majors, to take the three-course introductory sequence. Students then are able to choose the remaining four courses from the departmental offerings, of which a minimum of two must be laboratory courses.

INTERDISCIPLINARY AREAS

The interdisciplinary major in the natural sciences enables students to construct science majors around subject areas that bridge two or more disciplines in the natural sciences. An interdisciplinary major in the natural sciences requires a primary concentration in biology, chemistry, geology, or physics and a secondary concentration in another of these sciences.

Students interested in majoring in natural sciences with a primary focus in biology are required to take two of the three courses in the introductory biology sequence as well as *Principles of Classical Physics* and *Principles of Modern Physics*. Additionally, students must take two courses from the introductory sequences of either chemistry or geology. The remaining course work is done in biology and your secondary concentration.

The Environmental Studies major or minor is designed to give students a greater understanding of the interplay between the natural and social sciences in dealing with environmental issues. This interdisciplinary program draws courses from biology, economics, geology, government, and philosophy.

The interdisciplinary area in biomedical ethics is designed to coordinate a student’s background and interest in the biological sciences, health care economics and policy, and ethics with a variety of more specialized approaches. Course work incorporates a variety of disciplines, including biology, government, philosophy, and economics.

Neuroscience unites biology, chemistry, and psychology in a quest for understanding the nervous system. The program serves those whose primary interest is in how the brain works.

RESEARCH

At Lawrence, research begins with the first biology course, *Principles of Biology*, where you will design and conduct your own project and then present the experimental results to professors and classmates at a day-long symposium, much like a professional conference.

As you proceed in your studies, your research will become more sophisticated and independent. Honors in Independent Study projects in recent years have included: Jesse Norton, ’05, “An Investigation into the Role of Environmental Factors on Bryophyte Community Structure at Toft Point and an Analysis of the Adaptive Role of Cuticular Wax Composition” Royce Zehr, ’05, “Length-Weight Regressions and Skeletal Measurement Relationships of the Round Goby (*Neogobius melanostomus*) from Illinois Waters of Lake Michigan” John Giudicessi, ’05, “Tissue-specific Expression of the SUP-9 Potassium Ion Channel in *Caenorhabditis*” Lindsay Scheef, ’04, “*Daphnia pulicaria* Survival and Reproduction in the Water of Lake Winnebago,

Wisconsin, Before and After Zebra Mussel Invasion”
Matthew Koeberl, '04, “A Qualitative and Quantitative Assessment of Putative Caspase Activity in Untreated, Untreated-Aged, Spermine-Treated, and 6-Benzylaminopurine-Treated Senescing *Marchantia polymorpha* Thalli”

Daniel Putterman, '04, “Studies on the External Morphology, Songs, Oviposition, and Lifespan of the Cricket, *Acheta domestica*”

Daniel Adamski, '04, “The Influence of Wind Disturbance on Community Structure and Succession in an East Central Wisconsin White Cedar (*Thuja occidentalis*) Forest”

Trent Liebich, '03, “Fish Growth and Population Dynamics in Memorial Park Pond”

Catherine M. Ptaschinski, '02, “The Effects of Expression of Truncated Myosin Heads in *Caenorhabditis elegans*”

Nathan T. Schreiber, '02, “The Effects of BMP-7, FGF-8, and SHH on Brachial Arch and Limb Bud Mesenchyme”

Jason Tennesen, '01, “Identification and Characterization of a New Class of SUP-9 Mutations”

A number of biology students work with professors in summer research and are supported by a variety of scientific grants.

FACILITIES

Impressive laboratories and equipment await you as a biology student, including an electron microscopy lab, environmentally controlled labs, a greenhouse, a neuroscience computer lab, a eukaryotic tissue culture lab, and labs for fresh and saltwater study.

Equipment includes several specialized microscopes; for example, an inverted microscope with a micro-manipulator and micro-injector, a Zeiss TV-fluorescence-photo microscope, and a Leitz biomed binocular microscope. Your research may involve work with an atomic absorption spectrophotometer, an ultra centrifuge, PCR machines, a high performance liquid chromatography instrument, electrophoresis cells, incubators, and a high vacuum evaporator. Most laboratories are equipped with microcomputers, and there are dedicated computer laboratories for molecular modeling and geographic information systems. Two recent National Science Foundation grants have funded the acquisition of an inductively coupled plasma-mass spectrometer (ICP-MS) and a computer imaging system.

The complete renovation of Youngchild Hall of Science was celebrated in 2002. This is in addition to the recently constructed \$18 million Science Hall (Fall 2000) allowing students' exclusive access to state-of-the-art learning facilities.

CO-OPERATIVE PROGRAMS

If your interest is in forestry or environmental management, consider the cooperative Lawrence-Duke University program. You would spend three years at Lawrence, taking a broad range of courses, and then two years at Duke's School of Forestry and Environmental Studies, where you would focus on resource production, resource science, and resource policy and economics. In five years, you earn the Bachelor of Arts degree at Lawrence and the Master's Degree in forestry or environmental management at Duke.

In nursing or medical technology, five- and six-year programs in conjunction with Chicago's Rush-Presbyterian-St. Luke's Medical Center lead to the B.A. and the B.S. or M.S. degrees. A four-year program, with two years at Lawrence and two years in Chicago, will earn you the B.S. degree, and you will have had the benefit of a liberal arts experience.

A five-year program in association with Washington University in St. Louis allows biology or psychology majors to earn the B.A. at Lawrence and the M.S. in Occupational Therapy.

AFTER LAWRENCE

Professors come to know their students well at Lawrence and are available throughout the undergraduate years to give advice on course selection and career goals.

The Health Careers Advisory Committee organizes workshops with local physicians and with medical school representatives and arranges for internships in medical settings. Lawrence biology majors have earned advanced degrees in many scientific fields: developmental and population ecology at Harvard, aquatic ecology at Cornell, marine biology at Woods Hole Oceanographic Institute and Scripps Oceanographic Institute,

neurophysiology at Emory, hospital administration and genetics at Washington University, molecular and cellular biology at Brown, University of Minnesota, University of California - San Francisco, U.C. - San Diego, Utah, and Vanderbilt, plant ecology and plant physiology at Michigan State, pharmacology at Iowa and Minnesota, and entomology at Illinois, among many others. Some graduates go directly into scientific and medical careers, including work for the World Wildlife Fund, research at medical facilities, and sales representatives for pharmaceutical and chemical companies.

FACULTY

Bart T. DeStasio, associate professor
Lawrence University, B.A.; Cornell University, Ph.D.

Interests: aquatic ecology, computer modeling, evolutionary ecology, ecology of biological invasions

Elizabeth A. DeStasio, associate professor, Raymond J. Herzog Professor of Science

Lawrence University, B.A.; Brown University, Ph.D.

Interests: molecular and cell biology, specifically muscle assembly, evolution, biotechnology

Nicholas C. Maravolo, professor
The University of Chicago, B.S., M.S., Ph.D.

Interests: physiology of plant growth and development, tropical and subtropical plant ecology

William J. Perreault, professor
Siena College, B.A.; Adelphi University, M.S.; University of Michigan, Ph.D.

Interest: coordination of molecular and cytological techniques.

Bradford G. Rence, professor
University of Iowa, B.A.; University of California, Berkeley, Ph.D.

Interests: neurobiology of invertebrates, behavioral rhythms, communication and reproductive behavior, prairie insects.

Jodi L. Sedlock, assistant professor
Loyola University, B.S.; University of Illinois at Chicago, Ph.D.

Interests: terrestrial ecology, ecological and evolutionary mechanisms promoting species diversity, ecology of bats.

Nancy A. Wall, associate professor
Presbyterian College, B.S.; University of South Carolina, M.A.; Vanderbilt University, Ph.D.

Interests: embryonic pattern formation, cellular differentiation, neural development