

# Biochemistry, MS, PhD

**Department:** Chemistry and Biochemistry Department

**College:** College of Science

## Overview

### About This Degree

Biochemistry researchers at USU are studying the fundamental structures and functions of a range of biological systems. Ongoing projects include the elucidation of mechanisms of a number of enzymes and metalloenzymes involved in nitrogen metabolism, utilization and degradation of hydrocarbons, post-translational modifications such as phosphorylation and methylation, and the assembly of macromolecular enzyme systems. Departmental research impacts a diverse range of phenomena including understanding global energy and element cycles, bioremediation, and human health and disease.

Research programs are consistently funded by national agencies such as the National Science Foundation, National Institutes of Health, and the U.S. Department of Energy.

## Career Options

Chemistry is a versatile degree. While many of USU's graduate alumni enter the fields of research and academia, the following options are also available to chemistry graduates:

- Chemistry
- Ethnobotany
- Environmental law
- Patent law
- Pharmaceuticals
- Oceanography
- Forensic science
- Biotechnology
- Medicine
- Teaching
- Engineering
- Agrochemistry
- Military systems

## What it takes

### Admissions Requirements

Prospective students in the graduate programs must have undergraduate degrees in chemistry or biochemistry.

Applicants are encouraged to submit a preapplication directly to the department. The preapplication form is found on the department website. Based on the preapplication, the department will quickly inform applicants of the probability of their acceptance into a graduate program. It will also notify the faculty member(s) designated on the preapplication and put them in contact with the students. Students will then be encouraged to apply officially by completing the following steps:

#### Application Requirements:

- Complete the [online application](#)
- Pay the \$55 application fee
- Score at or above the 40<sup>th</sup> percentile on the GRE
- Have a 3.0 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation

International students have [additional admissions requirements](#).

## Admissions Deadlines

Due to the nature of graduate course sequences, it is highly recommended that students enter the graduate program in the fall semester. Although there are no application deadlines, submission of all application materials by April 15 is strongly encouraged.

## Master's Degree Plan Options

Students can receive the MS by pursuing the following option:

- In the **Plan A** option, students complete graduate-level coursework and must write a thesis.

## Financial Assistance

First-year graduate students are awarded a \$1,000 Department of Chemistry and Biochemistry Fellowship. [Health insurance](#) is offered to graduate students at a subsidized rate (80% covered).

The **Willard L. Eccles Foundation Science Fellowship** is an award of \$22,000 per year for three years. The graduate programs committee nominates two to three candidates, and one candidate is chosen from the College of Science each year. Selection criteria include: grade point average, GRE score, letters of recommendation, and evidence of strong academic and research potential in the discipline. The application deadline for this fellowship is February 15.

[Assistantships](#) are also available. With these, the department is responsible for the first nine months of stipend and tuition, with the remaining summer stipend and tuition usually paid from faculty research funds. Teaching assistants devote no more than 12 hours per week directing undergraduate laboratories, leading recitation sections, and assisting students with questions during the regular two-semester academic year. Research assistantships are funded from individual faculty research grants and support students conducting research related to the grant projects. Although first-year students are not normally supported as research assistants, well-prepared students may be eligible for research support at the discretion of their major professor.

A variety of additional funding opportunities are available, including [fellowships](#), [scholarships](#), [tuition awards](#), and [travel support](#).

## Program Requirements

[Click here](#) to see course requirements for the **Master of Science**.

[Click here](#) to see course requirements for the **Doctor of Philosophy**.

In the weeks prior to the first academic semester, new students must participate in the graduate student orientation program. New students are required to attend a safety workshop and departmental orientation sessions, take departmental competency examinations, and receive academic advising. Students receiving a teaching assistantship must attend training sessions administered by the School of Graduate Studies. The scheduling of these events will be announced well in advance.

### PhD Qualifying Exams:

PhD students must take both written and oral candidacy examinations. The written examination ensures that students have a broad understanding of chemistry and the depth of knowledge in their chosen fields required for PhD work. The written examination must be passed before the oral examination is attempted.

## Contact

### Advisor(s)

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## Get Involved

### Professional Organizations, Honor Societies, and Clubs

**American Chemical Society:** With more than 161,000 members, ACS is the world's largest scientific society and one of the world's leading sources of authoritative scientific information. A nonprofit organization, chartered by Congress, ACS is at the forefront of the evolving worldwide chemical enterprise and the premier professional home for chemists, chemical engineers and related professions around the globe.

### Labs, Centers, Research

**Center for Advanced Nutrition:** The CAN provides a multi-disciplinary venue for the discussion, discovery, and dissemination of information about the biological, physiological, and psychological mechanisms of proper nutrition. The scope of discovery is broad and falls into four distinct but overlapping focus areas: bioactive foods, nutrition and the brain, ingestive behavior, and personalized nutrition.

**Center for Integrated BioSystems:** The CIB leads a progressive, interdisciplinary effort in research, core services, and education serving agriculture and life sciences. The CIB is where the first hybrid animal, a mule, was cloned, and was named one of "30 Awesome College Labs" by Popular Science magazine. The CIB has a research program with several active projects in diverse areas of life science that encompass plant, animal, and microbe functional genomics.

**Energy Dynamics Laboratory:** EDL bridges the gap between academia and industry, confronting the challenges of prototyping, deployment, and commercialization of enabling technologies for renewable and advanced energy systems. USU researchers originate projects to derive energy from non-fossil fuels, such as biofuels, wind, and solar power. With EDL's collaboration, research develops through pilot projects to commercial application.

**Energy Laboratory:** This lab seeks to develop solutions to America's most intractable energy problems through scientific and technological innovation. It provides a cohesive framework permitting faculty, students, and partnering institutions to focus on contemporary energy-related research issues.

**Environmental Quality Laboratory:** The EQL is located at the Utah Water Research Lab and is equipped for analyses of organic and inorganic constituents in air, water, and soil. The EQL consists of chemistry, microbiology, radiological and analytical instrumentation laboratories, two constant-temperature rooms, and research project areas.

**Institute for Antiviral Research:** The IAR is comprised of a recognized team of scientists representing a spectrum of disciplines, who are researching ways to control viral diseases. The IAR has been involved with the pre-clinical development of several FDA-approved drugs, including Tamiflu, which was recently used to combat H1N1. The main areas of emphasis are respiratory diseases such as influenza and infections caused by emerging viruses, including West Nile virus.

**Metabolic Engineering Laboratory:** Research areas in this lab include the discovery and identification of bioactive natural products, biosynthetic mechanisms of pharmaceutically important compounds, characterization and development of biocatalysts for structural modification, as well as improvement of useful enzymes using protein-engineering approaches. Combinatorial biosynthesis of novel biologically significant compounds for drug discovery is also being investigated.

**USDA ARS Poisonous Plant Research Laboratory:** The Poisonous Plant Research Laboratory identifies toxic plants, and its interdisciplinary teams of chemists, geneticists, pathologists, physiologists, plant and range scientists, toxicologists and veterinarians provide an interdisciplinary approach of applied and basic research to develop solutions to intoxication.

