



Biology

Biology is the science of life. Each living thing is an amazingly complex system, and each interacts with other living things in complex ways. Biological science holds the key to addressing many issues facing humanity, including disease treatment and prevention, food production and its impacts, environmental changes, loss of biodiversity, genomic editing of organisms, regenerative medicine, and more. The need for dedicated, innovative, and socially responsible biological scientists, physicians, educators, and citizens has never been greater than it is today. Thus, at the core of Gonzaga University's Biology Department is the Jesuit mission to combine academic study with the pursuit of social justice and the development of the whole person.

THE PROGRAM

The Biology Department curriculum emphasizes an integrative and evolutionary approach that helps students become well-versed in central biological ideas and skills. All Biology majors take the same introductory courses that introduce foundational themes and concepts; they then pursue their area of interest through elective courses. Bachelor of Science majors may choose to focus their studies in one of four concentrations: Physiology, MMCB (Microbiology, Molecular and Cell Biology), ECB (Ecology and Conservation Biology), or IEB (Integrative and Evolutionary Biology).

The program's educational mission focuses on inclusive excellence and leadership; that is, it provides a rigorous yet supportive environment in which all students can develop their interests and hone their skills. Students can do this by participating in research, serving as teaching assistants or peer mentors, or getting involved in science outreach programs. The Biology Department strives to attract, retain, and promote the success of its students, including underrepresented and first-generation college students. Specific programs have been developed to build community among diverse learners, such as the student chapter of the *Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)*, the *Science Scholars* program, the *Bio in Bollier* mentoring program, and the *Science In Action!* outreach program.

DEGREE PROGRAMS

The Biology Department offers two different degrees, both of which provide a strong foundation of knowledge and hands-on research experience, while cultivating curiosity and critical thinking.

The **Bachelor of Science (B.S.) in Biology** provides students with a broad education in biology, supported by a solid grounding in chemistry and physics. This degree is designed for students pursuing continued training in graduate or professional programs in biological and biomedical sciences, or in health science careers, with the option to focus on one of four concentrations: *Physiology*, *MMCB (Microbiology, Molecular and Cell Biology)*, *ECB (Ecology and Conservation Biology)*, or *IEB (Integrative and Evolutionary Biology)*.

The **Bachelor of Arts (B.A.) in Biology** provides students with a thorough biology education, but with fewer chemistry and physics courses. It allows flexibility for students pursuing additional interests, such as teaching or a second major in another area of study.

BACHELOR OF SCIENCE CONCENTRATIONS

The B.S. in Biology offers four optional pathways for students to focus their studies.

Microbiology, Molecular and Cell Biology (MMCB). A scientific examination of how life works at the molecular and microscopic level—cells, genes, and molecules. This track prepares students for careers in medicine, biomedical research, biotechnology, food, agricultural and pharmaceutical industries.

Physiology. An examination of life that integrates cells, tissues, and organ systems up through free-living plants and animals. The concentration takes a broad perspective, comparing all types of organisms in an evolutionary context. This track prepares students for careers in human and veterinary medicine, allied health fields, and research in all branches of physiology.

Ecology and Conservation Biology (ECB). An examination of the interactions between organisms and their natural and human-impacted environments. This track provides knowledge and skills for jobs or graduate work in field biology, fish and wildlife management, environmental science, or conservation.

Integrative and Evolutionary Biology (IEB). An examination of life that provides a broad-based evolutionary background for understanding complex biological systems, integrating research and methods from multiple fields within biology. This track offers the most flexibility in courses, and prepares students for a wide range of careers.

RESEARCH CONCENTRATION

The Research Concentration is designed for students who want to explore graduate level training in science, and may be pursued as part of any of the Biology degrees and tracks. This concentration includes a significant research experience, participation in a seminar course, added math courses, and involvement in science outreach.

RESEARCH OPPORTUNITIES

Biology faculty involve students in their research projects because they are passionate about discovering new information and convinced that doing research is a great way for students to learn science. In recognition of their dedication to undergraduate research, the Biology Department and the Chemistry and Biochemistry Department were awarded two consecutive \$1.2 million grants by the Howard Hughes Medical Institute to support science education and research at Gonzaga. In addition, many faculty members have research grants from federal agencies (NSF, NIH, USDA) or charitable foundations that support student participation in their work. Gonzaga students are an integral part of the research process in faculty labs, present their research at regional and national scientific meetings, and co-author papers in scientific journals with their faculty mentors.

Current research projects seek to answer such questions as:

- How do certain human genes, which are essential for viability, do their work in cells?
- How does size and age of mother turtles affect the survival and success of her hatchlings?
- How do some viruses benefit their host?



- Can a naturally occurring fungus be used to fight cheatgrass invasions?
- How does heavy metal pollution affect animal behavior?
- What affects the evolution of arboviruses like Zika?
- How do salamanders communicate?
- How does environmental stress impact organisms and ecosystems?
- How and why do rhinoceros beetles evolve “horns” that they use as weapons?

For more detailed descriptions of faculty/student research, please see our Undergraduate Research website: gonzaga.edu/science-research.

STUDY ABROAD

Many Gonzaga Biology majors combine coursework or research with travel, which allows them to learn about other cultures and ecological systems while pursuing their educational goals. Study abroad programs popular with Biology majors include those in Edinburgh, Copenhagen, Brisbane, and Christchurch. If students are more of an “outside” biologist, the School for Field Studies offers field-based conservation-oriented programs in such places as Costa Rica, Australia, the Turks and Caicos Islands, Kenya, Panama, and Peru. The Department has faculty-led programs in the summer, including one in Zambia and a variety of immersive outdoor learning options in the western U.S.

SCIENCE OUTREACH

An understanding of the nature and value of science is important for the general public as well. For that reason, Gonzaga biology students participate in a variety of outreach programs, including



Science in Action! This popular program sends teams of GU students to K-12 classrooms in Spokane to do inquiry-based science activities. Other students volunteer at local science education events or serve as lab mentors to high school students who have an interest in science.

OUTCOMES

The Biology Department faculty members are dedicated to excellence in teaching and mentoring students through the rigorous curriculum of the Biology degree. As a result, Biology majors are well prepared for careers in medicine, research, teaching, and other biology-related fields. Some students decide to work for biotechnology companies after graduation, such as Jubilant HollisterStier Laboratories and AGC Biologics. Others take jobs with government agencies, hospitals, or university research laboratories. Still others pursue careers that integrate a passion for biology with other interests, such as genetic counseling, science writing, public health, forensics, law, and health care.

GRADUATE STUDIES

Through their undergraduate research experience, a number of Gonzaga students discover how exciting and intellectually stimulating scientific research can be and decide to pursue graduate study for advanced degrees. Gonzaga graduates are currently working on Ph.D. degrees in neuroscience, infectious diseases, cell and molecular biology, ecology, molecular plant sciences, and others at research universities throughout the country, such as:

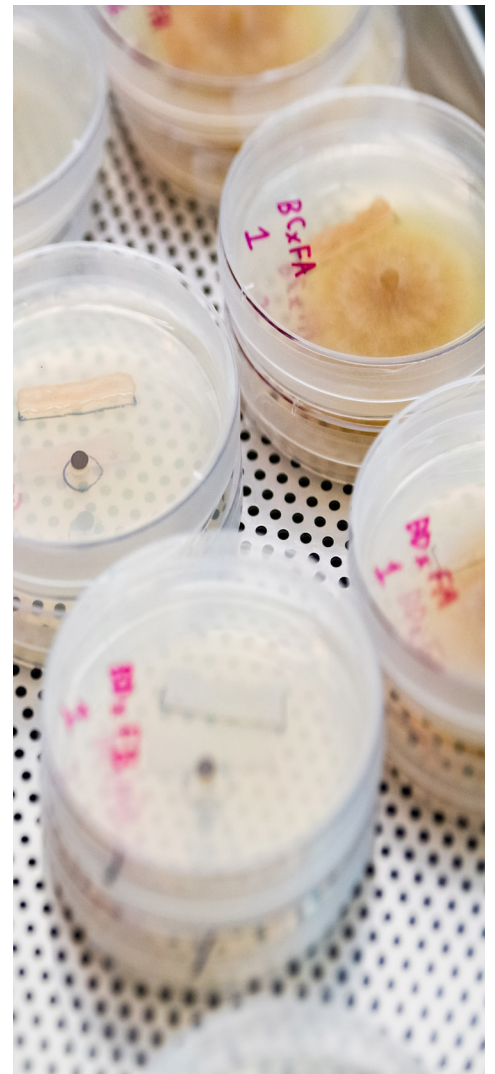
- Johns Hopkins University

- University of California - Berkeley
- University of Indiana
- University of Michigan
- University of Wisconsin - Madison
- Washington State University
- Yale University

HEALTH SCIENCE CAREERS

Several members of the Biology Department support Gonzaga's Health Professions Pathways Program (H3P), a program that advises students applying for professional schools in medicine, dentistry, veterinary medicine, and other fields. H3P helps students plan their academic path, explore health-related fields, navigate the application process, and obtain letters of recommendation. Students are strong candidates for health-care professional schools; Gonzaga Biology alumni are currently at schools across the country, including:

- Case Western Reserve University
- Creighton University
- Medical College of Wisconsin
- Oregon Health and Science University
- Saint Louis University
- University of Arizona
- University of California - Irvine
- University of Florida
- University of Iowa
- University of Nebraska
- University of Pittsburgh
- University of Utah
- University of Washington
- Washington State University



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