STATISTICS

In the Department of Mathematics and Statistics

Associate Professors Liam O’Brien and James Scott

A minor in statistics is described in the "Mathematics" section of the catalogue.

The statistics minor is designed to equip students with the analytical tools and capacities to interact with real-world data in a research environment while also accommodating students who seek a more theoretical foundation in the field. It is designed to pair with majors in which data plays a central role. This minor equips students with the fundamental skills necessary to understand not only how to display and analyze data, but how to design studies and experiments and collect data.

Course Offerings

SC110s  Statistical Thinking  Statistics is the science of learning from data; it provides tools for understanding data and arguments based on data in many diverse fields. Students will learn to describe data in basic terms and to verbalize interpretations of it. Topics include graphical and numerical methods for summarizing data, methods of data collection, basic study design, introductory probability, confidence intervals, and statistical inference. Does not count toward any major or minor. Credit may be received for only one of Mathematics or Statistics 110, 212, or 231.  Four credit hours.  Q, SCOTT

SC212fs  Introduction to Statistical Methods  An exploration of statistical methods relevant to a broad array of scientific disciplines. Students will learn to properly collect data through sound experimental design and to present and interpret data in a meaningful way, making use of statistical computing packages. Topics include descriptive statistics, design of experiments, randomization, contingency tables, measures of association for categorical variables, confidence intervals, one- and two-sample tests of hypotheses for means and proportions, analysis of variance, correlation/regression, and nonparametrics. Credit can be received for only one of Mathematics or Statistics 110, 212, or 231.  Four credit hours.  Q, W2.  O’BRIEN, SCOTT

[SC306]  Topics in Epidemiology  The purposes of epidemiological research are to discover the causes of disease, to advance and evaluate methods of disease prevention, and to aid in planning and evaluating the effectiveness of public health programs. Students will learn about the historical development of epidemiology, a cornerstone of public health practice. Through the use of statistical methods and software, they will explore the analytic methods commonly used to investigate the occurrence of disease. Topics include descriptive and analytic epidemiology; measures of disease occurrence and association; observational and experimental study designs; and interaction, confounding, and bias. Prerequisite:  Mathematics or Statistics 212, 231, or 382.  Four credit hours.

SC311f  Applied Regression Modeling  Students will expand on their inferential statistical background and explore methods of modeling data through linear and nonlinear regression analysis. Through the use of statistical software, they will learn how to identify possible models based on data visualization techniques, to validate assumptions required by such models, and to describe their limitations. Topics include multiple linear regression, multicollinearity, logistic regression, models for analyzing temporal data, model-building strategies, transformations, model validation. Prerequisite:  Mathematics or Statistics 212, 231, or 382.  Four credit hours.  SCOTT

[SC374]  Design and Analysis of Experiments  Students will learn how to identify potential sources of variation and plan experiments accordingly, paying attention to the desired comparisons. Statistical computing software will be used to perform analysis of variance and post-estimation techniques in a variety of experimental designs. Emphasis on statistical thinking and applications as well as the underlying mathematical structures and theory. Topics include completely randomized factorial designs, randomized block designs, Latin squares, factorial designs, and fractional factorial designs. Prerequisite:  Statistics 212, 231, or 382.  Four credit hours.

SC381f  Mathematical Statistics I: Probability  Listed as Mathematics 381.  Four credit hours.  LU

SC382s  Mathematical Statistics II: Inference  Building on their background in probability theory, students explore inferential methods in statistics and learn how to evaluate different estimation techniques and hypothesis-testing methods. Students learn techniques for modeling the response of a continuous random variable using information from several variables using regression modeling. Topics include method of moments and maximum likelihood estimation, sample properties of estimators including sufficiency, consistency, and relative efficiency, Rao-Blackwell theorem, tests of hypotheses, confidence intervals, linear models, and analysis of variance. Although applications are discussed, the emphasis is on theory. Prerequisite:  Mathematics 381. Mathematics 253 and 274 are recommended.  Four credit hours.  O’BRIEN

SC397f  Topics in Psychometrics  Psychometrics is concerned with the development and evaluation of psychological instruments such as tests and questionnaires. Students will learn about the fundamental concepts central to measurements derived from these tools. The
establishment and assessment of the validity and reliability of research instruments, as well as the construction of scales and indices will be discussed. Data reduction techniques and an introduction to testing theory will also be covered. Statistical software will be used throughout.

Prerequisite: One of the following: Economics 293; Statistics 212, 231, or 382; or Psychology 214. Mathematics 253 helpful, but not required.

Four credit hours.

O'BRIEN

**SC398s  Stochastic Processes**  Listed as Mathematics 398.  Four credit hours.  LU