

DEPARTMENT OF BIOLOGICAL SCIENCES COLLEGE OF ARTS AND SCIENCES

FACULTY

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DEPARTMENTAL MISSION AND GOALS

The mission of the Department of Biological Sciences is to provide educational opportunities in biological science that meet the needs of students and citizens of Oklahoma and surrounding states; to support faculty and student research in the biological sciences; and to contribute to the educational, economic, and cultural environment of the university, the community, and the region.

The Department of Biological Sciences accomplishes its mission and that of the university through the following:

- Ensuring quality education by recruiting the most qualified faculty without regard to national origin, race, gender, disability, age, or religion, who are committed to undergraduate teaching, involving undergraduates in research, and providing service to the university and the region.
- Providing courses of study that establish a foundation for life-long learning in biological science and that prepare graduates to successfully pursue professional and graduate education, to become effective teachers, and to begin fulfilling careers in biology and related fields.
- Establishing an environment of academic freedom, intellectual inquiry, and governance that encourages collaborative interactions among faculty and students and that values analytical and critical thinking, diversity of ideas, effective communication, innovation, and intellectual honesty.
- Extending learning opportunities outside of the classroom through field experiences, student research, regional and national professional meeting attendance and participation, service-learning experiences, and seminar series featuring local and invited speakers.
- Supporting faculty and student research with internal and extramural funding, dedicated space, equipment, and time and recognizing the scholarly achievements of faculty and students.

- Maintaining a curriculum that meets the constantly changing needs of modern biology through ongoing assessment by faculty, students, alumni, and external review.

PROGRAMS OF STUDY

- Majors:**
- B.S. Biological Sciences
 - Biomedical Sciences Option
 - Environmental & Organismal Science Option
 - B.S. Microbiology
 - Medical Laboratory Science Option (3+1)
 - B.S. Medical Lab. Science Option (Dual Degree)
 - B.S.Ed. Natural Science Education (Biology)
(Listed in Dept. of Education)

Minor: Biological Sciences

Pre-Professional:* Communication Sciences & Disorders
Dentistry and Dental Hygiene
Medical Imaging & Radiation Sciences
Medicine/Osteopathic Medicine
Nutritional Sciences/Clinical Dietetics
Optometry
Physical and Occupational Therapy
Physician Associate/Assistant
Veterinary Medicine

Master: M.Ed. Natural Sciences
M.Ed. Biomedical Sciences and Microbiology
(See Graduate Catalog for more information.)

* Students pursuing professional degrees should schedule an appointment with a pre-professional advisor during their first semester on campus to identify requirements specific to their particular program.

GENERAL INFORMATION

The course offerings in the Department of Biological Sciences span the sub-disciplines within the life sciences. Students may choose to pursue a generalized degree in biological sciences, focus their program in one of three program options, pursue professional programs in medical laboratory sciences and education, or pursue

a course of study that prepares students for admission to professional programs in health and medical sciences. This diversity prepares students for professional schools as well as a variety of options for graduate study and careers in professional biology.

SPECIAL OPPORTUNITIES

SWOSU is an affiliate member of the Gulf Coast Research Laboratory, a Mississippi State Institute of Higher Learning. Coursework in marine biology completed at this facility may be applied toward degree requirements in the biological sciences major. Classes are offered during two six-week summer sessions at the marine laboratory at Ocean Springs, Mississippi. Students may also enroll in courses at other field stations and request that credit earned apply to their degree programs.

Students are encouraged to pursue opportunities for research by contacting individual faculty members or applying for numerous off-campus summer research experiences and internships. Students may receive independent study course credit for participation in approved research projects. Paid positions as research and teaching assistants and departmental tutors are available for qualified students. Speak to your advisor or one of your instructors about opportunities for research in Biological Sciences.

STUDENT ORGANIZATIONS

Membership in the Biology Club can further enhance the training received by biology majors. This student organization, established in 1930 and open to all students, assists the department in such areas as display preparation, arrangement for seminar speakers and scheduling of tours of research laboratories and wildlife refuges. Multi-disciplinary organizations such as the Medical Professions Club and the Research Excellence Club provide additional opportunities to serve and experience the opportunities a Biological Sciences degree can provide.

Beta Beta Beta, a national biological science honor fraternity, recognizes the achievements of outstanding biology students. Students have the opportunity to present their research with posters and oral presentations and compete for regional and national recognition for research excellence.

GENERAL INFORMATION

(Programs and Advisors)

New students are assigned to the biological sciences faculty advisor with whom they consulted during initial enrollment. Students should select an advisor from one of the biological sciences degrees and options no later than the last semester of their sophomore year (transfer students entering after their sophomore year should select an advisor before enrolling for their second semester.)

B.S. Biological Sciences

Any biological science faculty member

B.S. Biological Sciences, Biomedical Sciences Option

Aracena, Ball, Horton, McGrane, Paul, Ubeidat

B.S. Biological Sciences, Environmental and Organismal Biology Option

Aracena, Boggs, Castle, Cothran, Frederickson, O'Neal

B.S. Microbiology

McGrane, Paul, Somalinga

B.S. Microbiology, Medical Laboratory Sciences Option

Horton

B.S. Ed. Natural Sciences Education

Boggs

Transfer Students

Jones

Professional Programs (Consult advisor in one of the following areas concerning requirements and application information.)

Pre-Medicine, Pre-Osteopathic Medicine

Aracena, Ball, Horton, McGrane, Ubeidat

Pre-Physical Therapy, Pre-Occupational Therapy

Ball

Pre-Dentistry, Pre-Dental Hygiene

Paul

Pre-Veterinary Medicine

Castle, Cothran, Frederickson, Jones

Pre-Optometry

O'Neal

Pre-Physician Associate, Pre-Medical Imaging and Radiation Sciences, Pre-Communication Sciences Disorders, Pre-Nutritional Sciences

Ball

Graduate Programs: Students must apply for graduate programs through the College of Professional and Graduate Studies. Following acceptance into the graduate program, each student will be assigned to an advisor from the Biological Sciences graduate faculty.

Department of Biological Sciences Statement on Evolution

Biology is a natural science that accumulates knowledge through empirical observation and rigorously tested hypotheses. Evolution by natural selection, a foundational principle of modern biology, is supported by overwhelming scientific evidence and is accepted by a vast majority of scientists. Because understanding evolution is fundamental to the understanding and practice of modern biology, Southwestern Oklahoma State University biology faculty teach evolution throughout the biology curriculum. This practice is in accordance with policy statements from the National Academies of Science, the American Association for the Advancement of Science, the American Institute of Biological Sciences, the National Science Teachers Association, the American Biology Teachers Association, the Oklahoma Academy of Sciences, and the Oklahoma Science Teachers Association and is supported by numerous religious denominations and organizations. Because we are a science department, we do not teach philosophically deduced theories or alternative hypotheses that cannot be rigorously tested.

For more information visit our web site at:

<http://www.swosu.edu/biology/>

Medical Laboratory Sciences

Students interested in working in medical laboratories may pursue an Associate degree as a medical laboratory technician (Sayre Campus) or a bachelor's degree in microbiology-medical laboratory sciences option (Weatherford Campus and clinical study at an accredited affiliated hospital).

Prior to admission to a clinical program, students complete 90 hours of general education and pre-medical laboratory sciences course work. This is the 3+1 program and after completion of the program, the student is awarded a B.S. in Microbiology, Medical Laboratory Sciences Option. Students may opt to complete an undergraduate degree before applying for one of the clinical programs. This is the dual degree program and students complete

an undergraduate degree in Biology before applying to the clinical program. Upon completion of the clinical program, students receive a B.S. in Biological Sciences and a B.S. in Microbiology, Medical Laboratory Sciences Option. Students do not have to be admitted to a Pre-Medical Laboratory Science program but should regularly seek advisement from the advisor of Medical Laboratory Sciences in the Department of Biological Sciences in the College of Arts and Sciences.

The clinical training portion of the Medical Laboratory Science option, which involves 30 credit hours, can only be achieved at an accredited hospital in affiliation with Southwestern Oklahoma State University.

Acceptance into the hospital-based clinical training program is the option of the hospital program. Student applications are required and must follow specified guidelines. Minimum requirements for application require an overall grade point average (OGPA) of 2.5. The students must have a personal interview with hospital program officials. After all applications and interviews have been completed, the students will be “matched” to a training hospital for their professional clinical training.

The Professional Medical Training program at the hospital is 12 months. The students will enroll in clinical courses each semester of the year – 12 hours in the fall and spring semesters and six hours

for the summer semester. Final letter grades for all 30 hours will not be posted until the total clinical program has been completed.

For additional information contact:

Dr. Zach Jones
Department of Biological Sciences
SCI 214B
(580) 774-3294
zach.jones@swosu.edu

Natural Sciences Education

Students interested in teaching middle school or high school biological sciences and other science disciplines should refer to the secondary education programs offered by the Department of Education within the School of Behavioral Sciences and Education in the College of Professional and Graduate Studies. For further information contact:

Dr. Lisa L. Boggs
Department of Biological Sciences
SCI 307A
(580) 774-3090
lisa.boggs@swosu.edu

BACHELOR OF SCIENCE BIOLOGICAL SCIENCES (Code No. 103)

GENERAL EDUCATION

Courses that are **required** are in bold type.
Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS **Min. 40**
REQUIRED CORE COURSES..... **31-35**

Written Communication..... **6**
ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics..... **3**
MATH 1513 College Algebra
or a higher numbered math course

U. S. History **3**
Select one course.
 HIST 1043 U.S. History to 1877
 HIST 1053 U.S. History since 1877

American Government..... **3**
POLSC 1103 American Government & Politics

Science **9**
Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.

Life Science..... **4**
BIOL 1054 Principles of Biology I w/Lab

Physical Science..... **5**
CHEM 1203 General Chemistry I (Lecture) and
CHEM 1252 General Chemistry I (Lab)

Humanities **6**
 HUM 1103 Introduction to Humanities
OR
 HIST 1033 World History
AND one of the following:
 ART 1223 Art Survey
 COMM 1263 Introduction to Theatre
 LIT 2333 Introduction to Film
 LIT 2413 Introduction to Literature
 MUSIC 1013 Introduction to Music I
 MUSIC 1103 Music and Culture
 PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity **3-4**
Select one course.
 ASL 2163 American Sign Language
 CATC 1204 Cheyenne Language I (or higher number)
 CATC 1254 Arapaho Language I (or higher number)
COMM 1313 Introduction to Public Speaking
 ECONO 2263 Intro to Macroeconomics
 ECONO 2363 Intro to Microeconomics
 GEOG 1103 World Cultural Geography
 ITAL 1004 Elementary Italian I
 KINES 1133 Wellness Concepts & Exercise Applications
 LATIN 1054 Elementary Latin I (or higher number)
PSYCH 1003 General Psychology
 SOCIO 1003 Introduction to Sociology
 SPAN 1054 Elementary Spanish I (or higher number)
 TECH 1223 Technology and Society

Computer Proficiency..... **0-3**
 Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) to total 40

BIOLOGICAL SCIENCES MAJOR

Required Courses..... **16**
 BIOL 1254 Principles of Biology II
 BIOL 3053 Cell Biology
 BIOL 3152 Genetics and Cell Biology Lab
 BIOL 3253 Genetics
 BIOL 3283 Ecology
 BIOL 4901 Biological Sciences Capstone

Major Electives **24**
 (Electives must include one Field Course [F] or a field course with lab from the Gulf Coast Research Lab or other field station or lab and one Plant Course [P].)
 BIOL 3012 Biological Terminology
 BIOL 3304 Aquatic Ecology [F]
 BIOL 3604 Biology of Insects [F]
 BIOL 3704 Human Anatomy
 BIOL 3814 Biology of Plants [P]
 BIOL 3904 Human Physiology
 BIOL 4001-4 Independent Studies
 BIOL 4010-4 Seminar in Biology
 (A maximum of 4 hours total of Independent Studies and Seminar may be counted toward the major.)
 BIOL 4021-4 Special Topics in Biomedical Sciences
 BIOL 4031-4 Special Topics in Microbiology
 BIOL 4041-4 Special Topics Environ & Organismal Biology
 BIOL 4154 Developmental Biology
 BIOL 4204 Vertebrate Biology [F]
 BIOL 4213 Immunology
 BIOL 4254 Invertebrate Biology [F]
 BIOL 4284 Parasitology
 BIOL 4314 Environmental Biology
 BIOL 4343 Applied Microbiology
 BIOL 4355 Microbiology
 BIOL 4404 Pathogenic Microbiology
 BIOL 4454 Plant Taxonomy [P]
 BIOL 4463 Virology
 BIOL 4503 Microbial Physiology
 BIOL 4523 Environmental Microbiology
 BIOL 4604 Terrestrial Ecology [P]
 BIOL 4622 Economically Important Plants [P]
 BIOL 4703 Infectious Disease Epidemiology
 BIOL 4853 Evolution
 BIOL 4864 Human Genetics
 BIOL 4914 General and Comparative Physiology
 BIOL 4935 Cell and Molecular Biology
 BIOL 4944 Neuroscience
 BIOL 4974 Histology

Other Requirements **18-20**
 MATH 1613 College Trigonometry (or 1834 Calculus I)
 MATH 3413 Statistical Methods I **OR** 3433 Statistics I
OR PSYCH 2433 Psychological Statistics
 CHEM 1303 & 1332 General Chemistry II (Lecture and Lab)
 CHEM 2114 Organic/Biochemistry **OR** one higher numbered chemistry course with lab
 PHY 1063 General Physics **OR** one higher numbered Physics course with lab

Minor Requirements (see Minor Programs of Study) **18-22**

Free Electives to total 120 hours..... **0-4**

TOTAL HOURS..... **120**

REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation120
 Minimum credit hours in the liberal arts & sciences 55
 Minimum credit hours in upper-division
 (3000/4000 courses)..... 40
 Minimum credit hours (3000/4000 courses)
 in major completed at SWOSU..... 8
 Minimum credit hours at SWOSU (15 of the last 30)..... 30
 Minimum Grade Point Average in all coursework.....2.00
 Minimum Grade Point Average in major.....2.00

BIOLOGICAL SCIENCES (Code 103) Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshmen Orientation+ (1) 1054 Principles of Biology I (4) 1113 English Composition I (3) 1513 College Algebra (3) General Education (1-4)	1254 Principles of Biology II (4) 1213 English Composition II (3) 1613 College Trigonometry (3) General Education (2-5)
Total (12-15)	Total (12-15)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
3253 Genetics (3) 3152 Genetics and Cell Biology Lab (2) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) Major electives, Minor courses, or General Education (3-7)	3053 Cell Biology (3) 3283 Ecology (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) General Education (1-3) Statistics course (3)
Total (13-17)	Total (15-17)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
Field/Plant course elective (4) Chemistry requirements (4)* Major electives, Minor courses, or General Education (3-7) Physics requirements (3-4)*	Chemistry requirements (4)* Field/Plant course elective (4) Major electives, Minor courses, or General Education (3-7) Physics requirements (4)*
Total (14-19)	Total (15-19)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
Major electives, Minor courses, General Education or Free electives (15)	4901 Biological Sciences Capstone (1) Major electives, Minor courses General Education or Free electives (14)
Total (15)	Total (15)

+ First time entering Freshmen need to take 1001 Freshman Orientation

* Chemistry requirement may be fulfilled by 2144 Organic/Biochemistry or Organic Chemistry I and Organic Chemistry II (with labs). Physics requirement may be filled by 1063 General Physics or Basic Physics I and Basic Physics II. Students planning to apply to graduate or professional schools should take Organic Chemistry I and II and Basic Physics I and II.

Students pursuing Biological Sciences Degree Options should enroll in specified electives during the third and fourth years.

Students applying to professional schools should regularly consult with a pre-professional advisor and the pre-medical committee to be aware of changes in admissions policies and deadlines.

NOTE: Students entering SWOSU with concurrent credits, Advanced Placement or CLEP credits may need to adjust the course sequences accordingly. Likewise, students entering with deficiencies may not be able to complete a degree in four years or may have to attend summer school.

BACHELOR OF SCIENCE-BIOLOGICAL SCIENCES BIOMEDICAL SCIENCES OPTION (Code No. 115)

GENERAL EDUCATION

Courses that are **required** are in bold type.

Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS **Min. 40**

REQUIRED CORE COURSES..... **31-35**

Written Communication..... **6**

ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics..... **3**

MATH 1513 College Algebra

U. S. History **3**

Select one course.

HIST 1043 U.S. History to 1877
HIST 1053 U.S. History since 1877

American Government..... **3**

POLSC 1103 American Government & Politics

Science..... **9**

Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.

Life Science..... **4**

BIOL 1054 Principles of Biology I w/Lab

Physical Science..... **5**

CHEM 1203 General Chemistry I (Lecture) and
CHEM 1252 General Chemistry I (Lab)

Humanities..... **6**

HUM 1103 Introduction to Humanities

OR

HIST 1033 World History

AND one of the following:

ART 1223 Art Survey

COMM 1263 Introduction to Theatre

LIT 2333 Introduction to Film

LIT 2413 Introduction to Literature

MUSIC 1013 Introduction to Music I

MUSIC 1103 Music and Culture

PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity **3-4**

Select one course. Psychology and Sociology are recommended for students who will be taking the MCAT.

ASL 2163 American Sign Language

CATC 1204 Cheyenne Language I (or higher number)

CATC 1254 Arapaho Language I (or higher number)

COMM 1313 Introduction to Public Speaking

ECONO 2263 Intro to Macroeconomics

ECONO 2363 Intro to Microeconomics

GEOG 1103 World Cultural Geography

ITAL 1004 Elementary Italian I

KINES 1133 Wellness Concepts & Exercise Applications

LATIN 1054 Elementary Latin I (or higher number)

PSYCH 1003 General Psychology

SOCIO 1003 Introduction to Sociology

SPAN 1054 Elementary Spanish I (or higher number)

TECH 1223 Technology and Society

Computer Proficiency..... **0-3**

Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) to total 40

BIOMEDICAL SCIENCE OPTION

Biological Sciences Core Courses (Required)..... **16**

BIOL 1254 Principles of Biology II

BIOL 3053 Cell Biology

BIOL 3152 Genetics and Cell Biology Lab

BIOL 3253 Genetics

BIOL 3283 Ecology

BIOL 4901 Biological Sciences Capstone

Major Electives (include one Field Course [F] and one Plant Course [P])..... **24**

BIOL 3304 Aquatic Ecology [F]

BIOL 3604 Biology of Insects [F]

BIOL 3704 Human Anatomy

BIOL 3814 Biology of Plants [P]

BIOL 4001-4 Independent Studies in Biological Sciences

(A maximum of 4 hours total of Independent Studies may be counted toward the major.)

BIOL 4021-4 Special Topics in Biomedical Sciences

BIOL 4154 Developmental Biology

BIOL 4204 Vertebrate Biology [F]

BIOL 4213 Immunology

BIOL 4254 Invertebrate Biology [F]

BIOL 4284 Parasitology

BIOL 4314 Environmental Biology

BIOL 4355 Microbiology

BIOL 4404 Pathogenic Microbiology

BIOL 4454 Plant Taxonomy [P]

BIOL 4463 Virology

BIOL 4604 Terrestrial Ecology [P]

BIOL 4622 Economically Important Plants [P]

BIOL 4703 Infectious Disease Epidemiology

BIOL 4853 Evolution

BIOL 4864 Human Genetics

BIOL 4914 General and Comparative Physiology

BIOL 4935 Cell and Molecular Biology

BIOL 4944 Neuroscience

BIOL 4974 Histology

Other Requirements..... **18-20**

MATH 1613 College Trigonometry (or 1834 Calculus I)

MATH 3413 Statistical Methods I OR 3433 Statistics I

OR PSYCH 2433 Psychological Statistics

CHEM 1303 & 1352 General Chemistry II and lab

CHEM 2114 Organic/Biochemistry OR one higher numbered chemistry course with lab

(Students planning to attend most professional or graduate schools should take CHEM 3013 and 3111 and CHEM 4113 and 4021)

PHY 1063 General Physics OR one higher numbered Physics course with lab

(Students planning to attend most professional or graduate schools should take PHYS 1044 and 1054)

Minor Requirements (see Minor Programs of Study)..... **18-22**

(Chemistry Minor is recommended for the Biomedical Sciences option)

Free Electives to total 120 hours..... **0-4**

TOTAL HOURS..... **120**

REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation..... **120**

Minimum credit hours in the liberal arts & sciences..... **55**

Minimum credit hours in upper-division

(3000/4000 courses)..... **40**

Minimum credit hours (3000/4000 courses)

in major completed at SWOSU **8**

Minimum credit hours at SWOSU (15 of the last 30)..... **30**

Minimum Grade Point Average in all coursework..... **2.00**

Minimum Grade Point Average in major..... **2.00**

BACHELOR OF SCIENCE - BIOLOGICAL SCIENCES ENVIRONMENTAL AND ORGANISMAL BIOLOGY OPTION (Code No. 117)

GENERAL EDUCATION

Courses that are **required** are in bold type.

Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS **Min. 40**

REQUIRED CORE COURSES..... **31-35**

Written Communication..... **6**

ENGL 1113 English Composition I

ENGL 1213 English Composition II

Mathematics..... **3**

MATH 1513 College Algebra

U. S. History **3**

Select one course.

HIST 1043 U.S. History to 1877

HIST 1053 U.S. History since 1877

American Government..... **3**

POLSC 1103 American Government & Politics

Science..... **9**

Life Science..... **4**

BIOL 1054 Principles of Biology I w/Lab

Physical Science..... **5**

CHEM 1203 General Chemistry I (Lecture) and

CHEM 1252 General Chemistry I (Lab)

Humanities..... **6**

HUM 1103 Introduction to Humanities

OR

HIST 1033 World History

AND one of the following:

ART 1223 Art Survey

COMM 1263 Introduction to Theatre

LIT 2333 Introduction to Film

LIT 2413 Introduction to Literature

MUSIC 1013 Introduction to Music I

MUSIC 1103 Music and Culture

PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity **3-4**

Select one course.

ASL 2163 American Sign Language

CATC 1204 Cheyenne Language I (or higher number)

CATC 1254 Arapaho Language I (or higher number)

COMM 1313 Introduction to Public Speaking

ECONO 2263 Intro to Macroeconomics

ECONO 2363 Intro to Microeconomics

GEOG 1103 World Cultural Geography

ITAL 1004 Elementary Italian I

KINES 1133 Wellness Concepts & Exercise Applications

LATIN 1054 Elementary Latin I (or higher number)

PSYCH 1003 General Psychology

SOCIO 1003 Introduction to Sociology

SPAN 1054 Elementary Spanish I (or higher number)

TECH 1223 Technology and Society

Computer Proficiency..... **0-3**

Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) to total 40

ENVIRONMENTAL AND ORGANISMAL BIOLOGY OPTION

Biological Sciences Core Courses (Required) **16**

BIOL 1254 Principles of Biology II

BIOL 3053 Cell Biology

BIOL 3152 Genetics and Cell Biology Lab

BIOL 3253 Genetics

BIOL 3283 Ecology

BIOL 4901 Biological Sciences Capstone

Major Electives (include one Field Course [F] and one Plant Course [P]) **24**

BIOL 3304 Aquatic Ecology [F]

BIOL 3604 Biology of Insects [F]

BIOL 3704 Human Anatomy

BIOL 3814 Biology of Plants [P]

BIOL 4001-4 Independent Studies in Biological Sciences

(A maximum of 4 hours total of Independent Studies may be counted toward the major.)

BIOL 4041-4 Special Topics in Environ & Organismal Biology

BIOL 4154 Developmental Biology

BIOL 4204 Vertebrate Biology [F]

BIOL 4254 Invertebrate Biology [F]

BIOL 4284 Parasitology

BIOL 4314 Environmental Biology

BIOL 4343 Applied Microbiology

BIOL 4355 Microbiology

BIOL 4454 Plant Taxonomy [P]

BIOL 4463 Virology

BIOL 4523 Environmental Microbiology

BIOL 4604 Terrestrial Ecology [P]

BIOL 4622 Economically Important Plants [P]

BIOL 4853 Evolution

BIOL 4914 General and Comparative Physiology

Other Requirements **18-20**

MATH 1613 College Trigonometry (or 1834 Calculus I)

MATH 3413 Statistical Methods I **OR** 3433 Statistics I

OR PSYCH 2433 Psychological Statistics

CHEM 1303 & 1352 General Chemistry II and lab

CHEM 2114 Organic/Biochemistry **OR** one higher numbered chemistry course with lab

PHY 1063 General Physics **OR** one higher numbered Physics course with lab

Minor Requirements (see Minor Programs of Study)..... **18-22**

Free Electives to total 120 hours..... **0-4**

TOTAL HOURS..... **120**

REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation 120

Minimum credit hours in the liberal arts & sciences 55

Minimum credit hours in upper-division
(3000/4000 courses) 40

Minimum credit hours (3000/4000 courses)
in major completed at SWOSU 8

Minimum credit hours at SWOSU (15 of the last 30) 30

Minimum Grade Point Average in all coursework 2.00

Minimum Grade Point Average in major 2.00

PRE-PROFESSIONAL PROGRAMS (Codes 115 & 117) Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1054 Principles of Biology I (4) 1113 English Composition I (3) 1203 General Chemistry I(3) 1252 General Chemistry I Lab (2) 1513 College Algebra (3)	1254 Principles of Biology II (4) 1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 1613 College Trigonometry (3)
Total (15)	Total (15)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
3152 Genetics and Cell Biology Lab (2) 3253 Genetics (3) Chemistry requirements (4)* General Education (4-6) Statistics course (3)	3053 Cell Biology (3) 3283 Ecology (3) Chemistry requirements (4)* General Education (4-6)
Total (16-18)	Total (14-16)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
Field/Plant course elective (4) Option electives, Minor courses, or General Education (7-11) Physics requirements (3-4)* MCAT, DAT, or other admissions tests should be taken in the junior year.	Field/Plant course elective (4) Option electives, Minor courses, or General Education (7-11) Physics requirements (4)* MCAT, DAT, or other admissions tests should be taken in the junior year.
Total (14-19)	Total (15-19)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
Option electives, Minor courses, or General Education (15)	4901 Biological Sciences Capstone (1) Option electives, Minor courses, or General Education (14)
Total (15)	Total (15)

* Chemistry requirement may be fulfilled by 2144 Organic/Biochemistry or Organic Chemistry I and Organic Chemistry II (with labs). Physics requirement may be filled by 1063 General Physics or Basic Physics I and Basic Physics II. Students planning to apply to graduate or professional schools should take Organic Chemistry I and II and Basic Physics I and II.

BACHELOR OF SCIENCE - MICROBIOLOGY (Code No. 116)

GENERAL EDUCATION

Courses that are **required** are in bold type.
Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS	Min. 40
REQUIRED CORE COURSES	31-35
Written Communication	6
ENGL 1113 English Composition I	
ENGL 1213 English Composition II	
Mathematics	3
MATH 1513 College Algebra	
U. S. History	3
<i>Select one course.</i>	
HIST 1043 U.S. History to 1877	
HIST 1053 U.S. History since 1877	
American Government	3
POLSC 1103 American Government & Politics	
Science	9
Life Science	4
BIOL 1054 Principles of Biology I w/Lab	
Physical Science	5
CHEM 1203 General Chemistry I (Lecture) and	
CHEM 1252 General Chemistry I (Lab)	
Humanities	6
HUM 1103 Introduction to Humanities	
OR	
HIST 1033 World History	
AND one of the following:	
ART 1223 Art Survey	
COMM 1263 Introduction to Theatre	
LIT 2333 Introduction to Film	
LIT 2413 Introduction to Literature	
MUSIC 1013 Introduction to Music I	
MUSIC 1103 Music and Culture	
PHILO 1453 Introduction to Philosophy	
Human, Cultural, & Social Diversity	3-4
<i>Select one course.</i>	
ASL 2163 American Sign Language	
CATC 1204 Cheyenne Language I (or higher number)	
CATC 1254 Arapaho Language I (or higher number)	
<i>COMM 1313 Introduction to Public Speaking</i>	
ECONO 2263 Intro to Macroeconomics	
ECONO 2363 Intro to Microeconomics	
GEOG 1103 World Cultural Geography	
ITAL 1004 Elementary Italian I	
KINES 1133 Wellness Concepts & Exercise Applications	
LATIN 1054 Elementary Latin I (or higher number)	
<i>PSYCH 1003 General Psychology</i>	
SOCIO 1003 Introduction to Sociology	
SPAN 1054 Elementary Spanish I (or higher number)	
TECH 1223 Technology and Society	
Computer Proficiency	0-3
Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).	
GE electives (from at least two different categories)	to total 40

MICROBIOLOGY MAJOR

Core Courses (Required)	28
BIOL 1254 Principles of Biology II	
BIOL 3053 Cell Biology	
BIOL 3152 Genetics and Cell Biology Lab	
BIOL 3253 Genetics	
BIOL 3283 Ecology	
BIOL 3704 Human Anatomy	
BIOL 4213 Immunology	
BIOL 4355 Microbiology	
BIOL 4901 Biological Sciences Capstone	
Major Electives	21
Choose one of the following courses:	
BIOL 3304 Aquatic Ecology	
BIOL 4604 Terrestrial Ecology	
BIOL 4314 Environmental Biology	
Choose the remaining 17 credit hours from the following list:	
BIOL 4001-4 Independent Studies in Biological Sciences <i>(A maximum of 4 hours total of Independent Studies may be counted toward the major.)</i>	
BIOL 4031-4 Special Topics in Microbiology	
BIOL 4284 Parasitology	
BIOL 4343 Applied Microbiology	
BIOL 4404 Pathogenic Microbiology	
BIOL 4503 Microbial Physiology	
BIOL 4463 Virology	
BIOL 4523 Environmental Microbiology	
BIOL 4703 Infectious Disease Epidemiology	
BIOL 4853 Evolution	
BIOL 4864 Human Genetics	
BIOL 4914 General and Comparative Physiology	
BIOL 4935 Cell and Molecular Biology	
BIOL 4944 Neuroscience	
Other Requirements	9
MATH 1613 College Trigonometry (or 1834 Calculus I)	
MATH 3413 Statistical Methods I OR 3433 Statistics I	
OR PSYCH 2433 Psychological Statistics	
PHY 1063 General Physics OR one higher numbered Physics course with lab	
Chemistry (Minor)	22
CHEM 1203 & 1252 General Chemistry I and lab	
CHEM 1303 & 1352 General Chemistry II and lab	
CHEM 3013 & 3111 Organic Chemistry I and lab	
CHEM 4113 & 4021 Organic Chemistry II and lab	
CHEM 4124 Biochemistry (w/lab)	
Free Electives to total 120 hours	0-4
TOTAL HOURS	120
REGULATIONS PERTAINING TO GRADUATION	
Minimum credit hours for graduation.....	120
Minimum credit hours in the liberal arts & sciences.....	55
Minimum credit hours in upper-division (3000/4000 courses).....	40
Minimum credit hours (3000/4000 courses) in major completed at SWOSU	8
Minimum credit hours at SWOSU (15 of the last 30).....	30
Minimum Grade Point Average in all coursework.....	2.00
Minimum Grade Point Average in major.....	2.00

PRE-PROFESSIONAL PROGRAMS (Code 116) Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1054 Principles of Biology I (4) 1113 English Composition I (3) 1203 General Chemistry I(3) 1252 General Chemistry I Lab (2) 1513 College Algebra (3)	1254 Principles of Biology II (4) 1213 English Composition II (3) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 1613 College Trigonometry (3)
Total (15)	Total (15)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
3152 Genetics and Cell Biology Lab (2) 3253 Genetics (3) 4355 Microbiology (5) Chemistry requirements (4)* General Education (3-4)	3053 Cell Biology (3) 3283 Ecology (3) Chemistry requirements (4)* General Education (4-6)
Total (17-18)	Total (14-16)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3704 Human Anatomy (4) Option electives, Minor courses, or General Education (7-11) Physics requirements (3-4)* MCAT, DAT, or other admissions tests should be taken in the junior year.	Option electives, Minor courses, or General Education (7-11) Physics requirements (4)* Statistics course (3) MCAT, DAT, or other admissions tests should be taken in the junior year.
Total (14-19)	Total (14-18)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
4213 Immunology (3) Option electives, Minor courses, or General Education (12)	4901 Biological Sciences Capstone (1) Option electives, Minor courses, or General Education (14)
Total (15)	Total (15)

* Chemistry requirement may be fulfilled by 2144 Organic/Biochemistry or Organic Chemistry I and Organic Chemistry II (with labs). Physics requirement may be filled by 1063 General Physics or Basic Physics I and Basic Physics II. Students planning to apply to graduate or professional schools should take Organic Chemistry I and II and Basic Physics I and II.

BACHELOR OF SCIENCE – MICROBIOLOGY MEDICAL LABORATORY SCIENCE OPTION (3+1) (Code No. 552)

GENERAL EDUCATION

Courses that are **required** are in bold type.
Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS **Min. 40**
REQUIRED CORE COURSES..... **31-35**

Written Communication..... **6**

ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics..... **3**

MATH 1513 College Algebra ‡
or a higher numbered math course

U. S. History **3**

Select one course.

HIST 1043 U.S. History to 1877
HIST 1053 U.S. History since 1877

American Government..... **3**

POLSC 1103 American Government & Politics

Science **7-8**

Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.

Life Science..... **4**

BIOL 1054 Principles of Biology I w/Lab

Physical Science..... **3-4**

CHEM 1004 General Chemistry w/Lab

General Chemistry may be satisfied by General Chemistry I (1203 & 1252) and Gen Chemistry II (1303 & 1352) which are requirements for this degree.

Humanities **6**

HUM 1103 Introduction to Humanities

OR

HIST 1033 World History

AND one of the following:

ART 1223 Art Survey

COMM 1263 Introduction to Theatre

LIT 2333 Introduction to Film

LIT 2413 Introduction to Literature

MUSIC 1013 Introduction to Music I

MUSIC 1103 Music and Culture

PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity **3**

PSYCH 1003 General Psychology

Computer Proficiency..... **0-3**

Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories) **to total 40**

COMM 1313 Intro to Public Speaking

MEDICAL LABORATORY SCIENCE OPTION

Courses marked with ‡ must be completed with a grade of C or better in order to apply for admission to clinical coursework.

Required Courses..... **16**

BIOL 1254 Principles of Biology II

BIOL 3704 Human Anatomy ‡

BIOL 4213 Immunology ‡

BIOL 4355 Microbiology ‡

Electives..... **14**

BIOL 3053 Cell Biology

BIOL 3152 Genetics and Cell Biology Lab

BIOL 3253 Genetics

BIOL 3904 Human Physiology ‡

BIOL 4031-4 Special Topics in Microbiology

BIOL 4284 Parasitology

BIOL 4343 Applied Microbiology

BIOL 4404 Pathogenic Microbiology

BIOL 4463 Virology

BIOL 4503 Microbial Physiology

BIOL 4523 Environmental Microbiology

BIOL 4703 Infectious Disease Epidemiology

BIOL 4853 Evolution

BIOL 4914 General and Comparative Physiology

BIOL 4935 Cell and Molecular Biology

BIOL 4974 Histology

Chemistry Minor (plus Gen Chem I in GE requirement)..... **22**

CHEM 1203 & 1252 General Chemistry I and lab ‡

CHEM 1303 & 1352 General Chemistry II and lab ‡

CHEM 3013 & 3111 Organic Chemistry I and lab ‡

CHEM 4113 & 4021 Organic Chemistry II and lab ‡

CHEM 4124 Biochemistry (w/lab) ‡

Clinical (performed at an accredited hospital affiliate) **30**

Admission through a competitive statewide process is required to enter clinical coursework. The required clinical hours are awarded only after successful completion of clinical training.

MLS 4117 Clinical Microbiology

MLS 4125 Clinical Chemistry I

MLS 4236 Clinical Hematology

MLS 4246 Clinical Immunology/Immunohematology

MLS 4325 Clinical Chemistry II

MLS 4351 Topics in Medical Laboratory Science

TOTAL HOURS..... **122**

REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation..... 122

Minimum credit hours in the liberal arts & sciences..... 55

Minimum credit hours in upper-division
(3000/4000 courses)..... 40

Minimum credit hours (3000/4000 courses) in major
completed at SWOSU..... 8

Minimum credit hours at SWOSU (15 of the last 30)..... 30

Minimum Grade Point Average in all coursework..... 2.00

Minimum Grade Point Average in major..... 2.00

B.S. Microbiology - Medical Laboratory Science Option (3+1) Code 552 Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshmen Orientation (1) ⁺ 1054 Principles of Biology I (4) 1113 English Composition I(3) 1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1513 College Algebra (3)	1213 English Composition II (3) 1254 Principles of Biology II (4) 1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) General Education (3)
Total (16)	Total (15)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
1043 US History to 1877 OR 1053 US History since 1877 (3) 1313 Intro to Public Speaking (3) 3013 Organic Chemistry I (3) 3111 Organic Chemistry I Lab (1) 4355 Microbiology (5)	1003 General Psychology (3) 1033 World History (3) 4021 Organic Chemistry II Lab (1) 4113 Organic Chemistry II (3) 4213 Immunology (3) General Education (3)
Total (15)	Total (16)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
3704 Human Anatomy (4) 4124 Biochemistry (4) Biology Electives (4) General Education (3)	Biology Electives (12) General Education (4)
Total (15)	Total (16)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
Clinical course taken at an accredited hospital affiliate (15)	Clinical course taken at an accredited hospital affiliate (15)
Total (15)	Total (15)

⁺ First time entering Freshmen need to take 1001 Freshman Orientation

BACHELOR OF SCIENCE – BIOLOGY & MICROBIOLOGY MEDICAL LABORATORY SCIENCE OPTION (Dual Degree - Codes 103 & 552)

GENERAL EDUCATION

Courses that are **required** are in bold type.
Courses that are *recommended* are in italics.

TOTAL GENERAL EDUCATION HOURS **Min. 40**
REQUIRED CORE COURSES..... **31-35**

Written Communication..... **6**

ENGL 1113 English Composition I
ENGL 1213 English Composition II

Mathematics..... **3**

MATH 1513 College Algebra ‡
or a higher numbered math course

U. S. History **3**

Select one course.

HIST 1043 U.S. History to 1877
HIST 1053 U.S. History since 1877

American Government..... **3**

POLSC 1103 American Government & Politics

Science..... **7-8**

Select one course from Life Science and one course from Physical Science. One Science course must be a lab science.

Life Science..... **4**

BIOL 1054 Principles of Biology I w/Lab

Physical Science..... **3-4**

CHEM 1004 General Chemistry w/Lab
General Chemistry may be satisfied by General Chemistry I (1203 & 1252) and Gen Chemistry II (1303 & 1352) which are requirements for this degree.

Humanities..... **6**

HUM 1103 Introduction to Humanities

OR

HIST 1033 World History

AND one of the following:

ART 1223 Art Survey

COMM 1263 Introduction to Theatre

LIT 2333 Introduction to Film

LIT 2413 Introduction to Literature

MUSIC 1013 Introduction to Music I

MUSIC 1103 Music and Culture

PHILO 1453 Introduction to Philosophy

Human, Cultural, & Social Diversity **3**

PSYCH 1003 General Psychology

Computer Proficiency..... **0-3**

Students must demonstrate computer proficiency (high school Computer Science course, SWOSU computer proficiency exam, or COMSC 1023 Computer & Info Access).

GE electives (from at least two different categories)..... **to total 40**

COMM 1313 Introduction to Public Speaking

DUAL DEGREE PROGRAM

B.S. Biological Sciences – Code No. 103

B.S. Microbiology, Medical Laboratory Science Option

Code No. 552

Courses marked with ‡ must be completed with a grade of C or better in order to apply for admission to clinical coursework.

Biological Sciences Core Courses (Required)..... **28**

BIOL 1254 Principles of Biology II
BIOL 3053 Cell Biology
BIOL 3152 Genetics and Cell Biology Lab
BIOL 3253 Genetics
BIOL 3283 Ecology
BIOL 3704 Human Anatomy ‡
BIOL 4213 Immunology ‡
BIOL 4355 Microbiology ‡
BIOL 4901 Biological Sciences Capstone

Major Electives..... **28**

BIOL 3904 Human Physiology ‡
OR BIOL 4914 Gen & Comp Physiology ‡
BIOL 4031-4 Special Topics in Microbiology
BIOL 4284 Parasitology
BIOL 4343 Applied Microbiology
BIOL 4404 Pathogenic Microbiology
BIOL 4463 Virology
BIOL 4503 Microbial Physiology
BIOL 4523 Environmental Microbiology
BIOL 4703 Infectious Disease Epidemiology
BIOL 4853 Evolution
BIOL 4914 General and Comparative Physiology
BIOL 4974 Histology

Recommend the following for Plant/Field Biol Requirement:

BIOL 4454 Plant Taxonomy
OR BIOL 4604 Terrestrial Ecology

Other Requirements..... **9-15**

MATH 1613 College Trigonometry (or 1834 Calculus I)
MATH 3413 Statistical Methods I OR 3433 Statistics I
OR PSYCH 2433 Psychological Statistics
PHY 1063 General Physics OR one higher numbered Physics course with lab

Chemistry (Minor) **22**

CHEM 1203 & 1252 General Chemistry I and lab ‡
CHEM 1303 & 1352 General Chemistry II and lab ‡
CHEM 3013 & 3111 Organic Chemistry I and lab ‡
CHEM 4113 & 4021 Organic Chemistry II and lab ‡
CHEM 4124 Biochemistry (w/lab) ‡

Clinical (performed at an accredited hospital affiliate) **30**

Admission through a competitive statewide process is required to enter clinical coursework. The required clinical hours are awarded only after successful completion of clinical training.

MLS 4117 Clinical Microbiology
MLS 4125 Clinical Chemistry I
MLS 4236 Clinical Hematology
MLS 4246 Clinical Immunology/Immunohematology
MLS 4325 Clinical Chemistry II
MLS 4351 Topics in Medical Laboratory Science

TOTAL HOURS..... **157**

REGULATIONS PERTAINING TO GRADUATION

Minimum credit hours for graduation..... 157
Minimum credit hours in the liberal arts & sciences..... 55
Minimum credit hours in upper-division
(3000/4000 courses)..... 40
Minimum credit hours (3000/4000 courses) in major
completed at SWOSU..... 8
Minimum credit hours at SWOSU (15 of the last 30)..... 30
Minimum Grade Point Average in all coursework..... 2.00
Minimum Grade Point Average in major..... 2.00

Upon completion of Clinical Program, will earn B.S. Biological Sciences and B.S. Medical Laboratory Sciences

B.S. Biology & Microbiology - Medical Laboratory Science Option (Dual Degree) Codes 103 & 552 Suggested Course Sequence

FIRST YEAR

FIRST SEMESTER	SECOND SEMESTER
1001 Freshmen Orientation (1)* 1054 Principles of Biology I (4) 1113 English Composition I (3) 1513 College Algebra (3) General Education (4)	1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 1213 English Composition II (3) 1254 Principles of Biology II (4) 1613 College Trigonometry (3) General Education (4)
Total (15)	Total (19)

SECOND YEAR

FIRST SEMESTER	SECOND SEMESTER
3152 Genetics and Cell Biology Lab (2) 3253 Genetics (3) 4355 Microbiology (5) Major electives, Minor courses, or General Educ (4-6) Statistics course (3)	1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 3053 Cell Biology (3) 3283 Ecology (3) General Education (6)
Total (17-19)	Total (17)

THIRD YEAR

FIRST SEMESTER	SECOND SEMESTER
Chemistry requirements (4)* Field/Plant course elective (4) Option electives, Minor courses, or General Education (4-7) Physics requirements (3-4)	Chemistry requirements (4)* Field/Plant course elective (4) Option electives, Minor courses, or General Education (4-7) Physics requirements (3-4)
Total (15-19)	Total (15-19)

FOURTH YEAR

FIRST SEMESTER	SECOND SEMESTER
Major electives, Minor courses, or General Education (15)	4901 Biological Sciences Capstone (1) Major electives, Minor courses, or General Education (14)
Total (15)	Total (15)

FIFTH YEAR

FIRST SEMESTER	SECOND SEMESTER
Clinical course taken at an accredited hospital affiliate (15)	Clinical course taken at an accredited hospital affiliate (15)
Total (15)	Total (15)

+ First time entering Freshmen need to take 1001 Freshman Orientation

* Chemistry requirement may be fulfilled by 2144 Organic Biochemistry or Organic Chemistry I and Organic Chemistry II (with labs.) Physics requirement may be filled by 1063 General Physics or Basic Physics I and Basic Physics II. Students planning to apply to graduate or professional schools should take Organic Chemistry I and II and Basic Physics I and II.