

STATISTICS

Statistics

College of Science, Engineering, & Technology
Department of Mathematics & Statistics
273 Wissink Hall • 507-389-1453
Web site: www.mnsu.edu/dept/mathstat/

Chair: Ernest Boyd

Mezbahur Rahman, Deepak Sanjel

Statistics in this department is designed to provide a basic theoretical background for statistical inference and some techniques and practice in applying the theory. Courses in statistics would be useful for anyone as a tool in another area of study or as preparation for more advanced study of statistics. Many students choose statistics as an option in their general education or take statistics as a requirement for their major. The Department of Statistics also offers both a major and a minor in statistics.

The major provides a background in statistics, mathematics, and computer science to enable students to pursue a career in business, industry, or actuarial science as well as to pursue advanced study in statistics. The major is organized into 3 tracks to allow an emphasis in applied mathematics, computer science, or biological science. A well prepared student can expect to complete the major in four years. The minor gives students a basic core of statistics that would compliment majors in many areas by providing a thorough grounding in basic statistical principles, methods of data analysis, and a knowledge base to assist in understanding statistical procedures applied to a variety of disciplines.

A student must be admitted to a major to be permitted to take 300- and 400-level courses. Admission is granted by the department. In addition to minimum university admission requirements of: a minimum of 32 earned semester credit hours and a minimum cumulative GPA of 2.00, students must complete 10 credits in mathematics and statistics counting towards the Major with a 2.5 GPA.

POLICIES/INFORMATION

GPA Policy. Statistics major and minors must earn a grade of 2.00 ("C") or better in all courses applied to the major or minor.

P/N Grading Policy. All 300- and 400-level courses are offered for grade only with the exception of STAT 498 and STAT 499 which are available for both P/N and letter grade.

Credit by examination. Will not be approved for courses in which a student has already received a grade.

Credit Limitation. A student may not receive credit for STAT 354 after completing MATH 455 or STAT 455.

STATISTICS BS

Required General Education

MATH 121 Calculus I (4)

Required for Major (76 credits)

CS 110 Computer Science I (4)
CS 111 Computer Science II (4)
CS 230 Intelligent Systems (4)
MATH 122 Calculus II (4)
MATH 223 Calculus III (4)
MATH 247 Linear Algebra I (4)
STAT 154 Elementary Statistics (3)
STAT 354 Concepts of Probability and Statistics (3)
STAT 357 Sample Survey and Design (3)
STAT 358 Categorical Data Analysis (3)
STAT 359 Nonparametric Methods (3)
STAT 450 Regression Analysis (3)

STAT 451 Experimental Designs (3)
STAT 455 Theory of Statistics I (4)
STAT 456 Theory of Statistics II (4)
STAT 492 Statistics Capstone Experience (3)

Major Emphasis: Select one of the following three tracks.

Applied Mathematics Track (minimum 16 credits from the following list)

MATH 290 Foundations of Mathematics (4)
MATH 321 Ordinary Differential Equations (4)
MATH 375 Introduction to Discrete Mathematics (4)
MATH 422 Partial Differential Equations (4)
MATH 425 Mathematical Modeling (4)
MATH 470 Numerical Analysis I (4)
MATH 471 Numerical Analysis II (4)

Computer Science Track (minimum 16 credits from the following list)

CS 210 Data Structures (4)
CS 220 Machine Structures and Programming (3)
CS 320 Computer Architecture (3)
CS 340 Concepts of Database Management Systems (3)
CS 350 Network Architectures (3)
CS 370 Concepts of Programming Language (3)
CS 433 Data Mining/Machine Learning (3)
MATH 470 Numerical Analysis I (4)
MATH 471 Numerical Analysis II (4)

Biological Science Track (minimum 16 credits from the following list)

BIOL 105 General Biology I (4)
BIOL 211 Genetics (4)
BIOL 320 Cell Biology (4)
BIOL 479 Molecular Biology (4)

Required Minor: None

STATISTICS MINOR

Required for Minor (20-21 credits)

MATH 121 Calculus I (4)
MATH 122 Calculus II (4)
STAT 354 Concepts of Probability and Statistics (3)
STAT 450 Regression Analysis (3)
STAT 451 Experimental Designs (3)
Choose one course from the following:
STAT 357 Sample Survey and Design (3)
STAT 358 Categorical Data Analysis (3)
STAT 359 Nonparametric Methods (3)
STAT 455 Theory of Statistics I (4)

COURSE DESCRIPTIONS

STAT 154 (3) Elementary Statistics

Basic descriptive measures of data, elementary probability concepts and their relation to statistical inference, tests of hypotheses and confidence intervals. An appropriate preparation for more advanced statistics courses in any area.

Pre: Must achieve a score of 18 or better on the MnSCU Math Readiness Test, or have achieved an ACT Math subscore of 19 or higher, or successful completion of MATH 098.

Fall, Spring
GE-4

STAT 354 (3) Concepts of Probability & Statistics

This is a calculus-based course covering introductory level topics of probability and statistics. It is designed to meet the needs of both the practitioner and the person who plans further in-depth study. Topics include probability, random variables and probability distributions, joint probability distributions, statistical inference (both estimation and hypothesis testing), analysis of variance, regres-

STATISTICS

sion, and correlation. Same as MATH 354.

Pre: MATH 122 with "C" (2.0) or better or consent

Fall, Spring

STAT 357 (3) Sample Survey and Design

Random sampling, systematic sampling methods including stratified random sampling, cluster sampling and two-stage sampling, ratio estimation, regression, and population size estimation.

Pre: MATH 354 / STAT 354 or STAT 154 with "C" (2.0) or better or consent

ALT-Fall

STAT 358 (3) Categorical Data Analysis

Forms of multivariate analysis for discrete data, two dimensional tables, models of independence, log linear models, estimation of expected values, model selection, higher dimensional tables, logit models and incompleteness.

Pre: MATH 354 / STAT 354 or STAT 154 with "C" (2.0) or better or consent

ALT-Fall

STAT 359 (3) Nonparametric Methods

Derivation and usage of nonparametric statistical methods, applications in count and rank data, analysis of variance for ranked data, statistical quality control.

Pre: MATH 354 / STAT 354 or STAT 154 with "C" (2.0) or better or consent

STAT 450 (3) Regression Analysis

Simple and multiple regression, correlation, analysis of variance and covariance.

Pre: MATH 354 / STAT 354 or STAT 455 with "C" (2.0) or better or consent

ALT-Spring

STAT 451 (3) Experimental Designs

Completely randomized, block, fractional factorial, incomplete block, split-plot, Latin squares, expected mean squares, response surfaces, confounding, fixed effects and random effects models.

Pre: MATH 354 / STAT 354 or STAT 455 with "C" (2.0) or better or consent

ALT-Spring

STAT 455 (4) Theory of Statistics I

A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications. Includes probability, continuous probability distributions, multivariate distributions, functions of random variables, central limit theorem and statistical inference. Same as MATH 455.

Pre: MATH 223 with "C" (2.0) or better or consent

Fall

STAT 456 (4) Theory of Statistics II

A mathematical approach to statistics with derivation of theoretical results and of basic techniques used in applications, including sufficient statistics, additional statistical inference, theory of statistical tests, inferences about normal models and nonparametric methods. Same as MATH 456.

Pre: MATH 455 / STAT 455 with "C" (2.0) or better or consent

STAT 488 (1-3) Seminar

The study of a particular topic primarily based upon recent literature. May be repeated for credit on each new topic.

STAT 491 (1-4) In-Service

A course designed to upgrade the qualifications of persons on-the-job. May be repeated for credit on each new topic.

STAT 492 (3) Statistics Capstone Experience

This course is designed to allow undergraduate students an opportunity to integrate their statistics experiences by engaging each student in working on problems in applied or theoretical statistics.

Pre: STAT 357, STAT 358, STAT 359, STAT 450 (at least two of these)

Spring

STAT 495 (1-4) Selected Topics

A course in an area of statistics not regularly offered. May be repeated for credit on each new topic.

STAT 498 (1-12) Internship

Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.

STAT 499 (1-4) Individual Study

Independent individual study under the guidance and direction of a faculty member. Special arrangements must be made with an appropriate faculty member.

May be repeated for credit of each new topic.