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.

Deficiencies in the required entrance subjects can be removed by the 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 ensure that a student will meet the minimum curriculum requirements of the College.

World Languages/Language Requirement

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

Experiential Learning

All undergraduates in the College of Agricultural Sciences and Natural Resources must take an Experiential Learning (EL) designated course. This may include 0-credit courses designed to document co-curricular activities recognized as Experiential Learning.

Minimum Hours Required for Graduation

The College grants the bachelors 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.

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 their cumulative average a course grade of C-, D+, 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 (withdrew), 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 (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. 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[1] (>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 college 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)		*3*
ENGL 150	Writing and Inquiry	
ENGL 151	Writing for Change	
ENGL 254	Writing and Communities	
JGEN 120	Basic Business Communication	
JGEN 200	Technical Communication I	
JGEN 300	Technical Communication II	
Oral Communication (ACE 2)		*3*
ALEC 102	Interpersonal Skills for Leadership	
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	

JGEN 300	Technical Communication II	
NRES 301	Environmental Communication Skills	
TMFD 121	Visual Communication with Animation	
Credit Hours Subtotal:		6
Mathematics (ACE 3)		
MATH 106	Calculus I	5
MATH 107	Calculus II	4
or MATH 107H	Honors: Calculus II	
MATH 208	Calculus III	4
or MATH 208H	Honors: Calculus III	
MATH 314	Linear Algebra	3
or MATH 314H	Honors: Linear Algebra	
Credit Hours Subtotal:		16
Natural Sciences (ACE 4)		
Select one each from two of the following areas:		8
Select from CASNR Approved Life Sciences:		
BIOS 101 & BIOS 101L	General Biology and General Biology Laboratory	
ENTO 115 & ENTO 116	Insect Biology and Insect Identification	
LIFE 120 & LIFE 120L	Fundamentals of Biology I and Fundamentals of Biology I laboratory	
LIFE 121 & LIFE 121L	Fundamentals of Biology II and Fundamentals of Biology II Laboratory	
PLAS 131 & PLAS 134	Plant Science and Plant Sciences Laboratory	
Select from the following:		
CHEM 105A & CHEM 105L	Chemistry in Context I and Chemistry in Context I Laboratory	
CHEM 109A & CHEM 109L	General Chemistry I and General Chemistry I Laboratory	
Select from the following:		
AGST 109	Physical Principles in Agriculture and Life Sciences	
PHYS 141	Physics for Life Sciences I	
PHYS 151	Elements of Physics	
PHYS 211	General Physics I	
Credit Hours Subtotal:		8
Economics, Humanities, and Social Sciences		
Select one of the following (ACE 6):		3
AECN 141	Introduction to the Economics of Agriculture	
ECON 211	Principles of Macroeconomics	
ECON 212	Principles of Microeconomics	
Select one course each from ACE outcomes 5, 7 and 9		9
Credit Hours Subtotal:		12
Statistics and Data Analytics Core Requirements		
STAT 100	Career Explorations in Statistics	1
STAT 101	Introduction to Data	3
STAT 102	Principles of Statistical Analysis	3
STAT 151	Introduction to Statistical Computing	1
STAT 212	Principles of Study Design	4
STAT 251	Statistical Computing I: Data Wrangling	3
STAT 262	Probability for Statisticians	3
STAT 301	Mathematical Statistics and Modeling I	3
STAT 302	Mathematical Statistics and Modeling II	3
STAT 325	Statistical Collaboration I	3
STAT 349	Technical Skills for Statisticians	3
STAT 351	Statistical Computing II: Data Management and Visualization	3
STAT 464	Model Selection and Prediction	3
Credit Hours Subtotal:		36
Capstone Course (ACE 10)		
Complete one of the following ACE 10 courses:		3
STAT 425	Statistical Collaboration II	
STAT 451	Development of Statistical Software	
STAT 471	Analysis of Messy Data	
STAT 499	Undergraduate Thesis	
Credit Hours Subtotal:		3
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		12
Credit Hours Subtotal:		12
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.		12
Credit Hours Subtotal:		12
Free Electives		
Select 12 hours		12
Credit Hours Subtotal:		12
Total Credit Hours		**120**

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)		
STAT 462	Introduction to Mathematical Statistics I: Distribution Theory	4
STAT 463	Introduction to Mathematical Statistics II: Statistical Inference	4
Select at least 6 hours from the following:		6
STAT 318	Introduction to Statistics II	
STAT 380	Statistics and Applications	
STAT 412	Advanced Statistical Design	
STAT 414	Introduction to Survey Sampling	
STAT 450	Introduction to Regression Analysis	
STAT 494	Topics in Statistics and Probability	
STAT 496	Independent Study	

Credit Hours Subtotal:		14
Total Credit Hours		**14**

Track 2 (Applications Focused)

STAT 218	Introduction to Statistics	3
STAT 318	Introduction to Statistics II	3
Select at least 9 hours from the following:		9
STAT 412	Advanced Statistical Design	
STAT 414	Introduction to Survey Sampling	
STAT 450	Introduction to Regression Analysis	
STAT 462	Introduction to Mathematical Statistics I: Distribution Theory	
STAT 463	Introduction to Mathematical Statistics II: Statistical Inference	
STAT 494	Topics in Statistics and Probability	
STAT 496	Independent Study	
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
Prerequisites: STAT 251, STAT 349
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: RAIK 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 RAIK 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, RAIK 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; RAIK 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
ACE: ACE 10 Integrated Product

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
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
Description: An introduction to supervised and unsupervised methods for statistical learning and data mining. Bias-variance trade-off, classification, regression, factor analysis, and neural networks for modeling and prediction.
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