Biochemistry Major

Program Requirements

- **Total Units Required:** Most students complete the major within 67-69 units; total units may vary depending on the courses selected to satisfy foundational, mathematics/data science, and advanced course requirements.
- **Grade Requirement:** A minimum grade of C– must be earned in each course to count toward the biochemistry major.
- **Note:** Regarding the double counting of course credits, College of Arts & Sciences Guidelines will be followed.

Required Courses

To prepare for a major in biochemistry, students will take the following foundational courses:

Foundational Requirements

Code	Title	Units
BIOL 2960	Principles of Biology I	4
BIOL 2970	Principles of Biology II	4
CHEM 1601	Principles of General Chemistry I *	3
or CHEM 1701	General Chemistry I	
CHEM 1602	Principles of General Chemistry II *	3
or CHEM 1702	General Chemistry II	
CHEM 1751	General Chemistry Laboratory I *	2
CHEM 1752	General Chemistry Laboratory II *	2
CHEM 2501	Organic Chemistry I *	3
CHEM 2502	Organic Chemistry II *	3
CHEM 2551	Organic Chemistry Laboratory I *	1
CHEM 2552	Organic Chemistry Laboratory II *	1
MATH 1510	Calculus I **	3
MATH 1520	Calculus II **	3
PHYSICS 1740	Physics I	3-4
or PHYSICS 1760	Focused Physics I	
PHYSICS 1741	Physics I Laboratory	1
PHYSICS 1742	Physics II	3-4
or PHYSICS 1762	Focused Physics II	
PHYSICS 1743	Physics II Laboratory	1
Total Units		**40-42**

* All Chemistry courses must be taken in residence at WashU to count toward the major.

**MATH 2801 Honors Mathematics I may replace both MATH 1510 Calculus I and MATH 1520 Calculus II.

In Fall 2026, the Organic Chemistry sequence (CHEM 2561 Organic Chemistry I With Lab and CHEM 2562 Organic Chemistry II With Lab) was replaced by a separated lecture and lab sequence. CHEM 2561 Organic Chemistry I With Lab is equivalent to CHEM 2501 Organic Chemistry I and CHEM 2551 Organic Chemistry Laboratory I. CHEM 2562 Organic Chemistry II With Lab is equivalent to CHEM 2502 Organic Chemistry II and CHEM 2552 Organic Chemistry Laboratory II.

Math and Data Science Requirement

Majors must take at least one math and data science elective course from the following list:

Code	Title	Units
CSE 2107	Introduction to Data Science	3
CSE 2400	Logic and Discrete Mathematics	3
MATH 2130	Calculus III	3-4
or MATH 2802	Honors Mathematics II	
SDS 2020	Elementary Probability and Statistics	3
SDS 3020	Elementary to Intermediate Statistics and Data Analysis	3
SDS 3110	Biostatistics	3

Advanced Course Requirements

For the biochemistry major, students must complete a minimum of 24 units of upper-level (3000+) courses, including those in the core options, as well as an advanced laboratory requirement and up to 9 units of advanced electives and/or independent study. The 24 units must be drawn from the requirements 1 through 5 as listed below.

Biochemistry majors must complete the Arts & Sciences Writing Intensive (WI) requirement. There are WI courses in the major, but students can complete the requirement with any A&S WI course.

1. Chemistry Core Requirement

Code	Title	Units
CHEM 4090	Physical Chemistry for the Life Sciences *	3

* CHEM 4020 Physical Chemistry II may replace CHEM 4090 Physical Chemistry for the Life Sciences. However, students will need to complete CHEM 4010 Physical Chemistry I as a prerequisite.

All chemistry coursework requirements must be taken in residence at Washington University in St. Louis.

2. Biochemistry Core Requirements

Both of the following courses must be completed:

Code	Title	Units
CHEM 4810	General Biochemistry I	3
CHEM 4820	General Biochemistry II	3
Total Units		**6**

3. Biology Core Requirement

At least one biology core course must be chosen from the following list:

Code	Title	Units
BIOL 3057	Physiological Control Systems	3
BIOL 3340	Cell Biology	3
BIOL 3490	Microbiology	4

4. Advanced Laboratory Requirement

Majors must take at least one advanced laboratory course from the following list:

Code	Title	Units
BIOL 3492	Laboratory Experiments With Eukaryotic Microbes	3
BIOL 3493	Bacterial Bioprospecting and Biotechnology	3
BIOL 4220	Practical Bioinformatics	4
BIOL 4342	Research Explorations in Genomics	4
or BIOL 4343	Research Explorations in Genomics (Writing-Intensive)	
BIOL 4346	Next-Gen Genetics: Merging Genetics With Genomic Insights	3
BIOL 4522	Laboratory in Protein Analysis, Proteomics, and Protein Structure	3
BIOL 4523	Molecular Methods in Enzyme Analysis	3
BIOL 4525	Structural Bioinformatics of Proteins (Writing Intensive)	4
CHEM 4035	Nuclear and Radiochemistry Lab	3
CHEM 4079	Instrumental Methods: Physical Chemistry	3
CHEM 4559	Advanced Organic Chemistry Laboratory	4
CHEM 4570	Synthetic Polymer Chemistry Laboratory	3
or CHEM 4579	Synthetic Polymer Chemistry Laboratory -- Writing Intensive	
CHEM 4670	Inorganic Chemistry Laboratory	3
or CHEM 4679	Inorganic Chemistry Laboratory -- Writing Intensive	
CHEM 4851	Biological Chemistry Laboratory	4
PHYSICS 3324	Biophysics Laboratory	3

5. Advanced Elective Courses

Majors must take at least 9 units of advanced elective courses from the following:

Code	Title	Units
BIOL 3151	Endocrinology	3
BIOL 3481	Parasitology	3
BIOL 4026	How Plants Work: Physiology, Growth, and Metabolism	3
BIOL 4240	Immunology	4
BIOL 4242	Virology	3
BIOL 4345	Epigenetics	3
BIOL 4715	Basic Cancer Biology	3
BIOL 4716	Advanced Cancer Biology	3
CHEM 4010	Physical Chemistry I	3
CHEM 4050	Computational Problem Solving in the Chemical Sciences	3
CHEM 4610	Inorganic Chemistry	3
CHEM 4821	Chemical Biology	3
CHEM 4830	Bioorganic Chemistry	3
or CHEM 4839	Bioorganic Chemistry-- Writing Intensive	
CHEM 4831	Nucleic Acids	3
CHEM 4833	Protein Biochemistry	3
CHEM 4842	Modern Medicinal Chemistry	3
BIOL 495X Independent Research **or** CHEM 4900 Introduction to Research **or** CHEM 4950 Advanced Undergraduate Research in Chemistry		up to 6

The listings above are recommended courses. However, any 3000+ level course in biology or chemistry may be applied to the major if appropriate and with approval of the major advisor in consultation with the Director of Undergraduate Studies.

BIOL 4060 Introduction to Biochemistry and BIOL 4510 General Biochemistry do not count as advanced electives toward the major.

Additional Information

Study Abroad

Study Abroad programs are available both for biochemistry and premedical studies. Details of these programs can be found on the Overseas Programs website. For biochemistry programs, students may be able to receive elective/research credit for courses taken or research done abroad. It is strongly advised that students contact a Study Abroad Advisor, the Director of Undergraduate Studies (dusbio@wustl.edu), or Professor Richard Mabbs (mabbs@wustl.edu) as soon as possible after they declare their major in order to discuss study abroad plans.

Latin Honors for the Biochemistry Major

To qualify for Latin Honors, students must do the following:

1. Maintain a 3.30 GPA in all biology and chemistry, foundational, and math coursework.*
2. Maintain a 3.65 overall GPA at the time of graduation.*
3. Complete at least 6 units of independent research through Biology Undergraduate Independent Research courses (BIOL 4950 Independent Research, BIOL 4951 Independent Research, BIOL 4952 Summer Independent Research, BIOL 4953 Summer Independent Research in Neuroscience, BIOL 4954 Independent Research in Neuroscience), CHEM 4900 Introduction to Research, or CHEM 4950 Advanced Undergraduate Research in Chemistry.

* Only courses taken at Washington University are considered.

Program Honors for the Biochemistry Major

Completion of a rigorous program of study in Biochemistry should emphasize research as an important part of a modern biochemistry education. To earn Biochemistry Program honors, a student will complete the Latin Honors Curriculum (above) and a Research Capstone, which consists of the following:

1. A paper written in the style of a scientific article for a professional journal (e.g., senior thesis for BIOL 4950 Independent Research) or a research presentation to an undergraduate thesis committee (CHEM 4950 Advanced Undergraduate Research in Chemistry).
2. Presentation of undergraduate research in the form of either a poster or short talk at the OUR Undergraduate Research Symposium (or an external meeting/conference).
3. Mentor's letter certifying acceptability of the thesis/CHEM 4950 Advanced Undergraduate Research in Chemistry and student symposium presentation.

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