

# BIOLOGY (B.S.)

Graduates are expected to:

1. use the scientific method to formulate testable hypotheses, design appropriate experiments, analyze quantitative and qualitative data and draw appropriate conclusions in biological sciences. The scientific enterprise also includes the use of biological models and simulation to understand complex biological systems.
2. report 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 biology, chemistry, 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. have a broad knowledge in: Cellular Biology, Ecology, Evolution, Genetics, Molecular Biology, and Physiology

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 design a major which emphasizes areas such as molecular biology, physiology or ecology.

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

Additionally, the Biology major serves as the basis for those who are seeking to obtain a professional educator license at the secondary level. For additional information about this major see the Teacher Education section of this catalog. Students may also earn their Middle Grades General Science Endorsement as part of this program. This program is also available as a Combined 4+1 program. A Bachelor of Science in Biology is earned along with a Master of Education degree after completing the required courses and program requirements.

All biology 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 biology graduates have pursued careers in medicine, biological research, ecology, forensic science, physical therapy, physician assistance, pharmacy, optometry, dentistry, teaching, and many other related areas.

## Major Program

### Required Courses (62 – 68 credit hours)

Code	Title	Hours
<b>Core Courses</b>		
BIOL 150	Fundamentals of Ecology/Evolution	3
BIOL 151	Beginning Investigative Experiences in Biology	2

BIOL 160	Cell Biology	4
BIOL 255	Genetics	4
BIOL 345	Perspectives in Evolution	3
BIOL 375	Advanced Investigative Experience in Biology I	3
BIOL 376	Advanced Investigative Experience Biology II	3
BIOL 410	Senior Seminar	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
PSCI 111 or PSCI 211	General Physics I Physics I	4
Select one of the following:		4-5
MATH 175	Statistics (4)	
MATH 181	Calculus/Analytic Geometry I (5)	
MATH 170	Applied Calculus (4)	
<b>Required Electives</b>		<b>15-20</b>
Select 15-20 credit hours of the following:		
2 courses from BIOL 211 - BIOL 483		
3 courses from BIOL 300 - BIOL 483 or CHEM 322		
<b>Total Hours</b>		<b>62-68</b>

## Pre-Professional Options

The University of St. Francis offers excellent undergraduate preparation for medical, optometry, pharmacy, physical therapy, physician assistant, veterinary medicine 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 biology degree with pre-professional concentrations for students interested in pursuing careers in athletic training, dental, medicine, occupational therapy, optometry, pharmacy, physical therapy, physician assistant or veterinary medicine. 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-Athletic Training

Graduate programs in athletic training 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. Athletic training graduate schools also require volunteer or other specific types of clinical experience outside the classroom (i.e. experience in an athletic training facility). In addition, coursework required in the humanities and social sciences may vary by school.

### Pre-Athletic Training Concentration (33 credit hours)

Code	Title	Hours
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
BIOL 321	Human Dissection Anatomy	3
BIOL 347	Biomechanics	3
BIOL 355	Exercise Physiology	3
BIOL 498	Internship	3



PSYC 111	General Psychology	3
PSYC 212	Sport Psychology	3
NURS 260	Human Nutrition	2
RADT 102	Medical Terminology	1
MATH 175	Statistics	4
<b>Total Hours</b>		<b>33</b>

## 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-Dental Concentration (34-36 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
CHEM 226 & CHEM 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHEM 322	Biochemistry	3
PSYC 111	General Psychology	3
PSCI 112	General Physics II	4
or PSCI 212	Physics II	
Select at least one of the following 300-level electives:		3-4
BIOL 321	Human Dissection Anatomy (3)	
BIOL 322	Molecular Biology (4)	
BIOL 342	Medical Microbiology (3)	
BIOL 343	Immunology (3)	
BIOL 353	Endocrinology (3)	
<b>Mathematics Requirement</b>		
MATH 175	Statistics	4-5
or MATH 181	Calculus/Analytic Geometry I	
<b>Total Hours</b>		<b>34-36</b>

## 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 (37-38 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
CHEM 226 & CHEM 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHEM 322	Biochemistry	3
PSCI 112	General Physics II	4
or PSCI 212	Physics II	
PSYC 111	General Psychology	3

SOCI 111	Principles of Sociology	3
Select at least one of the following 300-level electives:		3-4
BIOL 321	Human Dissection Anatomy (3)	
BIOL 322	Molecular Biology (4)	
BIOL 342	Medical Microbiology (3)	
BIOL 343	Immunology (3)	
BIOL 353	Endocrinology (3)	

### Mathematics Requirement

MATH 175	Statistics	4
<b>Total Hours</b>		<b>37-38</b>

## Pre-Occupational Therapy

Occupational therapy programs are looking for students who have completed a core of specific course work in biology, chemistry, mathematics and social sciences and who have performed at a high academic level. Occupational therapy programs may also require volunteer work or other specific types of clinical experience outside the classroom. Additional coursework may be required by individual occupational therapy programs.

### Pre-Occupational Therapy Concentration (28 credit hours)

Code	Title	Hours
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
PSYC 111	General Psychology	3
PSYC 240	Life-Span Development	3
PSYC 250	Abnormal Psychology	3
SOCI 111	Principles of Sociology	3
RADT 102	Medical Terminology	1
MATH 175	Statistics	4
Select at least one of the following 300-level electives:		3
BIOL 321	Human Dissection Anatomy (3)	
BIOL 343	Immunology (3)	
BIOL 347	Biomechanics (3)	
BIOL 353	Endocrinology (3)	
BIOL 355	Exercise Physiology (3)	
<b>Total Hours</b>		<b>28</b>

## 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 (35-36 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
CHEM 322	Biochemistry	3
PSCI 112	General Physics II	4
or PSCI 212	Physics II	
PSYC 111	General Psychology	3



Select at least one of the following 300-level electives: 3-4

BIOL 321	Human Dissection Anatomy (3)	
BIOL 322	Molecular Biology (4)	
BIOL 342	Medical Microbiology (3)	
BIOL 343	Immunology (3)	
BIOL 353	Endocrinology (3)	

#### Mathematics Requirement

MATH 175	Statistics	4
MATH 181	Calculus/Analytic Geometry I	5

**Total Hours** 35-36

## 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 (37-39 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
CHEM 226 & CHEM 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHEM 322	Biochemistry	3
ECON 101 or ECON 102	Principles of Macroeconomics Principles of Microeconomics	3
PSYC 111 or SOCI 111	General Psychology Principles of Sociology	3

Select at least one of the following 300-level electives: 3-4

BIOL 322	Molecular Biology (4)	
BIOL 343	Immunology (3)	

#### Mathematics Requirement

MATH 170	Applied Calculus	4-5
or MATH 181	Calculus/Analytic Geometry I	
MATH 175	Statistics	4

**Total Hours** 37-39

## Pre-Physical Therapy

Physical therapy 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. Physical therapy programs may also require volunteer work or other specific types of clinical experience outside the classroom. Additional coursework may be required by individual PT programs in such areas as psychology, sociology, and statistics; it is important to check with the individual program to determine specific requirements.

### Pre-Physical Therapy Concentration (28-29 credit hours)

Code	Title	Hours
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
PSCI 112 or PSCI 212	General Physics II Physics II	4

PSYC 111 General Psychology 3

PSYC 2XX 200-level psychology course 3

Select two of the following biology electives: 6

BIOL 321 Human Dissection Anatomy (3)

BIOL 347 Biomechanics (3)

BIOL 355 Exercise Physiology (3)

#### Mathematics Requirement

MATH 175	Statistics	4-5
or MATH 181	Calculus/Analytic Geometry I	

**Total Hours** 28-29

## Pre-Physician Assistant

Physician assistant 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. Almost all PA programs require volunteer work or other specific types of clinical experience outside the classroom. Additional coursework may be required by individual PA programs in such areas as psychology, sociology, medical terminology and statistics; it is important to check with the individual program to determine specific requirements.

### Pre-Physician Assistant Concentration (33-34 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
BIOL 221	Human Anatomy	4
BIOL 252	Human Physiology	4
CHEM 322	Biochemistry	3
PSYC 111	General Psychology	3
SOCI 111	Principles of Sociology	3
RADT 102	Medical Terminology	1

Select at least one of the following 300-level electives: 6-7

BIOL 311 Pathophysiology (3)

BIOL 321 Human Dissection Anatomy (3)

BIOL 322 Molecular Biology (4)

BIOL 343 Immunology (3)

BIOL 347 Biomechanics (3)

BIOL 353 Endocrinology (3)

#### Mathematics Requirement

MATH 175	Statistics	4
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**Total Hours** 33-34

## Pre-Veterinary Medicine

Veterinary 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. Veterinary 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-Veterinary Concentration (23-25 credit hours)

Code	Title	Hours
BIOL 211	Microbiology	5
CHEM 226 & CHEM 227	Organic Chemistry II and Organic Chemistry II Lab	4
CHEM 322	Biochemistry	3
PSCI 112	General Physics II	4



or PSCI 212	Physics II	
Select at least one of the following 300-level electives:		3-4
BIOL 322	Molecular Biology (4)	
BIOL 342	Medical Microbiology (3)	
BIOL 343	Immunology (3)	
BIOL 353	Endocrinology (3)	
<b>Mathematics Requirement</b>		
MATH 175	Statistics	4-5
or MATH 181	Calculus/Analytic Geometry I	
<b>Total Hours</b>		<b>23-25</b>

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