

# The Science of Life

**MAJOR**

Biology

**Contract Concentrations**

Biomedical Studies  
Biomolecular Science

[www.stolaf.edu/depts/biology](http://www.stolaf.edu/depts/biology)

**F**rom the molecules that make up the building blocks of life to the complex interactions between living beings and their environment, biology is where it all begins. “The 21st century is the century of biology,” says Professor of Biology Dave Van Wylen ’80. “For the first time in human history we have the computational and analytical power — bioinformatics, biophysics, biochemistry — to use in conjunction with biology, allowing us to understand life on a whole new level. Now more than ever, biology is an exciting field to study because of the sophisticated technology that can be directed to biological questions.”

Biologists seek a cure for cancer, study the impact of agriculture on soil and water quality, care for animals and protect natural habitats. They dissect the pillars of life, from genes to cells, and discover the hidden secrets of microbes and molecules. They look at how heredity works between parents and children, examine entire populations and explore the possibility of life beyond Earth. As Professor of Biology Gene Bakko says, “Biology is the study of life, and we are life.”

Biology is a diverse discipline, leading its scholars down many paths of knowledge and practice, including biomedical studies, bioinformatics, molecular genetics, biotechnology, marine biology and astrobiology. It’s no different at St. Olaf. Biology majors have a broad range of learning opportunities, from molecules to biomes, and can pursue independent study and research, internships and off-campus study programs in Australia, the Bahamas, Costa Rica, South India, the Galapagos Islands, Arizona and northern Minnesota.

“One thing that makes us unique is that we are strong in all areas of biology,” says Biology Professor Anne Walter. “We’re very good on molecular, organismal and ecosystemic levels. We also recognize and actively help students interact across the disciplines of biostatistics, biochemistry, biophysics and biopsychology.”

**Cool Classes**

**Equatorial Biology**

South America provides the palette for students to examine equatorial biology through intensive field experiences. Students visit three equatorial environments: the Amazon rainforest, the Andean cloud forests and the Galapagos Islands.

**Vertebrate Biology**

The focus is on the natural history of Upper Midwest vertebrates. Field trips include documenting bird migrations, amphibian chorusing and other animal activities and independent projects explore topics ranging from bluebird nesting behavior to thermal conductivity and insulation in animals.

**Biology in South India**

Biology in South India offers a mix of independent research and global travel. Students complete a cultural course and two independent research projects in topics related to rural health care, leprosy, emerging diseases, agriculture, mountain ecology and human/wildlife interactions.

Introducing students to a range of disciplines starts with a collaborative and interdisciplinary faculty who make a habit of working together, on research projects, in teaching classes and in helping students delve into emerging areas of expertise. “It’s a different kind of education,” notes Professor of Biology Eric Cole. “Students are learning to become cross-trained in terms of solving problems, using tools from different disciplines. No longer are you a chemist working on a problem or a biologist working on a problem. You find a problem you are interested in and you use the tools from chemistry or biology or molecular genetics to solve it.”

**IT’S A FACT: We are 6th among 217 baccalaureate liberal arts colleges nationwide in the number of graduates who go on to earn Ph.D.s in biology.**

Another strength of St. Olaf’s biology program is the depth and breadth of student research. Thanks to multiple grants from the Howard Hughes Medical Institute, the laboratories and classrooms are equipped with state-of-the-art technological tools that students can readily use. “When I applied to work with a research group from the Northwest Fisheries Science Center, a division of the National Oceanic and Atmospheric Administration, they were especially impressed with the water sampling, fish identification, and other general research skills that I had gained from St. Olaf’s courses,” says biology major Lindsay Vandelinder ’05.

St. Olaf biology students also get out into the world. While some might attend Emory University Medical School in Atlanta to study cardiac physiology or spend a semester in Denmark learning molecular or marine biology, others travel to Australia to study the



**Natural habitats**

Biology students at St. Olaf don’t learn about ecosystems only while sitting in classrooms or doing research in labs. They have nearly 1,000 lush acres to explore. That includes more than 150 acres of native tall-grass prairie, 15 wetlands, a bluebird trail of 60 houses, 600 acres of farmland, 10 miles of trails and 80 acres of woods recently planted with 40,000 tree seedlings and nursery stock trees.

interplay between the basic biology of marine and terrestrial environments and the policies that affect them. Still others spend January in Lake Itasca discovering how animals and plants survive the winter, or travel to the Bahamas to investigate the marine and terrestrial habitats of San Salvador Island.

“Every student who studies biology at St. Olaf will have an investigative experience. It gives them an understanding of the essence of scientific inquiry,” says Van Wylen. “It teases their sense of wonder, encourages them always to be curious and plants in them an understanding of scientific rigor, so they can address the issues they take on. These are lifelong learning skills that transfer to all areas of life.” ■

**UNLOCKING THE GENE STREAM**

**U**nlocking the mysteries of genes is one of the juiciest areas of science, one that interests scholars in biology, chemistry and biotechnology. A recent \$540,000 grant from the National Science Foundation allows students to have an experience that resembles that of a graduate student or professional scientist as they discover new genes and explore their functions. Called the “Gene Stream,” the project is open to any student, but is especially well suited to those who are developing a concentration in biomolecular science.

“We have a strong cadre of people at St. Olaf who specialize in genetics, everything from the genetic basis of evolution to cell biology and development. There are also many opportunities for students to get into genetics through independent research,” says Biology Professor Eric Cole. “It’s a golden era for genetics because of the genomic databases that have been published. Suddenly, we have an incredible tool box for understanding cell biology and disease.”

## Wise Counsel

**Genetic Counselor Barbara Bowles Biesecker ’79 balances science with ethics.**

**F**or many researchers, the joy of the scientific process lies in the precision and logic with which they pursue their work. For Barb Biesecker ’79, the most interesting part of her job is the way that science intersects with the complicated terrain of human emotion.

As director of the Johns Hopkins University-National Human Genome Research Institute Genetic Counseling Program, she is familiar with the wrenching decisions that some parents-to-be must make. Her research has examined the quality of life of people with genetic disorders and studied ways to improve women’s engagement in the decision to undergo invasive prenatal testing. Although such testing can provide information about possible genetic abnormalities, the testing itself can cause a woman to lose her pregnancy.

Biesecker might have overlooked this field had it not been for her attentive faculty members at St. Olaf. When a biology professor showed Biesecker an article in *The New York Times* about genetic counseling, it changed the course of her college career. “It was the pinnacle article about the starting of the field of genetic counseling,” she says. “As soon as I read that article, I knew what I wanted to do.” She had a number of mentors in her biology and psychology courses, and now, as the director of a genetic counseling program, she tries to provide her patients with the kind, practical wisdom that she received as a St. Olaf student.

As the field continues to develop, Biesecker hopes to see increased understanding of the often-combustible combination of genetics and emotion. “Genetic counseling research is a science, because we’re trying to understand it systematically and use it to inform clinical practice, but it’s also about how these things make people feel,” she says.



*“This is a very exciting time to be in biology. The genomic revolution is huge. It’s a new tool that can be used to answer questions people have asked for hundreds of years. Students often worry that everything is already known about a subject and there’s nothing left to probe, but that’s not true at all with biology.”*

—Anne Walter  
Professor of Biology

## CARDIAC RESEARCH AND SURGERY AT EMORY UNIVERSITY INTERIM

**A**lthough Atlanta in January is warmer than Minnesota, it isn't Barbados or the Galapagos Islands where other Interim biology courses are offered. The subject matter draws the Emory University Interim applicants. Students stay at St. Olaf for the first week of the course, poring through a medical school textbook and actual research reports from the Emory University Cardiothoracic Research University. Once students arrive in Atlanta, their prior legwork helps them keep up with Emory researchers and physicians.



The Emory experience is not intended to nudge students in any particular professional direction. Despite the cardiac thrust of the curriculum, the knowledge imparted is readily transferable to neurology, pathology, oncology, nephrology or any other medical field.

"St. Olaf students are bright and self-assured," says Dr. Jakob Vinten-Johansen, director of Emory's Cardiothoracic Research Laboratory. "They have a sense of confidence that I don't see in students from larger universities."

By the end of Interim, students clearly understand the relationship between a textbook, a research lab and the clinical arena where the research and coursework is applied. "Knowing that they can develop substantial expertise in the treatment of cardiac disease gives students the confidence that they can become an expert in any area of medicine," says Biology Professor Dave Van Wylen '80, who leads the Emory Interim each year.

Arriving with a heightened aptitude allows St. Olaf students to make the most of their time with Emory's medical and research teams. Early classroom experience with St. Olaf Biology Professor Dave Van Wylen (above left) helps students like Anna Cox '06 (top right, with Emory's Dr. Jakob Vinten-Johansen) and Berit Ahlgren '05 (bottom right, with Emory's Dr. James Reeves) fit smoothly into hospital and lab surroundings.



**"BIOLOGY IN SOUTH INDIA HAD THE BIGGEST IMPACT ON ME. It was so specific to my area of study. After a three-week orientation in Chennai, 10 of us split into groups and traveled to our study sites. I went first to Kodaikanal in the Western Ghats mountain range where, with the help of translators, I interviewed farmers about their agricultural practices. I talked with rural people who farmed about 10 acres of land and lived a life totally different from my own. My second site was the Mudumalai Wildlife Sanctuary where I studied the growth rate of a tree species and related it to rainfall and human disturbance. Here I saw the great diversity India has in birds, plants and other animals. I learned so much about scientific research, India and myself. Every day was an adventure."**

— Lily Ahrens '05, biology and environmental studies double major

