Biotechnology

Department Information

- **Department Web Site:**
  www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences (http://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/)
- **Credential Offered:**
  B.S.; Minor
- **Sample Program Guide:**
  catalog.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext (http://catalog.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext)

Major Requirements

Major: Biotechnology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 30 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.
6. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
7. Students presenting transfer credit must meet the NDSU residence credits and the minimum upper level credit. Of the 30 credits earned in residence, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.

For complete information, please refer to the Degree and Graduation Requirements (http://catalog.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/) section of this Bulletin.

University General Education Requirements

A list of university approved general education courses and administrative policies are available here (http://catalog.ndsu.edu/academic-policies/undergraduate-policies/general-education/#genedcoursestext).

Code	Title	Credits
Category C: Communication		**12**
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Category R: Quantitative Reasoning †		**3**
Category S: Science and Technology †		**10**
Category A: Humanities and Fine Arts †		**6**
Category B: Social and Behavioral Sciences †		**6**
Category W: Wellness †		**2**
Category D: Cultural Diversity *†		
Category G: Global Perspectives *†		
Total Credits		**39**

*
Courses for category D & G are satisfied by completing D & G designated courses in another general education category.

†
General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

Major requirements

Code	Title	Credits
Biotechnology Requirements		
MICR 189	Skills for Academic Success [1]	1
CSCI 114	Computer Applications	3
or CSCI 122	Visual BASIC	
MATH 165	Calculus I	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
STAT 330	Introductory Statistics	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
PLSC 315 & 315L	Genetics and Genetics Laboratory Cross-listed as BIOL 315/L	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 474	Methods of Recombinant DNA Technology [2]	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology [2]	3
MICR 471	Immunology and Serology Laboratory [2]	2
MICR 485	Capstone Experience I: Reflecting and Planning	1
MICR 486	Capstone Experience II: Reflection and Dissemination	1
Ethics - Select one philosophy/ethics course from the following:		3
PHIL 111	Professional Responsibility and Ethics	
PHIL 210	Ethics	
PHIL 215	Contemporary Moral Issues	
PHIL 216	Business Ethics	
PHIL 225	Environmental Ethics	
PHIL 327	Ethics, Engineering, and Technology	
Capstone - Select one of the following capstone experiences from the following:		2
MICR 493	Undergraduate Research (Research Experience) [3]	
MICR 494	Individual Study	
MICR 497	FE/Coop Ed/Internship (Internship Experience)	
Biotechnology Elective - Select one course from the following:		2-3
BME 220	Introduction to Biomedical Engineering	
MICR 455	Microbial Biotechnology [2]	
Genetics Elective - Select one course from the following:		3
ANSC 357	Animal Genetics [2]	

MICR 482	Microbial Genetics [2]	
PLSC 431	Intermediate Genetics [2]	
Physiology Elective - Select one course from the following:		3
MICR 480	Microbial Physiology [2]	
PLSC 380	Principles of Plant Physiology [2]	
BIOL 460	Animal Physiology [2]	
Major Electives - Select 9 credits from the following:		9
ABEN 263	Biological Materials Processing	
ABEN 456	Biobased Energy [2]	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts [2]	
ASM 234	3D Printing and Manufacturing	
BIOC 473	Methods of Biochemical Research [2]	
BIOC 487	Molecular Biology of Gene Expression [2]	
CFS 462	Food Ingredient Technology [2]	
CHEM 431	Analytical Chemistry I [2]	
CPM 436	Biopolymers and Biocomposites [2]	
ENVE 240	Microbiological Principles for Environmental Engineers	
IME 456	Program and Project Management	
MICR 352	Critical Skills in Microbiology	
MICR 352L	Critical Skills in Microbiology Laboratory Research	
MICR 445	Animal Cell Culture Techniques [2]	
MICR 481	Microbial Genomics with Computational Laboratory [2]	
PLSC 411	Genomics [2]	
PLSC 484	Plant Tissue Culture and Biotechnology [2]	
Total Credits		**90-91**

1

MICR 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

2

Courses that offer a 600 level dual course can be taken for the B.S./M.S. accelerated program. The 600 level courses have additional outcomes/ requirements that students will have to complete. Students approved for accelerated programs must complete and submit the *Accelerated Declaration form*, which will require the student and advisor to identify which graduate courses (no more than 15 credits) will be counted toward the B.S. degree.

3

The research may also be completed as BIOC or PLSC.

Degree Notes:

- An accelerated undergraduate to master's degree program is available for the B.S. in Biotechnology major to the M.S. in Microbiology. Students must have a 3.00 GPA. Instructions to apply can be found in the online catalog and a sample 5-year plan can be found on the departments website. Students may complete a thesis-based or comprehensive study-based master's program.