Microbiology (CASNR)

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Description
Website: http://microbiology.unl.edu

The microbiology major is an interdepartmental major that offers educational opportunities in various areas of microbiology leading to a bachelor of science degree in microbiology. The training offered is suitable for a professional career in microbiology, which may lead to employment in the food industry, clinical microbiology, biotechnology, and pharmaceuticals; or federal agencies such as the Food and Drug Administration, U.S. Department of Agriculture, U.S. Public Health Service, and Environmental Protection Agency. The program is also suitable as preparation for graduate studies leading to academic careers and professional careers in medicine, dentistry, veterinary medicine, pharmacy, and health-related fields. (Completion of the microbiology baccalaureate degree program does not automatically fulfill the admission requirements for application to a given professional program. Students considering application to a professional program are strongly encouraged to work with their advisor to ensure that admission requirements are met during completion of the microbiology degree.)

Students interested in majoring in microbiology are advised to make an appointment with the academic advisor.

Students concerned about their preparation for college-level biology should take LIFE 120 Fundamentals of Biology I and LIFE 120L Fundamentals of Biology I laboratory with an understanding that they will need to use the resource center and plan their time accordingly to allow for increased study time. Please consult your advisor if in doubt.

College Requirements

College Admission

Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social studies, and 2 units of foreign language. Students must also meet performance requirements (ACT composite of 20 or higher OR combined SAT score of 950 or higher OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance. For students entering the PGA Golf Management degree program, a certified golf handicap of 12 or better (e.g., USGA handicap card) or written ability (MS Word file) equivalent to a 12 or better handicap by a PGA professional or high school golf coach is required. For more information, please visit: http://pgm.unl.edu/requirements.

Admission Deficiencies/Removal of Deficiencies

Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at UNL, or within the first calendar year at UNL, whichever takes longer; excluding foreign languages. Students have up to 60 credit hours to remove foreign language deficiencies. College-level course work taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by completion of specified courses in the University or by correspondence.

The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

College Degree Requirements

Curriculum Requirements

The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education); College of Agricultural Sciences and Natural Resources Core; and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the catalog. The individual major/degree program listings of classes insures that a student will meet the minimum curriculum requirements of the College.

Foreign Languages/Language Requirement

Two units of a foreign language are required. This requirement is usually met with two years of high school language.

Minimum Hours Required for Graduation

The College grants the baccalaureate degree in programs associated with agricultural sciences, natural resources and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Grade Rules

Removal of C-, D and F Grades

Only the most recent letter grade received in a given course will be used in computing a student’s cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from his/her cumulative average a course grade of C-, D+, D-, or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (withdrawn), or NR (no report). If a course is no longer being offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at http://www.unl.edu/regrec/course-repeats.

Pass/No Pass

Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate. However, a department may specify that the Pass/No Pass status of its courses be limited to non-majors or may choose to offer some courses for letter grades only.

GPA Requirements

A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Transfer Credit Rules

To be considered for admission, a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another
Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty is the maximum number of hours UNL will accept on transfer from a two-year college. Ninety is the maximum number of hours UNL will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours in the major field, including the capstone course, must be completed at UNL regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C-, D+, D and D- grades from other schools. The C-, D+, D and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to UNL.

Joint Academic Transfer Programs
The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either UNL or the cooperating institution.

Dual Degree Programs
A to B Programs
The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized course work. Students transfer into CASNR with junior standing.

Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to UNL, and work toward a bachelor of science degree.

Participating community colleges include:

- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

3+2 Programs
Two specialized degree programs in animal science and veterinary science are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from UNL with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must complete the “Application for Degree” form and provide transcripts to the Credentials Clerk, Office of the University Registrar, 107 Canfield Administration Building, UNL. Students should discuss these degree programs with their academic advisor.

Cooperative Degree Programs
Academic credit from UNL and a cooperating institution is applied towards a four-year degree from either UNL (UNL degree-granting program) or the cooperating institution (non UNL degree-granting program). All have approved programs of study.

UNL Degree-Granting Programs
A UNL degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR and complete the requirements for a bachelor of science degree.

Chadron State College. Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a Bachelor of Science in Agricultural Education in the teaching option.

Wayne State College. Wayne State College offers a 3+1 program leading to a Bachelor of Science in Plant Biology in the ecology and management option.

University of Nebraska at Kearney. Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

University of Nebraska at Omaha. The University of Nebraska at Omaha (UNO) cooperates with CASNR in providing four-semester pre-agricultural sciences, pre-natural resources, pre-food science and technology, pre-horticulture and pre-turfgrass and landscape management transfer programs.

A student enrolled in these programs may transfer all satisfactorily completed academic credits identified in the suggested program of study, and enter CASNR to study toward a degree program leading to a bachelor of science degree. The total program would require a minimum of four years or eight semesters (16 credit hours/semester or 120 credit hours).

UNL CASNR faculty teach horticulture and food science and technology courses at UNO to assist an urban population in better understanding the food processing, horticulture, and landscape horticulture industries.

For more information, contact the CASNR Dean's Office, 800-472-8800, ext. 2541.

Non UNL Degree-Granting Programs
The CASNR cooperates with other institutions to provide course work that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at UNL prior to transferring and completing a degree at the cooperating institution.

Chadron State College—Range Science. The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of course work at Chadron State College and one year of specialized range science course work (32 credit hours) at CASNR.
Dordt College (Iowa) – Agricultural Education: Teaching Option. This program allows students to pursue an Agricultural Education Teaching Option degree leading toward a bachelor of science in agricultural education. Students at Dordt College will complete 90 credit hours in the Agricultural Education: Teaching Option Transfer Program.

Residency
Students must complete at least 30 of the total hours for their degree using UNL credits. At least 18 of the 30 credit hours must be in courses offered through CASNR\(^1\) (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another UNL college and excluding independent study regardless of the number of hours transferred. Credit earned during education abroad may be used toward the residency requirement if students register through UNL and participate in prior-approved education abroad programs. UNL open enrollment and summer independent study courses count toward residence.

Online and Distance Education
There are many opportunities to earn college credit online through the University of Nebraska–Lincoln. Some of these credits may be applicable not only as elective credits, but also toward the fulfillment of the College’s education requirements. Credits earned online may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

For further information, contact:
Office of Online and Distance Education
University of Nebraska–Lincoln
305 Brace Labs
Lincoln, NE 68588-0109
402-472-4681
http://online.unl.edu/

Independent Study Rules
Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean’s Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of course work under supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

Other College Degree Requirements
Capstone Course Requirement
A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

ACE Requirements
All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at www.ace.unl.

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6 and 10 with the college requirements.

Catalog Rule
Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to UNL or when they were first admitted to a Joint Academic Transfer Program. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes
Majors in microbiology will be able to:

1. Understand the physiology, biochemistry and genetics of bacteria and other microorganisms including cell structure, function, diversity, metabolism and the genetics of metabolic regulation.

2. Be knowledgeable about the immune response and disease-causing microorganisms including aspects of the innate and adaptive immune responses, as well as an introductory understanding of the molecular basis for pathogenesis.

3. Understand the role of microorganisms in plant and animal agriculture, foodborne disease and spoilage, as well as beneficial roles played by microorganisms.

4. Understand the taxonomic, ecological, evolutionary, and genetic relationships among microorganisms including nutrient cycling, microbial diversity and the biotechnological application of microorganisms to solve environmental problems.

5. Be proficient at the scientific method of investigation and hypothesis testing including the development of theoretical and practical skills in the design and execution of experiments as well as the development of oral and writing skills necessary for the effective communication of experimental results and/or scientific principles.

Major Requirements
The core courses and 12-18 hours of elective microbiology courses (a minimum of 12 hours at the 300 level or above) must be completed.

College Integrative Course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIL 101</td>
<td>Science and Decision-Making for a Complex World</td>
<td>3</td>
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Credit Hours Subtotal: 3

Microbiology Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOS 312</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOS 313</td>
<td>Molecular Microbiology Laboratory</td>
<td>1-2</td>
</tr>
<tr>
<td>or BIOS 314</td>
<td>Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOS 420</td>
<td>Molecular Genetics (ACE 10)</td>
<td>3</td>
</tr>
<tr>
<td>BIOS 420</td>
<td></td>
<td></td>
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<tr>
<td>BIOS 420</td>
<td></td>
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</tbody>
</table>

\(^1\) Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEP, HRTM, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBIO 440 / BIOS 440</td>
<td>Microbial Physiology</td>
<td>3</td>
</tr>
<tr>
<td>MBIO 443 / BIOS 443</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>LIFE 120 &amp; LIFE 120L</td>
<td>Fundamentals of Biology I and Fundamentals of Biology I laboratory (ACE 4)</td>
<td>4</td>
</tr>
<tr>
<td>LIFE 121 &amp; LIFE 121L</td>
<td>Fundamentals of Biology II and Fundamentals of Biology II Laboratory (ACE 4)</td>
<td>4</td>
</tr>
<tr>
<td>BIOS 206</td>
<td>General Genetics</td>
<td>4</td>
</tr>
<tr>
<td>or AGRO 215 / HORT 215 / TLMT 215</td>
<td>Genetics</td>
<td></td>
</tr>
<tr>
<td>CHEM 109 &amp; CHEM 110</td>
<td>General Chemistry I and General Chemistry II</td>
<td>8-11</td>
</tr>
<tr>
<td>CHEM 113 &amp; CHEM 114 &amp; CHEM 221</td>
<td>Fundamental Chemistry I and Fundamental Chemistry II and Elementary Quantitative Analysis</td>
<td></td>
</tr>
<tr>
<td>CHEM 251 &amp; CHEM 253</td>
<td>Organic Chemistry I and Organic Chemistry I Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 261 &amp; CHEM 263</td>
<td>Organic Chemistry and Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 255 &amp; CHEM 257</td>
<td>Biological Organic Chemistry and Biological Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>Sequence 1:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 251</td>
<td>Organic Chemistry I</td>
<td></td>
</tr>
<tr>
<td>CHEM 253</td>
<td>Organic Chemistry I Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 252</td>
<td>Organic Chemistry II</td>
<td></td>
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<tr>
<td>Sequence 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 261</td>
<td>Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 263</td>
<td>Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 262</td>
<td>Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EDPS 459</td>
<td>Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>ECON 215</td>
<td>Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 380</td>
<td>Statistics and Applications</td>
<td></td>
</tr>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EDPS 459</td>
<td>Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>ECON 215</td>
<td>Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 380</td>
<td>Statistics and Applications</td>
<td></td>
</tr>
<tr>
<td>ENGL 150</td>
<td>Writing and Inquiry</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 151</td>
<td>Writing and Argument</td>
<td></td>
</tr>
<tr>
<td>ENGL 254</td>
<td>Writing and Communities</td>
<td></td>
</tr>
<tr>
<td>JGEN 120</td>
<td>Basic Business Communication</td>
<td></td>
</tr>
<tr>
<td>JGEN 200</td>
<td>Technical Communication I</td>
<td></td>
</tr>
<tr>
<td>JGEN 300</td>
<td>Technical Communication II</td>
<td></td>
</tr>
<tr>
<td>AE 141</td>
<td>Introduction to the Economics of Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>ECON 211</td>
<td>Principles of Macroeconomics</td>
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<tr>
<td>ECON 212</td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td>AGRO 460 / BIOS 447</td>
<td>Soil Microbiology</td>
<td></td>
</tr>
<tr>
<td>BIOS 432 / BIOS 432 / CHEM 432</td>
<td>Metabolism and Biological Information</td>
<td></td>
</tr>
<tr>
<td>BIOC 433 / BIOS 433 / CHEM 433</td>
<td>Biochemistry Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

**Credit Hours Subtotal:**

- Natural Sciences: 13
- Mathematics and Statistics: 37
- Communication: 8
- Economics, Humanities, and Social Sciences: 15
- Upper Division Microbiology Electives: 12-18

**Total Credit Hours:** 75
**Microbiology (CASNR)**

**BIOL 437 / BIOS 437**  
Research Techniques in Biochemistry

**BIOS 302**  
Cell Biology

**BIOS 303**  
Molecular Biology

**BIOS 326**  
Biology of Viruses

**BIOS 402**  
Cancer Biology

**BIOS 407**  
Biology of Cells and Organelles

**BIOS 426**  
Systems Biology

**BIOS 444 / GEOL 444**  
Geomicrobiology

**BIOS 477**  
Bioinformatics and Molecular Evolution

**BIOS 487**  
Field Parasitology

**BIOS 497**  
Special Topics in Biological Sciences

**FDST 405 / BIOS 445**  
Food Microbiology

**FDST 406 / BIOS 446**  
Food Microbiology Laboratory

**FDST 415**  
Molds and Mycotoxins in Food, Feed, and the Human Environment

**FDST 455**  
Microbiology of Fermented Foods

**FDST 455L**  
Microbiology of Fermented Foods Laboratory

**MBIO 421**  
Microbial Diversity

**PLPT 369 / BIOS 369**  
Introductory Plant Pathology

**PLPT 369L**  
Introductory Plant Pathology Lab

**PLPT 370 / AGRO 370 / HORT 370**  
Biology of Fungi

**STAT 442 / BIOL 442**  
Computational Biology

**VBMS 303**  
Principles and Prevention of Livestock Diseases

**VBMS 408 / BIOS 408**  
Functional Histology

**VBMS 424**  
Basic Molecular Infectious Diseases

**VBMS 441 / BIOS 441**  
Pathogenic Microbiology

Credit Hours Subtotal: 12

**Free Electives**

Select 11-26 credits

Credit Hours Subtotal: 26

Total Credit Hours 120

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**Program Assessment.** To gauge the effectiveness of the program, majors within their senior year will be required to complete selected assessment activities. Results of participation in these assessment activities will in no way affect a student's GPA or graduation.

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**Additional Major Requirements**

**Grade Rules**

**Pass/No Pass**

No course taken Pass/No Pass will be counted toward the major or minor, except for courses involving independent study, research, and seminars.

**PLEASE NOTE**

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

**Icon Legend:** Critical

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**15 HR TERM 1**

**ACE 4 Chemistry**

complete CHEM 109  

4hr

**ACE 3 Math/Statistics**

complete MATH 106  

5hr

**College Course**

complete SCIL 101  

3hr

**ACE 1 Written**

complete 1 from ENGL 150, ENGL 151, ENGL 254, JGEN 120, JGEN 200, JGEN 300  

3hr

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**14 HR TERM 2**

**Life Science**

complete either LIFE 120 or LIFE 120L  

4hr

Completion of the LIFE Sequence (LIFE 120 & 120L and LIFE 121 & 121L) becomes critical to your success in the major if not completed by the fourth term of enrollment.

**ACE 4 Chemistry**

complete CHEM 110  

4hr
### Electives

**complete Any Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOS 312</td>
<td>3hr</td>
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</table>

BIOS 312 becomes critical to your success in the major if not completed by the fourth term of enrollment.

**ACE Comm Skills**

**complete 1 from ALEC 102, COMM 101, COMM 209, COMM 283, COMM 286, JGEN 300**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Comm Skills</td>
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**Microbiology Core**

**complete BIOS 314**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Microbiology Core</td>
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**Biological Sciences**

**complete BIOS 206**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Biological Sciences</td>
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**ACE 5 Humanities**

**complete 1 from ACE5**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACE 5 Humanities</td>
<td>3hr</td>
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</table>

**ACE 6 Economics**

**complete 1 from AECN 141, ECON 211, ECON 212, ECON 200**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACE 6 Economics</td>
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### 17 HR TERM 3

**Electives**

**complete Any Course**

<table>
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<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACE 3 Math/Statistics</td>
<td>3hr</td>
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Complete STAT 218

**ACE 5 Humanities**

**complete 1 from ACE5**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACE 5 Humanities</td>
<td>3hr</td>
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**ACE 3 Math/Statistics**

**complete STAT 218**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACE 3 Math/Statistics</td>
<td>3hr</td>
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**BIOC321/Lab Organic Chem**

**complete CHEM 251, CHEM 253**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BIOC321/Lab Organic Chem</td>
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</table>

CHEM 251 becomes critical to your success in the major if not completed by the fifth term of enrollment.

**Life Science**

**complete LIFE 121, LIFE 121L**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Life Science</td>
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Completion of the LIFE Sequence (LIFE 120 & 120L and LIFE 121 & 121L) becomes critical to your success in the major if not completed by the fourth term of enrollment.

### 14 HR TERM 4

**BIOC 431-Organic Chem**

**complete CHEM 252**

<table>
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<th>Course</th>
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<tbody>
<tr>
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**Microbiology**

**complete BIOS 312**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Microbiology</td>
<td>3hr</td>
</tr>
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**Electives**

**complete Any Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Electives</td>
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16 HR TERM 6

ACE 8 Ethical Principles
complete 1 from ACE8

ACE 4 Elem Gen Physics
complete PHYS 142

Electives
complete Any Course

MBIO 498 is recommended for 2 of the 5 elective hours this term.

Microbiology Electives
complete 1 from FDST 455, AGRO 460, BIOS 447, BIOS 432, BIOS 433, BIOS 437, BIOS 437, BIOS 302, BIOS 303, BIOS 326, BIOS 402, BIOS 407, BIOS 426, BIOS 444, GEOL 444, BIOS 477, BIOS 487, FDST 405, BIOS 445, FDST 406, BIOS 446, FDST 415, FDST 455L, MBIO 421, PLPT 369, PLPT 369L, BIOS 369, PLPT 370, AGRO 370, HORT 370, STAT 442, BIOC 442, VBMS 303, VBMS 408, BIOS 408, VBMS 424, VBMS 441, BIOS 441

15 HR TERM 7

Microbiology Core
complete MBIO 440, MBIO 443

Electives
complete Any Course

Microbiology Electives
complete 1 from FDST 455, AGRO 460, BIOS 447, BIOS 432, BIOS 433, BIOS 437, BIOS 437, BIOS 302, BIOS 303, BIOS 326, BIOS 402, BIOS 407, BIOS 426, BIOS 444, GEOL 444, BIOS 477, BIOS 487, FDST 405, BIOS 445, FDST 406, BIOS 446, FDST 415, FDST 455L, MBIO 421, PLPT 369, PLPT 369L, BIOS 369, PLPT 370, AGRO 370, HORT 370, STAT 442, BIOC 442, VBMS 303, VBMS 408, BIOS 408, VBMS 424, VBMS 441, BIOS 441

12 HR TERM 8

Microbiology Core
complete MBIO 420

Electives
complete Any Course

Microbiology Electives
complete 1 from FDST 455, AGRO 460, BIOS 447, BIOS 432, BIOS 433, BIOS 437, BIOS 437, BIOS 302, BIOS 303, BIOS 326, BIOS 402, BIOS 407, BIOS 426, BIOS 444, GEOL 444, BIOS 477, BIOS 487, FDST 405, BIOS 445, FDST 406, BIOS 446, FDST 415, FDST 455L, MBIO 421, PLPT 369, PLPT 369L, BIOS 369, PLPT 370, AGRO 370, HORT 370, STAT 442, BIOC 442, VBMS 303, VBMS 408, BIOS 408, VBMS 424, VBMS 441, BIOS 441

Graduation Requirements
1. Performance Measure: 2.00 GPA required for graduation.
2. ***Total Credits Applying Toward 120 Total Hours***

Career Information
The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.

Jobs of Recent Graduates
- Research Assistant, University of Nebraska Medical Center - Omaha NE
- Lab Manager, University of Nebraska-Lincoln - Lincoln NE
- Laboratory Technician, POET Research Center, Inc - Scotland SD
- Plant Research Biologist, Midwest Research Inc. - York NE
- Contractor, Syngenta - Omaha NE
- Postdoctorate, Harvard University - Boston MA
- Science Writer, LI-COR Biosciences - Lincoln NE
- Chemist, Archer Daniels Midland - Lincoln NE
- Scientist I, Aerotek - Chicago IL
- Phlebotomist, BryanLGH - Lincoln NE

Internships
- RD Summer Intern, Estee Lauder Companies - Melville NY
- Project Manager Assistant/Engineering Assistant, LI-COR Biosciences - Lincoln NE
- Construction Management Intern, Nemaha Landscape Construction - Lincoln NE
- Undergrad Student Research Intern, UNL Mid-America Transportation Center - Lincoln NE
• Certified Nursing Assistant, Delmar Gardens Retirement Home - CNA Program - O'Fallon MO
• Intern, Monsanto - Gothenburg NE
• Beckman Research Scholar, UNL College of Arts of Sciences Beckman Scholars - Lincoln NE
• Associate Management Intern, Cargill - Kansas City, MO
• Advanced Research Intern, Li-COR Biosciences - Lincoln NE
• Distinguished Life Sciences Scholar, College of Arts and Sciences - Lincoln NE

Grad Schools
• Medicine, University of South Dakota Sanford School of Medicine - Vermillion SD
• Dentistry, University of Nebraska Medical College - Lincoln NE
• College of Medicine, University of Nebraska - Medical Center - Omaha NE
• Cancer Research Graduate Program, UNMC - Omaha NE
• Medical Anatomy, University of Nebraska Medical Center - Omaha NE
• Interdisciplinary Biology and Chemistry with a focus on chemistry, West Texas AM University - Canyon TX
• Dental Program, UNMC College of Dentistry - Lincoln NE
• BS Biochemistry, University of Nebraska-Lincoln -
• Biochemistry, University of Nebraska - Lincoln - Lincoln NE
• Masters of Arts in Business Administration, University of Nebraska-Lincoln - Lincoln NE