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
Ball, Horton, Paul, Ubeidat

B.S. Biological Sciences, Environmental and Organismal Biology Option
Aracena, Boggs, Castle, Cothran, Jones, O'Neal

B.S. Microbiology
McGrane, Paul

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
Ball, Horton, Ubeidat

Pre-Physical Therapy, Pre-Occupational Therapy
Ball

Pre-Dentistry, Pre-Dental Hygiene
Paul

Pre-Veterinary Medicine
Aracena, 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 214
(580) 774-3230
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 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 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

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) Total (12-15)	1254 Principles of Biology II (4) 1213 English Composition II (3) 1613 College Trigonometry (3) General Education (2-5) 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) Total (13-17)	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 (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)* Total (14-19)	Chemistry requirements (4)* Field/Plant course elective (4) Major electives, Minor courses, or General Education (3-7) Physics requirements (4)* Total (15-19)

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

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) Total (16-18)	3053 Cell Biology (3) 3283 Ecology (3) Chemistry requirements (4)* General Education (4-6) 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. Total (14-19)	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 (15-19)

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

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
(A maximum of 4 hours total of Independent Studies may be counted toward the major.)
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) Total (15)	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)

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) Total (16-18)	3053 Cell Biology (3) 3283 Ecology (3) Chemistry requirements (4)* General Education (4-6) Total (14-16)

THIRD YEAR	
FIRST SEMESTER	SECOND SEMESTER
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. Total (14-19)	Microbiology (5) 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 (15-19)

FOURTH YEAR	
FIRST SEMESTER	SECOND SEMESTER
Immunology (3) Option electives, Minor courses, or General Education (12) Total (15)	4901 Biological Sciences Capstone (1) Option electives, Minor courses, or General Education (14) 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) Total (16)	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 (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) Total (15)	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 (16)

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

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

+ First time entering Freshmen need to take 1001 Freshman Orientation

BACHELOR OF SCIENCE – 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. 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) Total (15)	1254 Principles of Biology II (4) 1213 English Composition II (3) 1613 College Trigonometry (3) General Education (5) Total (15)

SECOND YEAR	
FIRST SEMESTER	SECOND SEMESTER
1203 General Chemistry I (3) 1252 General Chemistry I Lab (2) 3152 Genetics and Cell Biology Lab (2) 3253 Genetics (3) Major electives, Minor courses, or General Education (4-6) Statistics course (3) Total (17-19)	1303 General Chemistry II (3) 1352 General Chemistry II Lab (2) 3053 Cell Biology (3) 3283 Ecology (3) General Education (6) 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) Total (15-19)	Chemistry requirements (4)* Field/Plant course elective (4) Option electives, Minor courses, or General Education (4-7) Physics requirements (3-4) Total (15-19)

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

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