

# Biochemistry

Website: Biochemistry (<https://new.sewanee.edu/programs-of-study/biochemistry/>)

Biochemistry uses the principles of chemistry to explore biological processes at the molecular level. The core courses within the biochemistry major provide a strong foundation of organic chemistry and cell biology that enables majors to explore the biochemical processes and mechanisms driving metabolism and molecular biology. From there, students can tailor their elective courses to their own interests and career aspirations by taking a deep dive into topics ranging from inorganic chemistry and instrumental analysis to the biology of aging and infectious disease. Whether your future plans involve human or veterinary medicine, furthering scientific knowledge, or something completely different, the biochemistry major provides you with the skills to tackle real-world challenges that can have a lasting impact on society.

## Faculty

Professor: Kikis

Associate Professors: Seballos, C. Smith (Chair), R. Summers

## Major

The interdisciplinary major in Biochemistry is administered by the Departments of Biology and Chemistry.

## Requirements for the Major in Biochemistry

The major requires successful completion of the following:

| Code   | Title  | Semester Hours |
|--|--|----------------|
| <b>Course Requirements</b>                         |  |                |
| BIOL 133   | Introductory Molecular Biology and Genetics <sup>1</sup>     | 4              |
| BIOL 233   | Molecular Cell Biology                                       | 4              |
| BIOL 243   | Molecular Methods (Lab)                                      | 4              |
| BIOL 307   | Mechanistic Biochemistry (Lab)                               | 4              |
| or CHEM 307  | Mechanistic Biochemistry (Lab)                               |                |
| Select one of the following:                       |  | 4              |
| BIOL 236   | Biochemistry   |                |
| BIOL 316   | Biochemistry of Metabolism and Molecular Biology (Lab)       |                |
| BIOL 317   | Biochemistry of Metabolism and Molecular Biology             |                |
| CHEM 316   | Biochemistry of Metabolism and Molecular Biology (Lab)       |                |
| CHEM 122   | General Chemistry II - Equilibrium to Electrochemistry (Lab) | 4              |
| or CHEM 152  | Advanced General Chemistry II (Lab)                          |                |
| CHEM 201   | Organic Chemistry I (Lab)                                    | 4              |
| CHEM 202   | Organic Chemistry II (Lab)                                   | 4              |
| CHEM 352   | Thermodynamics and Kinetics (Lab)                            | 4              |
| MATH 102   | Calculus II  | 4              |
| PHYS 101   | General Physics I (Lab)                                      | 4              |
| Select at least two of the following: <sup>2</sup> |  | 8              |
| BIOL 223   | Genetics (Lab)   |                |
| or BIOL 224  | Genetics   |                |
| BIOL 280   | Molecular Genetics (Lab)                                     |                |
| BIOL 318   | Molecular Revolutions in Medicine                            |                |
| BIOL 319   | Cancer Cell Biology (Lab)                                    |                |
| or BIOL 320  | Cancer Cell Biology  |                |
| BIOL 325   | Biology of Aging   |                |
| BIOL 331   | Immunology   |                |
| BIOL 340   | Microbiology (Lab)   |                |
| or BIOL 339  | Microbiology   |                |

|             |  |
|-------------|--|
| BIOL 351    | Environmental Physiology and Biochemistry of Animals |
| BIOL 360    | Virology   |
| BIOL 388    | Epigenetics  |
| or BIOL 389 | Epigenetics (Lab)                                    |
| CHEM 308    | Inorganic Chemistry (Lab)                            |
| CHEM 311    | Instrumental Analysis (Lab)                          |
| CHEM 417    | Advanced Biochemistry                                |

|                             |           |
|-----------------------------|-----------|
| <b>Total Semester Hours</b> | <b>52</b> |
|-----------------------------|-----------|

|             |              |                       |
|-------------|--------------|-----------------------|
| <b>Code</b> | <b>Title</b> | <b>Semester Hours</b> |
|-------------|--------------|-----------------------|

### Additional Requirements

A comprehensive examination <sup>3</sup>

1

The Biochemistry Program will allow an AP test score of 5 or a higher level IB test score of 6 or 7 to substitute for BIOL 133. Students should be advised that mastery of the material covered in BIOL 133 will be important for their comprehensive exam.

2

Students who take BIOL 236 or BIOL 317 must select at least one laboratory course.

3

The comprehensive exam takes place during the second exam period of the Easter semester of a student's senior year. The exam consists of both written and oral portions covering core 200- and 300-level courses.

## Honors

In order to receive honors in the Biochemistry program, a student must have a 3.20 or higher GPA in the major courses and must complete a research project that the Biochemistry committee considers worthy of honors. The research project may be done as part of an approved departmental research course, or it may be done in the context of a summer research program at the University of the South or at another institution. The honors project must involve some original work. A formal written report and seminar presentation on the research are required. Students must inform the Biochemistry committee of their intention to seek honors no later than October 1 of their senior year.

## Student Learning Outcomes

A student majoring in Biochemistry will

1. Identify and clearly communicate foundational concepts of organic chemistry.
2. Identify and clearly communicate foundational concepts of cell biology.
3. Identify and clearly communicate foundational concepts of mechanistic and/or metabolic biochemistry.
4. Identify and clearly communicate foundational concepts of physical chemistry.
5. Apply the scientific method and core research techniques to interpret and analyze data and/or primary literature.
6. Apply foundational knowledge and/or verbal communication skills to hypothesize, predict, explain, and/or defend analysis of an applied problem.