

Biochemistry

Anyone who has ever imagined making a more effective medicine, discovering a cure for a disease, or finding a way to convert toxic waste into a valuable source of energy may want to consider a career in biochemistry.

The Department of Biochemistry at Ohio State offers excellent training in the chemical basis of life and insight into the chemistry of living systems. The study of biochemistry provides a good background for further study or employment in many basic science disciplines. Many undergraduates in biochemistry go on to professional schools, especially medical schools.

Biochemists look at how living organisms function at the molecular level. Biochemists may be teachers or they may be researchers who study such subjects as the structure of enzymes, the transfer of genetic information, or photosynthesis. Biochemists investigate how molecular structure determines biological function, how molecules recognize each other and how the dynamic chemical changes that occur in cells are orchestrated.

In recent years, basic information gained in biochemical research has been applied with outstanding success to some of the fundamental problems of biology. Biochemists have found that many biochemical processes are shared by all life forms. Basic research into the complex chemistry of living systems provides a springboard for practical advances in medicine, agriculture, and biotechnology.

Pursuing Biochemistry at Ohio State

High school students planning to major in biochemistry are advised to acquire a strong background in mathematics and science (biology, physics, and especially chemistry). Enriched, advanced, or honors courses, courses with an associated laboratory, and research experience are encouraged. Good written and oral communication skills are also important.

All Ohio State freshman applicants are considered within a competitive admission process for the Columbus campus. The primary criteria for admission are the completion of the applicant's high school college preparatory program, performance in that program as indicated by class rank and/or grade-point average, and performance on either the ACT or SAT. Upon admission to the university, students can declare a major in anthropology within the College of Biological Sciences. Interested students should contact the undergraduate advisor for biochemistry and an Undergraduate Student Academic Services (USAS) counselor.

Biochemistry Requirements

The biochemistry major consists of a minimum of 14 upper level courses in biochemistry, molecular genetics, organic and physical chemistry, and mathematics. Once students decide they want to major in biochemistry, they should contact the Department of Biochemistry for the current major requirements.

Not included in the biochemistry major, but required by it, are courses that yield a basic understanding of the sciences upon which biochemistry is built. All biochemistry majors take math through Calculus III, one year of general chemistry, one year of introductory physics, and two terms of general biology. These basic math and science requirements of the biochemistry major are nearly identical with the requirements of pre-medicine, pre-optometry, pre-dentistry, and pre-veterinary medicine.

Co-Curricular Opportunities

Biochemistry majors at Ohio State are strongly encouraged to do a research project with a faculty member. Ohio State offers well-equipped laboratories containing sophisticated instrumentation for biochemical research. Information about choosing an undergraduate research laboratory is available on the Biochemistry Department web page and on the College of Biological Sciences web page at www.biosci.ohio-state.edu/undergrad/undergrad-research.php.

The Biochemistry Club and the College of Biological Sciences honorary student organization enhance learning opportunities and the quality of the undergraduate experience for students in biochemistry. These clubs provide opportunities for students to interact with faculty, discuss careers and research areas with scientists from the Ohio State campus and beyond, and participate in service activities.

Honors & Scholars Programs

The Honors Program in the Colleges of the Arts and Sciences provides high-ability students opportunities to pursue challenging academic programs. Honors students in biochemistry are encouraged to meet with their faculty advisor on a regular basis and to construct an enhanced curriculum that includes honors courses, upper-division courses to meet general requirements, rigorous sequences, honors seminars, and a strong major, including a significant research experience.

The Ohio State Scholars Programs feature residential communities for students who share academic interests and career goals. Two of the Scholars programs of interest to biochemistry majors are the Biological Sciences and Health Sciences Scholars Programs. The Biological Sciences Scholars

For more information, check these web sites:

Biochemistry: www.biosci.ohio-state.edu/~biochem
College of Biological Sciences: www.biosci.ohio-state.edu
Ohio State: www.osu.edu

Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu
First Year Experience Program: fye.osu.edu

Curriculum Sample

This is a sample list of the classes a student will take to pursue a degree in Biochemistry. Since university students need more than specific education in a narrow field, they also will take classes to complete the General Education Curriculum (GEC). The GEC will allow students to develop the fundamental skills essential to collegiate success across major programs. Course work options satisfying the GEC often come from a variety of academic areas of study allowing students to tailor their GEC toward their interests. Note: This sample represents one of several possible paths to a degree in Biochemistry. Consult the departmental web site, www.biosci.ohio-state.edu/~biochem, for additional details about the major.

Freshman Year:

Biological Sciences Survey	1
General Biology	10
General Chemistry	15
Mathematics (calculus)	15
GEC (first writing)	5
GEC (social sciences)	5
Freshman Seminar	1
Total hours	52

Sophomore Year:

Organic Chemistry	15
Analytical Chemistry	5
Mathematics (calculus)	5
Introductory Physics	15
GEC (foreign language)	10
Total hours	50

Junior Year:

Biochemistry lecture	12
Biochemistry laboratory	5
Physical Biochemistry	9
Molecular Genetics	5
GEC (foreign language)	10
GEC (second writing course)	5
Total hours	46

Senior Year:

Electives	10
GEC (social sciences)	10
GEC (arts & humanities)	25
Research (optional)	5
Total hours	50

Program emphasizes research, with individualized advising and significant lab and field experience. The Health Sciences Scholars Program is focused on preparing students for careers in health sciences and health care.

Career Prospects in Biochemistry

Biochemists may work in industry, pharmaceutical companies, hospitals, universities, or private research labs. The federal government employs many biochemists, as do state and local government agencies, and the rapidly growing field of biotechnology has a great need for biochemists.

Many jobs in biochemistry involve high-level research and require advanced training leading to an M.S. or a Ph.D. degree. For positions designing or directing research projects, a Ph.D. is a must. Keep in mind that most Ph.D. students, as part of their training, serve as research and teaching assistants and thereby earn a large part of their living and educational expenses while they are in graduate school.

With the increasing demand for biochemists and the excellent quality of Ohio State's training at the undergraduate level, a variety of employment opportunities can be found with a bachelor's degree. Examples of jobs available to graduates with bachelor's degrees in biochemistry might include biochemist, medical or pharmaceutical lab technician, food scientist, or industrial salesperson.

Many biochemistry students go on to careers in medicine or some other health profession. While a major in the biological sciences is not a requirement for medical school (or other professional schools in the health sciences), it has many advantages, with its exposure to the basic principles of life processes and the theoretical underpinnings of sophisticated medical procedures.

An undergraduate major in biochemistry does not limit one's options to careers in medicine or biological research. Some students move into other science careers such as science teaching, or working in nature centers, forensic labs or for the government. Some biochemistry students choose to use the science background and the analytical thinking skills they acquired through the biochemistry major in careers that best suit their talents and interests, for example in business or law.

Salaries are commensurate with level of education and prior job experiences. Students who complete graduate degrees can expect to earn substantially more than students with a bachelor's degree. Salaries in general are dependent upon a variety of economic factors and change with market trends.

For more information about careers in biochemistry, call or write the Arts and Sciences Career Services Office, 06 Denney Hall, 164 West 17th Avenue, Columbus, Ohio 43210-1371. (614) 292-1868.

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