



Master of Science in Statistics

Statistics is a scientific discipline by which statisticians assist other scientists and researchers in making informed decisions in the face of uncertainty. Statisticians use skills in a variety of areas to solve problems. The application of statistics is the embodiment of the scientific method.

The Statistics MS is an applied statistics degree that prepares outstanding students for successful and productive careers. The graduate curriculum is designed to equip students with decision-making skills necessary for successful careers as professional statisticians. Although a firm foundation in theoretical statistics is provided, most of the courses are applied in nature, offering approaches to the solution of important real-world problems.

Twenty to twenty-five students are currently enrolled in the master's program in statistics. Full-time students should complete the master's program in two years.

Admission Requirements

Applicants must have a Bachelor's degree from an accredited US university or equivalent, with a minimum 3.3 undergraduate GPA. We also require a methods course beyond introductory statistics and a calculus-based statistical theory course, multivariate calculus, and linear algebra with a B- or better in each course. A Math minor is recommended.

Profile of Students Admitted Fall 2009

Mean GPA: 3.76

Mean GRE: Q-768, V-535, A-4.5

Master's in Statistics Requirements

- Thesis or Project
 - Thesis option (30): minimum 24 coursework hours plus 6 thesis hours (Stat 699R)
 - Project option (33): minimum 30 coursework hours plus 3 project hours (Stat 698R)
- Required courses: Stat 535, 536, 624, 641, 642, and 9 hours of 600-level Statistics courses
- Comprehensive written examination covering Stat 535, 536, 641, and 642
- C+ or better in each class with a cumulative 3.0 GPA in all MS degree classes

100% Post-graduation Placement*

78% Employment (median starting salary \$60,000) at

Battelle—Columbus
First National Bank of Omaha
Monsanto Co.
Pacific Northwest National Laboratory
Alliant Techsystems (ATK)
Overstock.com
LDS Church
Edison Media Research
Hallmark
University of Utah School of Medicine
Quintiles
TiVo

22% Pursue Doctoral Degree at

Harvard
Carnegie Mellon
Duke
Iowa State
Texas A&M
UNC-Chapel Hill
North Carolina State
U.C. Santa Cruz
Ohio State (College of Medicine, MD)
Chicago

*Last 5 years

To Apply

Application forms are available online at <http://www.byu.edu/gradstudies/admissions/>

As part of the application process, applicants must submit three recommendation letters, a letter of intent, official GRE scores, official TOEFL scores for international students, and payment of all university application fees. All application materials must be submitted before the February 1 deadline for Fall admission and students must agree to live according to BYU standards of personal conduct as stated in the Honor Code.

Financial Assistance

The department has limited funds to supplement students' financial resources. All admitted students receive teaching or research assistantships. Some students will receive tuition awards.

Program Courses

Required Courses:

STAT 535 Applied Linear Models

Analysis of full-rank model, over-parameterized model, cell means model, unequal subclass frequencies, and missing and fused cells. Estimability issues, diagnostics.

STAT 536 Modern Regression Methods

Weighted least squares, measurement error models, robust regression, nonlinear regression, local regression, generalized additive models, tree-structured regression.

STAT 624 Statistical Computation

Fundamental numerical methods used by statisticians, programming concepts, efficient use of software available for statisticians, simulation studies.

STAT 641 Probability Theory & Mathematical Statistics 1

Axioms of probability; combinatorics; random variables, densities and distributions; expectation; independence; joint distributions; conditional probability; inequalities; derived random variables; generating functions; limit theorems; convergence results.

STAT 642 Probability Theory & Mathematical Statistics 2

Introduction to statistical theory, principles of sufficiency and likelihood, point and interval estimation, maximum likelihood, Bayesian inference, hypothesis testing, Neyman-Pearson lemma, likelihood ratio tests, asymptotic results including delta method, exponential family.

Graduate Electives:

STAT 537 Generalized Linear Models

Generalized linear models framework, binary data, polytomous data, log-linear models.

STAT 538 Survival Analysis

Basic concepts of survival analysis, hazard functions, types of censoring, Kaplan-Meier estimates, Logrank tests, proportional hazard models, examples drawn from clinical and epidemiological literature.

STAT 545 Stochastic Processes

Conditional expectation and probabilities, Markov chains, solutions using time reversible chains, modeling using hidden Markov chains, exponential waiting times, Poisson processes, Brownian motion with approximations.

STAT 631 Advanced Experimental Design

Response surface methods; mixture designs; optimal designs; fractions of two-level, three-level, and mixed-level factorials; analysis of experiments with complex aliasing; robust parameter designs.

STAT 635 Mixed Model Methods

Fixed effects, random effects, repeated measures, non-independent data, general covariance structures, estimation methods.

STAT 643 Theory of Linear Models

Random vectors, multivariate normal distribution, quadratic forms distribution, full-rank and non-full-rank linear models, hypothesis testing, random predictors, estimability, Bayesian topics, mixed and/or generalized linear models.

STAT 651 Bayesian Methods

Basic Bayesian inference, conjugate and non-conjugate analyses, Markov Chain Monte Carlo Methods, hierarchical modeling, convergence diagnostics.

STAT 666 Multivariate Statistical Methods

Inference about mean vectors and covariance matrices, multivariate analysis of variance and regression, canonical correlation, discriminant analysis, cluster analysis, principal component analysis, factor analysis.

While not required, we recommend these undergraduate courses to expand your career opportunities.

SAS Programming (STAT 124, 224, 324, 424)

STAT 431 Experimental Design

STAT 435 Nonparametric Statistical Methods

STAT 462 Quality Control & Industrial Statistics

STAT 466 Introduction to Reliability

STAT 469 Applied Time Series & Forecasting

Department Research

Research emphases include Bayesian methods, environmental and spatial statistics, reliability of industrial and computing processes, statistical genetics and bioinformatics, mixed models and longitudinal data, data mining, chemometrics, actuarial methods, design and analysis of experiments, and statistical computation. In addition to these general areas, more specific research interests for individual faculty are listed on their web pages.

Graduate Committee Chairs

Blades, Natalie J., *Assistant Professor*. PhD, Johns Hopkins University, 2003. Statistical Genetics, Epidemiology.

Christensen, William F., *Professor*. PhD, Iowa State University, 1999. Environmental and Spatial Statistics, Multivariate Analysis.

Collings, Bruce J., *Professor*. PhD, University of North Carolina, 1981. Combinatorics, Actuarial Science, Biostatistics.

Engler, David L., *Assistant Professor*. PhD, Harvard University, 2007. High-dimensional Data Analysis, Variable Selection, Biomedical Applications.

Fellingham, Gilbert W., *Professor*. PhD, University of Washington, 1990. Application of Bayesian and nonparametric Bayesian models to health and human performance; Biostatistics.

Grimshaw, Scott D., *Professor*. PhD, Texas A&M University, 1989. Data Mining, Statistical Computing.

Johnson, W. Evan, *Assistant Professor*. PhD, Harvard University, 2007. Statistical Genomics, Computational Biology, Bioinformatics.

Lawson, John S., *Professor*. PhD, Polytechnic Institute of New York, 1984. Reliability, Industrial Statistics, Experimental Design, Record Linkage.

Neeley, E. Shannon, *Assistant Professor*. PhD, Rice University, 2007. Microarrays, Biostatistics, Statistical application in medicine, health, and wildlife.

Reese, C. Shane, *Professor*. PhD, Texas A&M University, 1999. Bayesian Methods, Reliability, Information Combination, Experimental Design.

Schaalje, G. Bruce, *Professor*. PhD, North Carolina State University, 1988. Mixed Models, Experimental Design, Biostatistics.

Scott, Del T., *Professor*, PhD, Pennsylvania State University, 1977. Statistical Computing, Categorical Data Analysis, Linear Models.

Tolley, H. Dennis, *Professor*. PhD, University of North Carolina, 1974. Actuarial methods in health, methods for chemical transport.

Whiting, David G., *Associate Professor*. PhD, Texas A&M University, 1995. Proteomics; Bioinformatics; Statistical Computing; Spatial Statistics.