

BS in Biological Sciences with emphasis in Medical Science and Human Biology

Degree Program Description

The emphasis in Medical Science and Human Biology will provide students with the opportunity to expand their knowledge beyond the BS in Biological Science by allowing them to take additional coursework that will help them on post-baccalaureate examinations and entry to a variety of professional programs including pre-med, veterinary medicine and health sciences.

Major Program Requirements

The following degree requirements must be completed in addition to University (<https://catalog.missouri.edu/academicdegreerequirements/universityrequirements/>), general education (<https://catalog.missouri.edu/academicdegreerequirements/generaleducationrequirements/>), and College of Arts and Science (<https://catalog.missouri.edu/collegeofartsandscience/#undergraduatetext>) requirements, students must also meet the following major program requirements. All major requirements in the College of Arts and Science must be completed with grades of C- or higher unless otherwise indicated.

Major Core Requirements Biology

BIO_SC 1500	Introduction to Biological Systems with Laboratory	5
or BIO_SC 1010 & BIO_SC 1020	General Principles and Concepts of Biology and General Biology Laboratory	
or BIO_SC 1030	General Principles and Concepts of Biology with Laboratory	
or BIO_SC 1200	General Botany with Laboratory	
(BIO_SC 1030 is not offered at MU and is for crediting transfer courses only. Grades of B- or higher required for BIO_SC 1010/ BIO_SC 1020 & BIO_SC 1030)		
BIO_SC 1550	Introduction to Life Science Research	2-3
or GN_HON 2453H	Introduction to Research	
BIO_SC 2200	General Genetics	4
BIO_SC 2300	Introduction to Cell Biology	4
Evolutionary Biology (select one):		3
BIO_SC 3400	Evolution and Ecology	
BIO_SC 4600	Evolution	
BIO_SC 3700	Human Physiology	5
BIO_SC 3750	General Microbiology	3-4
or MICROB 3200	Medical Microbiology and Immunology	
BIOCHM 4270	Biochemistry	3
Capstone: Select from the following		
BIO_SC 4950 & BIO_SC 4952	Undergraduate Research in Biology and Undergraduate Research in Biology	3-6
BIO_SC 4972	Developmental Biology	3
BIO_SC 4976	Molecular Biology	3
BIO_SC 4978	Cancer Biology	3
BIO_SC 4982	Human Inherited Diseases	3
BIO_SC 4984	Mammalian Reproductive Biology	3
BIO_SC 4988	Nerve Cells and Behavior	3

BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
BIO_SC 4994	Senior Seminar (only specific sections)	3

No more than 5 credits of introductory coursework (BIO_SC 1010, BIO_SC 1020, BIO_SC 1030, BIO_SC 1100, BIO_SC 1200, and BIO_SC 1500) may be included in the major. At least 12 hours of biology coursework must be taken in residence at MU.

Electives

All biology majors must take additional biology courses to total at least 33 credits for the BS degree, of which at least 16 credits must be at the 3000 level or higher.

Elective credits must be in formal courses numbered above 2000 must include at least one 3000- or 4000-level laboratory course, one 4000-level course, and one WI course at the 3000- or 4000-level in a natural science. In addition to the biological diversity and capstone courses listed above, the following courses may be used as elective credit:

BIO_SC 3002	Topics in Biological Sciences - Biological Sciences	1-3
BIO_SC 3040	Eugenics Past, Present and Future: An Ugly Partnership Between Science and Society	3
BIO_SC 3050	Genetics and Society	3
BIO_SC 3060	Science and Society: Past, Present and Future	3
BIO_SC 3075	The Human Microbiome	3
BIO_SC 3210	Plant Systematics	4
BIO_SC 3240	Vertebrate Biology	3
BIO_SC 3260	Invertebrate Zoology	4
BIO_SC 3360	Herpetology	3-4
BIO_SC 3400	Evolution and Ecology	3
BIO_SC 3510	Biology of Fungi	3
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3710	Introductory Entomology	3
BIO_SC 3715	Insect Diversity	2
BIO_SC 3760	Microbiology Laboratory	2
BIO_SC 3780	Genetics Laboratory	2
BIO_SC 4002	Topics in Biological Science - Biological Science	1-3
BIO_SC 4320	Molecular Plant Physiology	3
BIO_SC 4400	Plant Anatomy	4
BIO_SC 4500	Neurobiology	3
BIO_SC 4590	Computational Neuroscience	3
BIO_SC 4600	Evolution	3
BIO_SC 4640	Behavioral Biology	3-4
BIO_SC 4642	Animal Communication	3
BIO_SC 4950	Undergraduate Research in Biology	1-3
BIO_SC 4952	Undergraduate Research in Biology	1-3
BIO_SC 4972	Developmental Biology	3
BIO_SC 4974	Molecular Biology Laboratory	3
BIO_SC 4976	Molecular Biology	3
BIO_SC 4978	Cancer Biology	3
BIO_SC 4982	Human Inherited Diseases	3
BIO_SC 4983	Molecular Ecology	4
BIO_SC 4984	Mammalian Reproductive Biology	3

BIO_SC 4988	Nerve Cells and Behavior	3
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
BIO_SC 4994	Senior Seminar	3
BIOCHM 4270	Biochemistry	3
BIOCHM 4272	Biochemistry	3
F_W 2600	Ornithology	5
F_W 2700	Ichthyology	4
F_W 3660	Mammalogy	4
MICROB 3200	Medical Microbiology and Immunology	4

List of 3000/4000 level lab courses.

BIO_SC 3210	Plant Systematics	4
BIO_SC 3360	Herpetology	3-4
BIO_SC 3510	Biology of Fungi	3
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3710 & BIO_SC 3715	Introductory Entomology and Insect Diversity	5
BIO_SC 3760	Microbiology Laboratory	2
BIO_SC 3780	Genetics Laboratory	2
BIO_SC 4400	Plant Anatomy	4
BIO_SC 4974	Molecular Biology Laboratory	3
BIO_SC 4983	Molecular Ecology	4
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
F_W 3660	Mammalogy	4

The following two courses satisfy the lab requirement if taken for 4 credit hours.

BIO_SC 3260	Invertebrate Zoology	4
BIO_SC 4640	Behavioral Biology	3-4

Students completing research courses

(BIO_SC 2950, BIO_SC 4950, BIO_SC 4950H, BIO_SC 4952, or BIO_SC 4952H) for 6 credits may apply 3 credits toward fulfillment of capstone or biology elective hours for the BS degree.

Students may repeat readings, internships, problems, or research courses for a total of 18 hours. Any credits remaining after 3 hours are used as a capstone or an elective in biology will be applied toward total hours to graduate. A maximum of 18 credit hours from the following courses (BIO_SC 2940, BIO_SC 2950, BIO_SC 2960, BIO_SC 2965H, BIO_SC 4085, BIO_SC 4950, BIO_SC 4950H, BIO_SC 4952 and BIO_SC 4952H) can be counted toward graduation.

Related Sciences

Chemistry (all courses required)		
CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
CHEM 2100	Organic Chemistry I	3
CHEM 2110	Organic Chemistry II	3
CHEM 2130	Organic Laboratory I	2
Physical Sciences (select one set of courses)		
PHYSICS 1210 & 1210	College Physics I and College Physics I	8
PHYSICS 2750 & PHYSICS 2760	University Physics I and University Physics II	10

Mathematical Sciences (select one calculus option and one statistics option)

MATH 1400	Calculus for Social and Life Sciences I	3-5
or MATH 1500	Analytic Geometry and Calculus I	
STAT 1200	Introductory Statistical Reasoning	3
or STAT 2500	Introduction to Probability and Statistics I	

Psychology/Sociology for Pre-Professional Requirement

These Psychology/Sociology hours will also fulfill the General Education requirement for Behavioral Sciences.

Choose 6 hours from the following:

PSYCH 1000	General Psychology	3
PSYCH 2210	Mind, Brain, and Behavior	3
PSYCH 2220	Drugs and Behavior	3
PSYCH 2310	Social Psychology	3
PSYCH 2410	Developmental Psychology	3
PSYCH 2510	Survey of Psychopathology	3
PSYCH 2810	Human Sexuality	3
SOCIOL 2200	Social Inequalities	3

Ethics Requirement

Students will need to choose 9 hours in two subject areas for Humanities and Fine Arts from the standard list available to all A&S students, including at least one of the following courses:

PHIL 1150	Introductory Bioethics	3
PHIL 2400	Ethics and the Professions	3
PHIL 2440	Medical Ethics	3

Second Language Alternative (SLA) for students pursuing a BS degree in biological sciences

Students may opt to satisfy the second language requirement through alternative coursework consisting of at least 12 credits in courses numbered 2000 or above. These courses may not be used to satisfy other degree requirements. Students should confer with the Biology Advising Office to ensure that alternative courses meet departmental requirements. All alternative courses must be approved by the Director of Undergraduate Studies.

Second Language Alternative

Medicine, Health and Society		
ANTHRO 2050	Introduction to Biological Anthropology with Laboratory	5
ANTHRO 2500	Primate Anatomy and Evolution	3
ANTHRO 2580	Evolution of Human Sexuality	3
ANTHRO 3560	Plagues and Peoples	3
ANTHRO 4360	Medical Anthropology	3
ANTHRO 4540	Human Biological Variation	3
ANTHRO 4580	Evolutionary Medicine	3
ANTHRO 4890	Human Skeletal Identification and Analysis	5
BIOCHM 4272	Biochemistry	3
BIOMED 2110	Biomedical Terminology	3
CDS 2190	Medical Terminology	3
CHEM 2140	Organic Laboratory II	2
CHEM 2400	Fundamentals of Inorganic Chemistry with Lab	3
CHEM 3200	Quantitative Methods of Analysis with Lab	4
F_S 2172	Elements of Food Microbiology	3

F_S 4370	Food Microbiology	3
HIST 3550	Science and Medicine in Ancient and Medieval Europe	3
HLTH_SCI 2400	Contemporary Health Issues	3
HLTH_SCI 3800	Holistic Health Systems for the Health Professions	3
HLTH_SCI 3700	Health Care in the United States	3
HLTH_SCI 4430	Health Care Across the Lifespan	3
MICROB 4304	Immunology for Health Professions	3
MPP 4204	Medical Pharmacology	4
NEP 2222	Socio-Cultural Perspectives on Obesity	3
NEP 2340	Human Nutrition I	3
NEP 2380	Diet Therapy for Health Professionals	3
NEP 2450	Nutrition Throughout the Life Span	3
NEP 2460	Eating Disorders	3
NEP 3450	Activity Throughout the Lifespan	3
NEP 4400	Pathophysiology of Diseases Affecting Metabolic Health	3
PHIL 2440	Medical Ethics	3
PHIL 4400	The Nature of Scientific Inquiry: An Introduction to Philosophy of Science	3
P_HLTH 2200	Introduction to Public Health and Health Promotion	3
P_HLTH 3310	Social and Behavioral Health Theory and Practice	3
P_HLTH 4350	Principles of Environmental Health for Public Health	3
P_HLTH 4485	Ethics in Public Health	3
PSYCH 3830	Health Psychology	3
PTH_AS 2201	Human Anatomy Lecture	3
PTH_AS 2203	Human Anatomy Laboratory	2
PTH_AS 4220	Forensic Pathology and Death Investigation	2
SOCIOL 3440	Sociology of Health	3
WGST 2050	Gender and Public Health	3
WGST 4600	Women and Health	3
V_PBio 3345	Fundamentals of Parasitology	3
V_PBio 3551	Introduction to Immunology I	3
V_PBio 3554	Introduction to Virology	3
V_PBio 3600	Bacterial Genetics and Genomics	3
V_PBio 3658	Public Health Microbiology	3

Semester Plan

NOTE: These plans are intended only as general guides. Courses outside Biology and Chemistry are provided only for illustrative purposes. Advanced credit or exemption from the Second Language requirement and/or advanced credit in non-science courses, along with the interests of each individual student will determine a final combination of courses in each semester that is unique for each student. Note also that the sample schedules in Semester 5 and beyond are left incomplete on purpose because each schedule should be highly individualized at that point.

Plan 1

A student that is exempt from MATH 1100

First Year			
Fall	CR	Spring	CR
CHEM 1400		3 CHEM 1410	3
CHEM 1401		1 CHEM 1411	1
Bio 1550 or Gn Hon 2453H		2 BIO_SC 1500	5
Math 1400 or 1500, Related Science Requirements		3 ENGLSH 1000	3
Psychology/Sociology for Pre-Professional Requirement		3 Phil 1150 or 2440, Ethics Requirement	3
Int Disc 1001, SSC 1150, or elective		2	
			14
			15

Second Year			
Fall	CR	Spring	CR
BIO_SC 2200		4 BIO_SC 2300	4
CHEM 2100		3 CHEM 2110	3
Stat 1200 or 2500, Related Science Requirements		3 CHEM 2130	2
Missouri State Law Requirement: Social Science from Arts and Science		3 Second Language or Language Alternative Requirement	3
Second Language or Language Alternative Requirement		3 Undergraduate research, second major, minor, certificate, or elective	3
			16
			15

Third Year			
Fall	CR	Spring	CR
BIO_SC 3700		5 PHYSCS 1220	4
PHYSCS 1210		4 BIOCHM 4270	3
Psychology/Sociology for Pre-Professional Requirement, 2000+ level		3 First Writing Intensive	3
Second Language or Language Alternative Requirement		3 Second Language or Language Alternative Requirement	3
		Undergraduate research, second major, minor, certificate, or elective	3
			15
			16

Fourth Year			
Fall	CR	Spring	CR
Biology Capstone, Second Writing Intensive		3 Bio 3400 or 4600, Evolutionary Biology Requirement	3
Bio 3750 or Micro 3200		4 Humanities, 2000+ level	3
Humanities, 2000+ level		3 Undergraduate research, second major, minor, certificate, or elective	3
Undergraduate research, second major, minor, certificate, or elective		3 Second major, minor, certificate, or elective	3
Second major, minor, certificate, or elective		2 Second major, minor, certificate, or elective	2
			15
			14

Total Credits: 120

Plan 2

A student that needs MATH 1100

First Year			
Fall	CR	Spring	CR
BIO_SC 1500		5 CHEM 1400	3
Math 1100: Math and Quantitative Reasoning		3 CHEM 1401	1
Psychology/Sociology for Pre-Professional Requirement		3 Bio 1550 or Gn Hon 2453H	2
Missouri State Law Requirement: Social Science from Arts and Science		3 ENGLISH 1000	3
Int Disc 1001, SSC 1150, or elective		2 Phil 1150 or 2440, Ethics Requirement	3
		Second major, minor, certificate, or elective	3
		16	15
Second Year			
Fall	CR	Spring	CR
BIO_SC 2200		4 BIO_SC 2300	4
CHEM 1410		3 CHEM 2100	3
CHEM 1411		1 Math 1400 or 1500, Related Science Requirements	3
Second Language or Language Alternative Requirement		3 Second Language or Language Alternative Requirement	3
Stat 1200 or 2500, Related Science Requirements		3 Undergraduate research, second major, minor, certificate, or elective	2
		14	15
Third Year			
Fall	CR	Spring	CR
BIO_SC 3700		5 BIOCHM 4270	3
CHEM 2110		3 PHYSCS 1210	4
CHEM 2130		2 Second Language or Language Alternative Requirement	3
Second Language or Language Alternative Requirement		3 Humanities, 2000+ level, Arts and Science Diversity Requirement	3
Undergraduate research, second major, minor, certificate, or elective		2 First Writing Intensive	3
		15	16
Fourth Year			
Fall	CR	Spring	CR
Bio 3750 or Micro 3200, Biological Diversity Requirement		4 Biology Capstone, Second Writing Intensive	3
PHYSCS 1220		4 Bio 3400 or 4600, Evolutionary Biology Requirement	3
Psychology/Sociology for Pre-Professional, 2000+ level		3 Undergraduate research, second major, minor, certificate, or elective	3
Humanities, 2000+ level		3 Second major, minor, certificate, or elective	3
		Second major, minor, certificate, or elective	3
		14	15

Total Credits: 120