

BIOCHEMISTRY (B.S.)

Graduates are expected to:

1. Use the scientific method to design experiments and/or build mathematical models, to analyze quantitative and qualitative data, to interpret data using common statistical methods and software programs, and to draw appropriate conclusions in chemical and biological sciences.
2. Report chemical and biological findings in an accurate and knowledgeable way, both in written and oral forms.
3. Effectively use primary scientific literature, including finding information, assessing sources, critically evaluating the work of others, and contributing to scientific knowledge.
4. Integrate and relate information from chemistry, biology, physics, mathematics, and the liberal arts to make meaningful connections to society and the natural world and to apply this knowledge to new situations.
5. Understand and apply ethical implications of science including scientific integrity and relationship between science and society.
6. Biochemistry majors should have a broad knowledge in chemistry (specifically organic, biochemistry, physical, and analytical) as well as cellular biology, molecular biology, and genetics. Important concepts include:
 - a. energy is required by and transformed in biological systems,
 - b. macromolecular structure determines function and regulation,
 - c. information storage and flow are dynamic and interactive, and
 - d. discovery requires objective measurement, quantitative analysis and clear communication.

The core and required support courses provide the means to fulfill these objectives. Through consultation with a departmental advisor, the student may choose electives to meet their intended career goals and interests.

The Biochemistry major also serves as a pre-professional program for students who are interested in attending medical, dental, pharmacy, or physician assistant graduate programs. See the information listed under **Pre-Professional Options**.

All biochemistry majors are strongly encouraged to complement on-campus course work and research with internship and course work opportunities at nearby institutions such as Argonne National Laboratory, the Shedd Aquarium, the Morton Arboretum, and the Midewin National Tallgrass Prairie.

USF biochemistry graduates have pursued careers in medicine, biological or science research, pharmacy, optometry, dentistry, and many other related areas.

Major Program

Required Courses (71-73 credit hours)

Code	Title	Hours
Required Core Courses		
BIOL 151	Beginning Investigative Experiences in Biology	2
BIOL 160	Cell Biology	4
BIOL 322	Molecular Biology	4
BIOL 375	Advanced Investigative Experience in Biology I	3
CHEM 121 & CHEM 123	General Chemistry I and General Chemistry I Lab	5

CHEM 122 & CHEM 124	General Chemistry II and General Chemistry II Lab	5
CHEM 224 & CHEM 225	Organic Chemistry I and Organic Chemistry I Lab	4
CHEM 226 & CHEM 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHEM 322	Biochemistry	3
CHEM 323	Biochemistry Lab	2
CHEM 324	Biochemistry II	3
CHEM 375	Advanced Investigative Experience in Chemistry	3
CHEM 410	Senior Seminar	3
CHEM 422	Bioanalytical Chemistry	4
CHEM 450	Biophysical Chemistry	3

Required Support Courses

MATH 181	Calculus/Analytic Geometry I	5
PSCI 211	Physics I	4
PSCI 212	Physics II	4

Electives

Select two courses of the following, one must be 300-level or above: 6-8

BIOL 252	Human Physiology (4)
BIOL 255	Genetics (4)
BIOL 343	Immunology (3)
BIOL 353	Endocrinology (3)
CHEM 341	Medicinal Chemistry (3)
CHEM 345	Perspectives in Evolution (3)
CHEM 494	Topics in Chemistry (1-5)

Total Hours **71-73**

Students work with their advisors in selecting additional elective credits to fulfill the 120 credit hours required for graduation.

Pre-Professional Options

The University of St. Francis offers excellent undergraduate preparation for dental, medical, optometry, and pharmacy and other health related professional schools. USF does not offer a specific "pre-med, pre-dent, or pre-professional" major. Few colleges in the United States do because there is not a specific major required for admission to professional schools. USF does offer a biochemistry degree with a pre-professional concentration for students interested in pursuing careers in dental, medicine, optometry, or pharmacy. Therefore, USF students complete a core of courses which prepare them for entrance into professional school and still enjoy the freedom and flexibility to design a curriculum in advanced science courses which are appropriate to their interests.

Pre-Dental

Dental Schools are looking for students who have completed a core of specific work in biology, chemistry, math and physics and who have performed at a high academic level. Dental schools may also require volunteer work or other specific types of clinical experience outside the classroom. In addition, coursework required in the humanities and social sciences may vary by school.

Pre-Dentistry Concentration (20 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4

BIOL 252	Human Physiology	4
BIOL 255	Genetics	4
BIOL 343	Immunology	3
or CHEM 345	Perspectives in Evolution	
Total Hours		20

PSYC 111	General Psychology	3
or SOCI 111	Principles of Sociology	
ECON 101	Principles of Macroeconomics	3
or ECON 102	Principles of Microeconomics	
Total Hours		26

Pre-Medicine

Medical schools are looking for students who have completed a core of specific course work in biology, chemistry, mathematics and physics and who have performed at a high academic level. Medical schools may also require volunteer work or other specific types of clinical experience outside the classroom. In addition, coursework required in the humanities and social sciences may vary by school.

Pre-Medicine Concentration (23 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
BIOL 255	Genetics	4
PSYC 111	General Psychology	3
SOCI 111	Principles of Sociology	3
Total Hours		23

Pre-Optometry

Optometry programs are looking for students who have completed a core of specific course work in biology, chemistry, mathematics and physics and who have performed at a high academic level. Optometry programs may also require volunteer work or other specific types of clinical experience outside the classroom. In addition, coursework required in the social sciences (sociology and psychology) and statistics will likely be required by most optometry programs.

Pre-Optometry Concentration (20 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
PSYC 111	General Psychology	3
MATH 175	Statistics	4
Total Hours		20

Pre-Pharmacy

Pharmacy schools are looking for students who have completed a core of specific course work in biology, chemistry, mathematics and physics and who have performed at a high academic level. Pharmacy schools may also require volunteer work or other specific types of clinical experience outside the classroom. In addition, coursework required in the humanities and social sciences may vary by school.

Pre-Pharmacy Concentration (20 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
BIOL 343	Immunology	3
MATH 175	Statistics	4