BIOLOGY, BS

Program Description

The Bachelor of Science degree in biology combines theory and concepts of biology with intensive, hands-on experiences in our state-of-the-art laboratories and a wealth of close-by field sites. Students build on a core of biology classes by selecting the physiology and taxonomy classes and other electives that best fit their interests.

The program is an excellent preparation for biology or related careers. Our graduates are currently employed as doctors, dentists, veterinarians, biological researchers, laboratory technicians, consultants and teachers. Many careers in biology require education beyond the baccalaureate degree and LSSU's biology program has a proven record of excellent preparation for professional and graduate school.

Animal Biology concentration – In this program, you will study the physiology, nutrition, behavior, and health of animals, with focus on species that are economic resources or beloved companions. Includes instruction in molecular and cell biology, microbiology, nutrition and physiology, ecology and behavior, genetics and evolutionary biology, disease prevention, and applications to specific species and phyla. As an animal biology major, you'll have the chance to put your theoretical knowledge into practice by working with wild and domesticated animals in hands-on situations. It will prepare you for employment in laboratories, zoos, farms, or animal shelters.

Food and Ecology concentration – prepares students for specific careers or graduate studies in particular aspects of the food system. These careers range from technical, policy, outreach, and research work with federal, local and tribal government agencies; university research, food businesses; NGOs working to improve health and nutrition, advocacy groups, industry groups. The skills required for these careers thus range across a number of disciplines. This program provides the required basis in biological sciences and adds choices in other disciplines to let students tailor their program to their specific interests. Students interested in pursuing graduate school in the sciences should consider adding additional chemistry classes, including organic chemistry, to their schedule. The program requires that students complete an apprenticeship class with an organization working in an aspect of the food system and complete a senior project.

Pre-Medical concentration – prepares students for medical, dental, optometry, podiatry, chiropractic, and physician assistant graduate studies. Biology students will work with a pre-professional advisor to select the electives best suited for the health professional program of their choice while also providing a well-rounded biology education. This program has an embedded chemistry minor that meets the requirements of most U.S. medical schools. The LSSU Biology department is recognized by all health professional schools in Michigan as a top rate biology program.

LSSU participates in the Michigan State University College of Human Medicine's Early Assurance Program. During their junior year, students who excel in the LSSU biology pre-medical program may apply to the College of Human Medicine, and selected students will be assured of admission and begin a relationship with MSU College of Human Medicine during their senior year of college.

Pre-Veterinary concentration – with an embedded chemistry minor, prepares students to enter veterinary college after graduation from LSSU. It was designed to meet the specific requirements for the Michigan State University-College of Veterinary Medicine, but our students go to vet schools all over the country, for example North Carolina State, Oklahoma State and University of Illinois. This program stresses not only academics, but also the animal care experience that is critical for gaining admission to a veterinary college.

Program Learning Outcomes

- Thoroughly research and synthesize the primary literature for information relevant to a current scientific investigation.
- Design and conduct a scientific investigation of a testable hypothesis or methodology using appropriate tools and techniques.
- Effectively communicate the results or outcomes of a scientific investigation in multiple formats.
- Engage in professional activities related to the study of biological sciences and practice good professional ethics.

Bachelor of Science Biology

Code	Title	Hours
Biology Courses		
BIOL 131	General Biology: Cells	4
BIOL 132	General Biology: Organisms	4
BIOL 199	Freshman Seminar	1
BIOL 204	General Microbiology	4
BIOL 220	Genetics	4
BIOL 280	Biostatistics	3
BIOL 299	Sophomore Seminar	1
BIOL 337	General Ecology	3
BIOL 399	Planning Research Project	1
BIOL 499	Senior Symposium	1
Focal Courses in Biology		
Select one Physiology Elective from the following:		4
BIOL 315	Plant Sciences: Structure/Func	
BIOL 330	Animal Physiology	
BIOL 421	Adv Cell & Molecular Biology	
Select one Taxonomy Elective from the following:		3-4
BIOL 202	Plant Science: Ident/Diversity	
BIOL 302	Invertebrate Zoology	
BIOL 303	General Entomology	
BIOL 306	Mycology	
NRES 310	Ichthyology	
NRES 311	Mammalogy	
NRES 312	Ornithology	
BIOL 422	Parasitology	
BIOL 425	Virology	
NRES 475	Aquatic Entomology	
Biology Cognates		
Select 21 credits of Biology Cognates [1]		21
Support Courses		
CHEM 115	General Chemistry I	5
CHEM 116	General Chemistry II	5
CHEM 225	Organic Chemistry I	4
or CHEM 208	Survey Organic Chem/Biol Apps	

MATH 111	College Algebra	3
MATH 112	Calculus Business/Life Science	4
Physical Science (CHEM, PHYS, GEOL) course with lab		4
Free Electives [2]		16-19
Total Hours		**95-99**

[1] 21 credits of any BIOL courses not used to satisfy one of the other requirements, or any NRES courses other than:

- NRES 199 Freshman Seminar,
- NRES 299 Sophomore Seminar,
- NRES 250 Quantitative Biology,
- NRES 398 Plan Experiential Lrn Project,
- NRES 399 Research Project Design,
- NRES 450 Apprenticeship in (Discipline),
- BIOL 490 Ind Study in (Discipline)
- NRES 495 Senior Project, or
- NRES 499 Senior Capstone.

A minimum of 17 credits must be from 300/400 level courses. At least one elective must be a 400 level course.

[2] As needed to reach 124 total credits.

General Education: All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.00 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.

Bachelor of Science Biology, Animal Biology Concentration

Code	Title	Hours
Biology Courses		
BIOL 131	General Biology: Cells	4
BIOL 132	General Biology: Organisms	4
BIOL 199	Freshman Seminar	1
BIOL 204	General Microbiology	4
BIOL 220	Genetics	4
BIOL 280	Biostatistics	3
BIOL 299	Sophomore Seminar	1
BIOL 337	General Ecology	3
BIOL 399	Planning Research Project	1
BIOL 499	Senior Symposium	1
Focal Courses in Animal Biology		
BIOL 208	Prin Animal Biology & Health	3
BIOL 243	Vertebrate Anatomy	4
BIOL 330	Animal Physiology	4
BIOL 405	Animal Behavior	3
BIOL 420	Evolutionary Analysis	3
BIOL 335	Principles of Animal Nutrition	3
or BIOL 426	Animal Disease and Zoonoses	
Cognates		
Select twelve Zoology and/or Animal Health credits from the following:		12
Zoology:		
NRES 240	Natural Hist of the Vertebrate	
BIOL 302	Invertebrate Zoology	
BIOL 303	General Entomology	
NRES 310	Ichthyology	
NRES 311	Mammalogy	
NRES 312	Ornithology	
NRES 475	Aquatic Entomology	
Animal Health:		
BIOL 306	Mycology	
BIOL 423	Immunology [1]	
BIOL 422	Parasitology	
BIOL 425	Virology	
CHEM 353	Medicinal Chemistry/Toxicology [1]	
Support Courses		
CHEM 115	General Chemistry I	5
CHEM 116	General Chemistry II	5
CHEM 225	Organic Chemistry I	4
or CHEM 208	Survey Organic Chem/Biol Apps	
MATH 111	College Algebra	3
Free Electives [2]		21-24
Total Hours		**96-99**

[1] Requires CHEM 225 Organic Chemistry I and CHEM 351 Introductory Biochemistry.

[2] Credit as needed to reach 124 total credits. A minimum of 17 credits must be from BIOL/NRES 300/400 level courses. At least one elective must be a BIOL/NRES 400 level course.

General Education: All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.00 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.

Bachelor of Science Biology, Food and Ecology Concentration

Code	Title	Hours
Biology Foundation and Research Courses		
BIOL 131	General Biology: Cells	4
BIOL 132	General Biology: Organisms	4
BIOL 199	Freshman Seminar	1
BIOL 204	General Microbiology	4
BIOL 220	Genetics	4
BIOL 280	Biostatistics	3
BIOL 299	Sophomore Seminar	1
BIOL 337	General Ecology	3
BIOL 399	Planning Research Project	1
BIOL 499	Senior Symposium	1
Focal Courses in Food Systems		

BIOL 307	US Food System	3
BIOL 202	Plant Science: Ident/Diversity	3
BIOL 235	Int to Protected Horticulture	3
BIOL 389	Internship in: (Discipline)	3-4
Specialty Cognates		
Select one area from the following:		6-11
Policy and Communications		
POLI 130	Intro State/Local Government (Select three of the following:)	
POLI 301	Policy Analysis and Evaluation	
COMM 302	Argumentation & Advocacy	
or COMM 32	Public Relations	
Production		
BIOL 232	Introduction to Aquaponics	
BIOL 302	Invertebrate Zoology	
BIOL 315	Plant Sciences: Structure/Func	
Marketing		
Select two of the following:		
MRKT 281	Marketing Principles/ Strategy	
MRKT 384	Social Media Marketing	
MRKT 386	Mobile Marketing	
Analytics		
Select three of the following:		
BIOL 385	Public Hlth Stats Epidemiology	
EVRN 131	Introduction to GIS and GPS	
EVRN 225	Intermediate GIS	
EVRN 325	Geospatial Analysis	
Support Courses [1]		
CHEM 115	General Chemistry I	5
MATH 111	College Algebra	3
Free Electives [2]		
Total Hours		**52-58**

[1] Students interested in science graduate programs should consult with their advisor regarding additional chemistry courses.

[2] Credits as needed to reach 124 total credits. A minimum of 17 credits must be from BIOL/NRES 300/400 level courses. At least one elective must be a BIOL/NRES 400 level course.

General Education: All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.00 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.

Bachelor of Science Biology, Pre-Medical Concentration

Code	Title	Hours
Biology Courses		
BIOL 121	Human Anatomy & Physiology I	4
BIOL 122	Human Anatomy & Physiology II	4
BIOL 131	General Biology: Cells	4
BIOL 132	General Biology: Organisms	4
BIOL 199	Freshman Seminar	1
BIOL 204	General Microbiology	4
BIOL 220	Genetics	4
BIOL 280	Biostatistics	3
BIOL 299	Sophomore Seminar	1
BIOL 337	General Ecology	3
BIOL 399	Planning Research Project	1
BIOL 499	Senior Symposium	1
Physiology Elective		
BIOL 330	Animal Physiology	4
or BIOL 421	Adv Cell & Molecular Biology	
Advanced Study		
Select 17 credits from the following:		17
BIOL 243	Vertebrate Anatomy	
BIOL 306	Mycology	
BIOL 332	Embryology	
BIOL 380	Clin Hematology & Hemostasis	
BIOL 385	Public Hlth Stats Epidemiology	
BIOL 406	Immunohematology	
BIOL 422	Parasitology	
BIOL 423	Immunology	
BIOL 425	Virology	
BIOL 426	Animal Disease and Zoonoses	
BIOL 433	Histology and Histopathology	
BIOL 455	Clin Chem Body Fluid Analysis	
BIOL 480	Adv Clinical Microbiology	
Support Courses		
CHEM 115	General Chemistry I	5
CHEM 116	General Chemistry II	5
CHEM 225	Organic Chemistry I	4
CHEM 326	Organic Chemistry II	4
CHEM 351	Introductory Biochemistry	4
MATH 111	College Algebra	3
PHYS 221	Principles of Physics I	4
PHYS 222	Principles of Physics II	4
HLTH 328	Multicultural Appr Health Care	3
PSYC 101	Intro to Psychological Science	3
SOCY 101	Introduction to Sociology	4
Free Electives [1]		12-14
Total Hours		**110-112**

[1] Credits as needed to reach 124 total credits.

General Education: All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.75 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.

Bachelor of Science Biology, Pre-Veterinary Concentration

Code	Title	Hours
Biology Courses		
BIOL 131	General Biology: Cells	4
BIOL 132	General Biology: Organisms	4
BIOL 199	Freshman Seminar	1
BIOL 204	General Microbiology [1]	4
BIOL 220	Genetics	4
BIOL 280	Biostatistics	3
BIOL 299	Sophomore Seminar	1
BIOL 337	General Ecology	3
BIOL 399	Planning Research Project	1
BIOL 499	Senior Symposium	1
Physiology Elective		
Select one of the following:		4
BIOL 330	Animal Physiology	
BIOL 421	Adv Cell & Molecular Biology [1]	
Taxonomy Elective		
Select one of the following:		3
BIOL 306	Mycology	
BIOL 422	Parasitology	
BIOL 425	Virology	
Support Courses		
CHEM 115	General Chemistry I	5
CHEM 116	General Chemistry II	5
CHEM 225	Organic Chemistry I	4
CHEM 326	Organic Chemistry II	4
CHEM 351	Introductory Biochemistry	4
MATH 111	College Algebra	3
MATH 112	Calculus Business/Life Science	4
PHYS 221	Principles of Physics I	4
PHYS 222	Principles of Physics II	4
Advanced Study		
Select 17 credits from the following:		17
BIOL 208	Prin Animal Biology & Health	
BIOL 243	Vertebrate Anatomy	
BIOL 306	Mycology	
BIOL 332	Embryology	
BIOL 335	Principles of Animal Nutrition [1]	
BIOL 380	Clin Hematology & Hemostasis	
BIOL 405	Animal Behavior	
BIOL 423	Immunology	
BIOL 426	Animal Disease and Zoonoses	
BIOL 433	Histology and Histopathology	
BIOL 480	Adv Clinical Microbiology	
Free Electives [2]		9-11
Total Hours		**96-98**

[1] These courses required by MSU-CVM.
[2] Credits as needed to reach 124 total credits.

General Education: All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.75 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.