STATISTICS & DATA ANALYTICS

Description
Students in statistics learn how to use data to solve problems in a complex world. The degree program offers students the opportunity to formulate an answerable question, develop methodology for data analysis, collect data appropriately, extract evidence from that data, and use statistical reasoning to transform that evidence into information that can be used by enterprises, government, and other stakeholders. Graduates will be able to adapt to an ever-evolving data landscape and use their knowledge to construct novel solutions to challenges that are meaningful for society.

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 sciences, and 2 units of world language. Students must also meet performance requirements: a 3.0 cumulative high school grade point average OR an ACT composite of 20 or higher, writing portion not required OR a score of 1040 or higher on the SAT Critical Reading and Math sections 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.

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 the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, whichever takes longer. College-level coursework taken to remove deficiencies may be used to meet degree requirements in CASNR.

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.

Minimum Hours Required for Graduation
The College grants the bachelor's 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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

Graduate Requirements

Minimum GPA
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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

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 college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

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 (60) is the maximum number of hours the University
will accept on transfer from a two-year college. Ninety (90) is the
maximum number of hours the University 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 the University of Nebraska–
Lincoln 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 the University of Nebraska–Lincoln.

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
the requirements for a bachelor of science degree in CASNR. Cooperative
programs result in a single degree from either the University of
Nebraska–Lincoln 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
coursework. 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 the University of Nebraska–Lincoln, 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
- Nebraska Indian Community College
- 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 the University of Nebraska–Lincoln 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
provide transcripts and complete the Application for Degree form via
MyRED. Students without MyRED access may apply for graduation in

person at Husker Hub in the Canfield Administration Building, or by mail.
Students should discuss these degree programs with their academic
advisor.

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

UNL Degree-Granting Programs
A University of Nebraska–Lincoln 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 and a 3+1 program leading to a bachelor of science in Applied
Science.

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. Transfer programs are available for
students pursuing degree programs leading to a bachelor of science
degree.

Non University of Nebraska–Lincoln Degree-Granting Programs
CASNR cooperates with other institutions to provide coursework 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 the University 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
coursework at Chadron State College and one year of specialized range
science coursework (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 University of Nebraska–Lincoln credits. At least 18 of the 30 credit
hours must be in courses offered through CASNR (>299) including
the appropriate ACE 10 degree requirement or an approved ACE 10
substitution offered through another Nebraska 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 the University of Nebraska–
Lincoln and participate in prior-approved education abroad programs.
The University of Nebraska–Lincoln open enrollment and summer independent study courses count toward residence.

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.

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 coursework under the 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 ace.unl.edu (https://ace.unl.edu/).

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 course requirements.

Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to the University of Nebraska–Lincoln or when they were first admitted to a Joint Academic Transfer Program. Students transferring from a community college, but without admission to a Joint Academic Transfer Program, may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln. This decision should be made in consultation with academic advisors, provided the student a) was enrolled in a community college during the catalog year they are utilizing, b) maintained continuous enrollment at the previous institution for 1 academic year or more, and c) continued enrollment at the University of Nebraska-Lincoln within 1 calendar year from their last term at the previous institution. 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 the University of Nebraska–Lincoln 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

Graduates of statistics and data analytics will be able to:

1. Identify the question to be answered, and design an appropriate data collection strategy.
2. Appropriately analyze data to solve complex problems.
3. Understand the underlying assumptions and theoretical properties of the analysis.
4. Use appropriate computing applications to pre-process, organize, visualize, and analyze data.
5. Demonstrate an understanding of how statistical procedures are computationally implemented, including awareness of when a procedure has failed and what to do about it.
6. Communicate statistical concepts and interpretation of data and results with collaborators in conversation, and through visual summaries and written reports.

Major Requirements

Core Requirements

College Integrative Course and ACE 8

| SCIL 101 | Science and Decision-Making for a Complex World | 3 |

Credit Hours Subtotal: 3

Communications

Written Communication (ACE 1)

| ENG 150 | Writing and Inquiry | 3 |
| ENG 151 | Writing for Change | |
| ENG 254 | Writing and Communities | |

Technical Communication

| JGEN 120 | Basic Business Communication | |
| JGEN 200 | Technical Communication I | |
| JGEN 300 | Technical Communication II | |

Oral Communication (ACE 2)

<p>| ALEC 102 | Interpersonal Skills for Leadership | 3 |
| COMM 101 | Communication in the 21st Century | |
| COMM 209 | Public Speaking | |
| COMM 210 | Communicating in Small Groups | |
| COMM 283 | Interpersonal Communication | |
| COMM 286 | Business and Professional Communication | |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>JGEN 300</td>
<td>Technical Communication II</td>
<td></td>
</tr>
<tr>
<td>NRES 301</td>
<td>Environmental Communication Skills</td>
<td></td>
</tr>
<tr>
<td>TMFD 121</td>
<td>Visual Communication with Animation</td>
<td></td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Mathematics (ACE 3)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 107</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 107H</td>
<td>Honors: Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 208H</td>
<td>Honors: Calculus III</td>
<td></td>
</tr>
<tr>
<td>MATH 314</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 314H</td>
<td>Honors: Linear Algebra</td>
<td></td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

**Natural Sciences (ACE 4)**

Select one each from two of the following areas:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 101</td>
<td>General Biology</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOS 101L</td>
<td>General Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>ENTO 115</td>
<td>Insect Biology</td>
<td></td>
</tr>
<tr>
<td>&amp; ENTO 116</td>
<td>Insect Identification</td>
<td></td>
</tr>
<tr>
<td>LIFE 120</td>
<td>Fundamentals of Biology I</td>
<td></td>
</tr>
<tr>
<td>&amp; LIFE 120L</td>
<td>Fundamentals of Biology I laboratory</td>
<td></td>
</tr>
<tr>
<td>LIFE 121</td>
<td>Fundamentals of Biology II</td>
<td></td>
</tr>
<tr>
<td>&amp; LIFE 121L</td>
<td>Fundamentals of Biology II laboratory</td>
<td></td>
</tr>
<tr>
<td>PLAS 131</td>
<td>Plant Science</td>
<td></td>
</tr>
<tr>
<td>&amp; PLAS 134</td>
<td>Plant Sciences Laboratory</td>
<td></td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

**Select from the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 105A</td>
<td>Chemistry in Context I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 105L</td>
<td>Chemistry in Context I Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 109A</td>
<td>General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 109L</td>
<td>General Chemistry I Laboratory</td>
<td></td>
</tr>
<tr>
<td><strong>Select from the following:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGST 109</td>
<td>Physical Principles in Agriculture and Life Sciences</td>
<td></td>
</tr>
<tr>
<td>PHYS 141</td>
<td>Physics for Life Sciences I</td>
<td></td>
</tr>
<tr>
<td>PHYS 151</td>
<td>Elements of Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics I</td>
<td></td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

**Economics, Humanities, and Social Sciences**

Select one of the following (ACE 6):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AECN 141</td>
<td>Introduction to the Economics of Agriculture</td>
<td></td>
</tr>
<tr>
<td>ECON 211</td>
<td>Principles of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>ECON 212</td>
<td>Principles of Microeconomics</td>
<td></td>
</tr>
<tr>
<td><strong>Select one course each from ACE outcomes 5, 7 and 9:</strong></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Statistics and Data Analytics Core Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 100</td>
<td>Career Explorations in Statistics</td>
<td>1</td>
</tr>
<tr>
<td>STAT 101</td>
<td>Introduction to Data</td>
<td>3</td>
</tr>
<tr>
<td>STAT 102</td>
<td>Principles of Statistical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 151</td>
<td>Introduction to Statistical Computing</td>
<td>1</td>
</tr>
<tr>
<td>STAT 212</td>
<td>Principles of Study Design</td>
<td>4</td>
</tr>
<tr>
<td>STAT 251</td>
<td>Statistical Computing I: Data Wrangling</td>
<td>3</td>
</tr>
<tr>
<td>STAT 262</td>
<td>Probability for Statisticians</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 301</td>
<td>Mathematical Statistics and Modeling I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 302</td>
<td>Mathematical Statistics and Modeling II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 325</td>
<td>Statistical Collaboration I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 349</td>
<td>Technical Skills for Statisticians</td>
<td>3</td>
</tr>
<tr>
<td>STAT 351</td>
<td>Statistical Computing II: Data Management and Visualization</td>
<td>3</td>
</tr>
<tr>
<td>STAT 464</td>
<td>Model Selection and Prediction</td>
<td>3</td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

**Capstone Course (ACE 10)**

Complete one of the following ACE 10 courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 425</td>
<td>Statistical Collaboration II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 451</td>
<td>Development of Statistical Software</td>
<td></td>
</tr>
<tr>
<td>STAT 471</td>
<td>Analysis of Messy Data</td>
<td></td>
</tr>
<tr>
<td>STAT 499</td>
<td>Undergraduate Thesis</td>
<td></td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Statistics Electives**

Select 12 hours of Statistics courses at the 300 level or higher, excluding STAT 318, STAT 380, STAT 430, STAT 462 and STAT 463

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Focused Electives**

In consultation with their advisor, students will formulate an individualized 12-credit plan to enhance the student’s educational goals. These credits will often be applied to an undergraduate minor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Free Electives**

Select 12 hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Total Credit Hours**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

**Grade Rules**

**Pass/No Pass**

Students may not take STAT courses as Pass/No Pass credit for the degree program.

**Requirements for Minor Offered by Department**

Select either Track 1 (Theory Focused) or Track 2 (Applications Focused) for completion of the minor.

**Track 1 (Theory Focused)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 462</td>
<td>Introduction to Mathematical Statistics I: Distribution Theory</td>
<td>4</td>
</tr>
<tr>
<td>STAT 463</td>
<td>Introduction to Mathematical Statistics II: Statistical Inference</td>
<td>4</td>
</tr>
<tr>
<td><strong>Select at least 6 hours from the following:</strong></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 318</td>
<td>Introduction to Statistics II</td>
<td></td>
</tr>
<tr>
<td>STAT 380</td>
<td>Statistics and Applications</td>
<td></td>
</tr>
<tr>
<td>STAT 412</td>
<td>Advanced Statistical Design</td>
<td></td>
</tr>
<tr>
<td>STAT 414</td>
<td>Introduction to Survey Sampling</td>
<td></td>
</tr>
<tr>
<td>STAT 450</td>
<td>Introduction to Regression Analysis</td>
<td></td>
</tr>
<tr>
<td>STAT 494</td>
<td>Topics in Statistics and Probability</td>
<td></td>
</tr>
<tr>
<td>STAT 496</td>
<td>Independent Study</td>
<td></td>
</tr>
</tbody>
</table>

**Credit Hours Subtotal:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
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<td></td>
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**Capstone Course (ACE 10)**

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<tr>
<td>STAT 471</td>
<td>Analysis of Messy Data</td>
<td></td>
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<tr>
<td>STAT 499</td>
<td>Undergraduate Thesis</td>
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</tr>
<tr>
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<td></td>
<td>3</td>
</tr>
</tbody>
</table>

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<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td>12</td>
</tr>
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</table>

**Focused Electives**

In consultation with their advisor, students will formulate an individualized 12-credit plan to enhance the student’s educational goals. These credits will often be applied to an undergraduate minor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
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</table>

**Free Electives**

Select 12 hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Hours Subtotal:</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Total Credit Hours**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td></td>
<td>120</td>
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</tbody>
</table>
## Track 2 (Applications Focused)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 218</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 318</td>
<td>Introduction to Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>Select at least 9 hours from the following:</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>STAT 412</td>
<td>Advanced Statistical Design</td>
<td></td>
</tr>
<tr>
<td>STAT 414</td>
<td>Introduction to Survey Sampling</td>
<td></td>
</tr>
<tr>
<td>STAT 450</td>
<td>Introduction to Regression Analysis</td>
<td></td>
</tr>
<tr>
<td>STAT 462</td>
<td>Introduction to Mathematical Statistics I: Distribution Theory</td>
<td></td>
</tr>
<tr>
<td>STAT 463</td>
<td>Introduction to Mathematical Statistics II: Statistical Inference</td>
<td></td>
</tr>
<tr>
<td>STAT 494</td>
<td>Topics in Statistics and Probability</td>
<td></td>
</tr>
<tr>
<td>STAT 496</td>
<td>Independent Study</td>
<td></td>
</tr>
</tbody>
</table>

**Credit Hours Subtotal:** 15

**Total Credit Hours:** 15

**NOTE:** Alternative classes may be substituted if approved by the Department of Statistics curriculum committee.

### Grade Rules

**C- and D Grades**
A grade of C or better must be earned in all courses in the minor.

**Pass/No Pass**
No courses taken for Pass/No Pass credit will be applicable to the minor.

### STAT 100 Career Explorations in Statistics
**Description:** Introduction to the field of statistics, and exploration of careers available to those trained in statistics.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Grading Option:** Graded

### STAT 101 Introduction to Data
**Notes:** Removal of all entrance deficiencies in mathematics.

**Description:** An introduction to statistics through exploratory data analysis and data visualization. Topics include data types, chart types, methods for working with and reducing data, simple regression, regression diagnostics. Focuses on how to communicate statistical information and how to critically consume statistical information presented in the media and popular press.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** STAT 102

### STAT 102 Principles of Statistical Analysis
**Prerequisites:** STAT 101; concurrent STAT 151

**Description:** Introduction to formal statistical inference and elementary probability for statistics majors. Explores the practical application of statistical techniques to meaningful scientific problems. Inference topics will be implemented using both simulation-based approaches and classical, theory-based methods.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** STAT 212; STAT 262; STAT 349

### STAT 151 Introduction to Statistical Computing
**Description:** Introduction to programming for statistical analysis. Covers basic programming concepts necessary for statistics, good computing practice, and use of built-in functions to complete basic statistical analyses.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Grading Option:** Graded

**Prerequisite for:** STAT 251; STAT 349

### STAT 212 Principles of Study Design
**Prerequisites:** STAT 102

**Description:** Introduction to statistical aspects of study design. Both designed experiments and observational studies are covered. Sampling techniques, major experimental and treatment design structures, as well as power and sample size considerations.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded

**Prerequisite for:** STAT 301; STAT 325; STAT 412

### STAT 218 Introduction to Statistics
**Prerequisites:** Removal of all entrance deficiencies in mathematics.

**Notes:** Credit toward the degree may be earned in only one of: CRIM 300 or ECON 215 or EDPS 459 or SOCI 206 or STAT 218. Credit toward the degree cannot be earned in STAT 218 if taken after or taken in parallel with STAT 380.

**Description:** The practical application of statistical thinking to contemporary issues; collection and organization of data; probability distributions; statistical inference; estimation; and hypothesis testing.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** ABUS 341, MRKT 341; ACCT 308; AECN 340; AECN 436; ASCI 330; BLAW 371; BLAW 371H; BLAW 372; ECON 311A; ECON 311B; ECON 312A; ECON 312B; ECON 315; ECON 417; ECON 448; ECON 452; FINA 361; FINA 361A; FINA 361H; FORS 411; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; SCMA 250; SCMA 331; SCMA 335; SCMA 350; SCMA 350H; SOCI 333; STAT 318

**ACE:** ACE 3 Math/Stat/Reasoning
STAT 251 Statistical Computing I: Data Wrangling
Prerequisites: STAT 151
Description: Techniques for processing, cleaning, and visualizing messy data. Topics include data reduction strategies, data transformations, combining multiple data sources, and special types of data (text, spatial, dates and times, hierarchical).
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 325; STAT 351; STAT 443; STAT 452; STAT 485

STAT 262 Probability for Statisticians
Prerequisites: STAT 102; MATH 208
Description: Probabilistic undergirding of statistical procedures including moments, common parametric families, marginal and conditional densities, sufficient statistics, modes of convergence, laws of large numbers and the central limit theorem and how they apply to estimators.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 301; STAT 414

STAT 301 Mathematical Statistics and Modeling I
Prerequisites: MATH 314, STAT 212, STAT 262
Description: Essential statistical theory and methods for professional statistical practice. Broad statistical topics include estimation and hypothesis testing, elementary Bayesian concepts, multiple linear regression, linear mixed effects models, analysis of variance (ANOVA), logistic regression, Poisson regression, and nonparametric methods.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 302; STAT 452; STAT 475; STAT 478

STAT 302 Mathematical Statistics and Modeling II
Prerequisites: STAT 301
Notes: A continuation of STAT 301.
Description: Essential statistical theory and methods for professional statistical practice. Topics include data transformation, multiple sources of error, elementary model selection, generalized linear mixed models, Bayesian models, and other theory and methods deemed appropriate as statistical science continues to evolve.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 432; STAT 443; STAT 451; STAT 464; STAT 471; STAT 474; STAT 485; STAT 486

STAT 318 Introduction to Statistics II
Prerequisites: STAT 218 or STAT 380
Description: Tests for means/proportions of two independent groups, analysis of variance for completely randomized design, contingency table analysis, correlation, single and multiple linear regression, nonparametric procedures, design of experiments.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: STAT 412; STAT 414; STAT 450

STAT 325 Statistical Collaboration I
Prerequisites: STAT 212, STAT 251
Description: Introduction to the role and purpose of statistical consulting and interdisciplinary collaboration. Covers processes for successful interdisciplinary collaboration, including asking good questions, dealing with difficult clients, communicating statistics to non-statisticians, working in teams and determining solutions to answer the client’s research question.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 425

STAT 349 Technical Skills for Statisticians
Prerequisites: STAT 151, STAT 102
Description: Creation of research reports, business reports, and executive summaries. Presentation strategies, consequences of statistical modeling for real-world decision making, and countering common misconceptions and errors in statistical reasoning. Focus on real-world applications in research, business, and public service.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 351

STAT 351 Statistical Computing II: Data Management and Visualization
Crosslisted with: RAÏK 270H
Prerequisites: A grade of P, C, or higher in MATH 107 or MATH 107H.
Notes: Credit toward the degree can not be earned in STAT 218 if taken after or taken in parallel with RAÏK 270H/STAT 380.
Description: Computational skills for management, visualization and analysis of large and complex data which are necessary for modern statistics. Includes a wide range of topics necessary for data analytics, including harvesting data from websites and common data structures, setting up and working with databases, and designing interactive data displays.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Prerequisite for: STAT 425; STAT 451; STAT 471

STAT 380 Statistics and Applications
Crosslisted with: RAÏK 270H
Prerequisites: A grade of P, C, or higher in MATH 107 or MATH 107H.
Notes: Credit toward the degree can not be earned in STAT 218 if taken after or taken in parallel with RAÏK 270H/STAT 380.
Description: Probability calculus; random variables, their probability distributions and expected values; t, F and chi-square sampling distributions; estimation; testing of hypothesis; and regression analysis with applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded with Option
Prerequisite for: ABUS 341, MRKT 341; ACCT 308; BLAW 371; BLAW 371H; BLAW 372; BSAD 371H, RAÎK 371H; ECEN 850, ECEN 450; ECON 311A; ECON 311B; ECON 312A; ECON 312B; ECON 315; ECON 417; ECON 448; ECON 452; ENVE 430; FINA 361; FINA 361A; FINA 361H; MATH 435; MECH 343; MECH 380; MNGT 301; MNGT 301H; MRKT 345; MRKT 350; MRKT 446; RAÎK 370H, CSCE 370H; SCMA 250; SCMA 331; SCMA 350; SCMA 350H; STAT 318; STAT 414
ACE: ACE 3 Math/Stat/Reasoning
STAT 412 Advanced Statistical Design  
**Prerequisites:** STAT 212 or STAT 318  
**Description:** Advanced statistical designs, including complex treatment and experimental designs and analyses. Incomplete Blocks, Response Surfaces, Advanced Row-Column designs, Split-Plots, Repeated Measures, Crossover designs, Analysis of Covariance, and Meta-analysis.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 414 Introduction to Survey Sampling  
**Prerequisites:** STAT 262 or STAT 318 or STAT 380  
**Description:** Sampling frames, sampling methodology, questionnaire design. Basics of standard sampling plans including simple random sampling, ratio estimators, stratified sampling, and cluster sampling. More advanced topics may include complex surveys, nonresponse, confidentiality problems, and adaptive methods.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 425 Statistical Collaboration II  
**Prerequisites:** STAT 325, STAT 351  
**Description:** Practical experience in applying collaboration skills, working with domain experts to strategically plan and analyze the domain experts' research data. Collaboration with the domain expert will include proposing a design and sample size for a research study, determination and implementation of appropriate statistical analyses, and summarization and presentation of analysis results.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 430 Sensory Evaluation  
**Crosslisted with:** FDST 430, FDST 830, STAT 830  
**Prerequisites:** Introductory course in statistics.  
**Description:** Food evaluation using sensory techniques and statistical analysis.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option  
**Course and Laboratory Fee:** $10

STAT 432 Introduction to Spatial Statistics  
**Prerequisites:** STAT 302 or STAT 463 (could be concurrent to either)  
**Description:** Introduces statistical analysis of spatial and spatiotemporal data. Topics include statistical theory, methods and applications for geostatistical, lattice and point processes. The focus is on methods and applications, but necessary and essential theories and proofs will also be covered.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 442 Computational Biology  
**Crosslisted with:** BIOC 842, STAT 842, BIOC 442  
**Prerequisites:** Any introductory course in biology, or genetics, or statistics.  
**Description:** Databases, high-throughput biology, literature mining, gene expression, next-generation sequencing, proteomics, metabolomics, system biology and biological networks.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 443 Statistical Analysis of Genomics Data  
**Prerequisites:** STAT 251, STAT 302  
**Notes:** Familiarity with R or Python highly recommended  
**Description:** Introduction to basic statistical analyses in bioinformatics. Techniques for processing and analysis of commonly occurring genomic data types such as GWAS, micro-arrays, mass. spec, and RNAseq. Estimation of gene networks and visualization of data and results from analysis.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option

STAT 450 Introduction to Regression Analysis  
**Prerequisites:** STAT 301 or STAT 463  
**Notes:** Previous knowledge of matrix algebra is beneficial.  
**Description:** Practical tools and techniques for building linear regression models using real-world data and assessing their validity; necessary theory and supporting proofs will also be covered. Topics include introduction of simple/multiple linear regression, parameter estimation and inference in both frequentist and Bayesian frameworks, model diagnostics, and variable selection.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option  
**Prerequisite for:** STAT 475; STAT 478

STAT 451 Development of Statistical Software  
**Prerequisites:** STAT 302, STAT 351  
**Notes:** ACE 10 scholarly product will be a statistical software package which fills a need in the ecosystem.  
**Description:** Advanced statistical software development. Packaging code into functions, intelligent software design, compiled languages to speed up code, development and release cycles.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option  
**ACE:** ACE 10 Integrated Product

STAT 452 Advanced Computational Statistics  
**Prerequisites:** STAT 251, STAT 301  
**Description:** Comprehensive treatment of modern and classical computational statistics, including algorithms for statistical prediction, inference, numerical optimization, Markov Chain Monte Carlo methods, bootstrapping and computing tools for big data problems.  
**Credit Hours:** 3  
**Max credits per semester:** 3  
**Max credits per degree:** 3  
**Grading Option:** Graded with Option
STAT 462 Introduction to Mathematical Statistics I: Distribution Theory  
Prerequisites: Grade of C or better in MATH 208 or MATH 107H.  
Notes: STAT 380 or equivalent is strongly recommended.  
Description: Sample space, random variable, expectation, conditional probability and independence, moment generating function, special distributions, sampling distributions, order statistics, limiting distributions, and central limit theorem.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Grading Option: Graded with Option  
Offered: FALL  
Prerequisite for: STAT 463

STAT 463 Introduction to Mathematical Statistics II: Statistical Inference  
Prerequisites: C or better in STAT 462  
Description: Interval estimation; point estimation, sufficiency, and completeness; Bayesian procedures; uniformly most powerful tests, sequential probability ratio test, likelihood ratio test, goodness of fit tests; elements of analysis of variance and nonparametric tests.  
Credit Hours: 4  
Max credits per semester: 4  
Max credits per degree: 4  
Grading Option: Graded with Option  
Offered: SPRING  
Prerequisite for: STAT 432; STAT 450; STAT 486

STAT 464 Model Selection and Prediction  
Prerequisites: STAT 302  
Description: Methods for selecting models applicable to real-world problems. Prediction as a modeling goal, models for prediction as opposed to inference. Methods for emerging data types, such streaming data, social network data, censored data, and others.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded

STAT 471 Analysis of Messy Data  
Prerequisites: STAT 302, STAT 351  
Description: Analysis of complex, real-world data sets. Analysis techniques will vary depending on interest and availability of data sets.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded  
ACE: ACE 10 Integrated Product

STAT 474 Introduction to Nonparametric Statistics  
Prerequisites: STAT 302  
Description: Most commonly used nonparametric techniques in statistics including rank-based methods for testing and estimation, nonparametric estimators of parameters, distributions, and curves, assessing the properties of data, and permutation tests including how to cope with multiple comparisons. Comparisons between methods will be emphasized throughout.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

STAT 475 Introduction to Categorical Data Analysis  
Prerequisites: STAT 301 or STAT 450  
Description: Introduction to methodology for analyzing categorical data, including contingency table methods, binary regression, multinomial regression, and loglinear regression.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

STAT 478 Introduction to Time Series Analysis  
Prerequisites: STAT 301 or STAT 450  
Description: A basic introduction to modern time series analysis including time series regression and exploratory data analysis, the classical decomposition, ARIMA models, model identification/estimation/forecasting, seasonality, Fourier analysis, spectral estimation, and state space models.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

STAT 485 Statistical Learning  
Prerequisites: STAT 251, STAT 302  
Notes: Proficiency in a statistical computing language may replace STAT 251  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

STAT 486 Introduction to Bayesian Analysis  
Prerequisites: STAT 302 or STAT 463  
Description: Principles of Bayesian analysis including forming posteriors from priors and likelihoods. Bayesian estimation, testing, linear regression, and hierarchical models. Computing posterior distributions using existing software and standard classes of algorithms such as MCMC.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Grading Option: Graded with Option

STAT 494 Topics in Statistics and Probability  
Prerequisites: Permission.  
Description: Special topics in either statistics or the theory of probability.  
Credit Hours: 1-5  
Min credits per semester: 1  
Max credits per semester: 5  
Max credits per degree: 24  
Grading Option: Graded with Option

STAT 496 Independent Study  
Prerequisites: Prior arrangement with a faculty member and submission of proposed study plan to department office.  
Credit Hours: 1-5  
Min credits per semester: 1  
Max credits per semester: 5  
Max credits per degree: 5  
Grading Option: Graded with Option
STAT 499 Undergraduate Thesis

Prerequisites: Permission

Description: Independent research project carried out under the guidance of a faculty member in the Department of Statistics. Culminates in the presentation of a thesis to the department.

Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
ACE: ACE 10 Integrated Product