

# Bachelor of Science with Major in Biology (Professional Health Sciences Emphasis)

This major is designed for students interested in medical professions (medicine, osteopathic medicine, dentistry, optometry, pharmacy, podiatry and veterinary), or allied medical professions (physician assistant, occupational therapy, physical therapy, or medical research). Health sciences students should consult with their Biology advisor and the Health Sciences advisor in the College of Arts and Sciences to develop an appropriate course of study.

Required 120 credits (36 of which must be numbered 300 or above, and 30 of which must be from UND), including:

I. Essential Studies requirements (see University ES listing, minimum 39 total credits). The following course must be taken as part of the Essential Studies requirement:

Code	Title	Credits
COMM 110	Fundamentals of Public Speaking	3
<b>Total Credits</b>		<b>3</b>

II. 39 major hours including:

A. Core requirements (18 credit hours), all courses below:

Code	Title	Credits
BIOL 120	Orientation to the Biology Major	1
BIOL 150 & BIOL 151	General Biology I and General Biology II *	6
BIOL 150L & BIOL 151L	General Biology I Laboratory and General Biology II Laboratory	2
BIOL 315	Genetics	3
BIOL 341	Cell Biology	3
BIOL 480	Senior Capstone Seminar **	3
<b>Total Credits</b>		<b>18</b>

\* Students who take BIOL 111 Concepts of Biology and BIOL 111L Concepts of Biology Laboratory and earn a grade of "B" or higher in both of those courses prior to becoming a Biology major may complete the General Biology sequence by taking BIOL 150 General Biology I and BIOL 150L General Biology I Laboratory.

\*\* Three credits for an accepted BIOL 489 Senior Honors Thesis can be substituted for the BIOL 480 Senior Capstone Seminar with prior approval of the thesis topic by the Chair of Biology.

We strongly advise mastery of materials in all core courses except BIOL 480 Senior Capstone Seminar prior to enrolling in other 300 or 400 level Biology courses.

At least 15 of the total 39 credits required for the BS degree must be taken in the UND Biology department, exclusive of the credits earned in other departments and institutions.

B. Advanced requirements (minimum 21 credit hours of upper level Biology courses):\*

Code	Title	Credits
BIOL 364	Parasitology	
BIOL 364L	Parasitology Laboratory	

1. Must include a minimum of 9 credits from the following health-related courses below:

BIOL 369	Histology	
BIOL 369L	Histology Lab	
BIOL 378	Developmental Biology	
BIOL 380	Disease Biology	
BIOL 390	Endocrinology	
BIOL 415	Genomics	
BIOL 418	Systems Biology	
BIOL 420	Neuroscience	
BIOL 442	Physiology of Organs and Systems	
BIOL 442L	Physiology of Organs and Systems Laboratory	
BIMD 220 & 220L	Human Anatomy Physiology I and Human Anatomy Physiology I Lab **	
or BIMD 221 & 221L	Human Anatomy Physiology II and Human Anatomy Physiology II Lab	
BIMD 302	General Microbiology Lecture	
BIMD 302L	General Microbiology Laboratory	
BIMD 328	Introduction to Immunology	

2. Additional 12 credits of upper level Biology electives. All 300 or 400 level Biology courses will count toward the elective credit hours needed. Certain science courses in other departments may also qualify as electives (see examples below). Only one 200 level course will count towards Biology elective credits.

3. Laboratory Requirement. At least four upper-division Biology courses with laboratories must be included. The following labs or courses satisfy this requirement:

BIOL 312L	Evolution Laboratory	
BIOL 332L	Gen Ecology Lab	
BIOL 336	Systematic Botany	
BIOL 341L	Cell Biol Lab	
BIOL 363	Entomology	
BIOL 364L	Parasitology Laboratory	
BIOL 369L	Histology Lab	
BIOL 376L	Animal Biology Laboratory	
BIOL 410	Molecular Biology Techniques	
BIOL 415	Genomics	
BIOL 416	Ecological Genomics	
BIOL 418	Systems Biology	
BIOL 425	Ichthyology	
BIOL 427	Ornithology	
BIOL 428	Mammalogy	
BIOL 431	Wildlife Management	
BIOL 433	Aquatic Ecology	
BIOL 438	Fisheries Management	
BIOL 442L	Physiology of Organs and Systems Laboratory	
BIMD 302L	General Microbiology Laboratory	

• Up to three of the following courses from UND departments outside Biology can be applied toward the 39 credits required for a BS in Biology degree (lecture + lab = 1 course). Other courses will be considered on a case by case basis. To have a course considered, the student should provide a syllabus to the Department Chair.

Code	Title	Credits
BIMD 220 & 220L	Human Anatomy Physiology I and Human Anatomy Physiology I Lab **	4
or BIMD 221 & 221L	Human Anatomy Physiology II and Human Anatomy Physiology II Lab	
BIMD 302 & 302L	General Microbiology Lecture and General Microbiology Laboratory	4
BIMD 328	Introduction to Immunology	3
BIMD 401	Advanced Biochemistry	3

\* No more than 10 combined credit hours from BIOL 491 Seminar; BIOL 492 Research; BIOL 493 Instructional Experience in Biology; BIOL 494

Directed Studies; BIOL 497 Internship; and BIOL 489 Senior Honors Thesis, will count towards this 39 credit major, and no more than 4 credit hours from any single one of those courses.

\*\* Either BIMD 220/220L or BIMD 221/221L will count as an elective, but not both courses.

- BMB 301 Biochemistry will not be allowed to fulfill elective requirements.
- BIMD 202 Introduction to Medical Microbiology Lecture/BIMD 202L Introduction to Medical Microbiology Laboratory will only be allowed with special permission of the Biology department.

medicine students because some medical schools require or prefer this combination.

# Students may take BIOL 470 and have those credits count toward biology electives AND satisfy the statistics requirement.

### III. Cognate requirements in other departments (29-32 credit hours):

Code	Title	Credits
<b>Mathematics *</b>		
MATH 146 or MATH 165	Applied Calculus I ** Calculus I	3-4
<b>Chemistry</b>		
General Chemistry		
CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory	
OR		
CHEM 221 & 221L & CHEM 254 & CHEM 254L	Fundamentals of Chemistry - Concepts and Fundamentals of Chemistry Laboratory and Inorganic Chemistry I and Inorganic Chemistry I Laboratory ***	
Organic Chemistry		
CHEM 340 & 340L & BIMD 301	Survey of Organic Chemistry and Survey of Organic Chemistry Laboratory and Biochemistry	
OR		
CHEM 341 & 341L & BIMD 301	Organic Chemistry I and Organic Chemistry I Laboratory and Biochemistry	
OR		
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory ****	
<b>Physical Sciences</b>		
PHYS 161 & PHYS 162	Introductory College Physics I and Introductory College Physics II (OR)	
OR		
PHYS 211 & PHYS 212	College Physics I and College Physics II (OR)	
OR		
PHYS 251 & PHYS 252	University Physics I and University Physics II	
<b>Statistical Methods and Data Interpretation</b>		
Select one of the following:		3
BIOL 470	Biostatistics #	
PSYC 241	Statistics for the Behavioral Sciences	
SOC 326	Sociological Statistics	
MATH 321	Applied Statistical Methods	

\* Students with a particular aptitude for mathematics should consider taking both MATH 165 Calculus I and MATH 166 Calculus II and should consult with their adviser regarding this potential option.

\*\* Prerequisites for either course are the responsibility of the student.

\*\*\*The chemistry sequence CHEM 221, CHEM 221L, CHEM 254, and CHEM 254L is intended for students with a strong background and interest in chemistry and presumes some exposure to calculus.

\*\*\*The sequence of CHEM 341 Organic Chemistry I and CHEM 342 Organic Chemistry II AND BIMD 301 Biochemistry is highly recommended for pre-