Department of Statistics

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Statistics is the science concerned with developing and studying methods for collecting, analyzing, interpreting, and presenting empirical data. Statistical principles and methods are important for addressing questions in public policy, medicine, industry, and virtually every branch of science. Interest in statistical methods has increased dramatically with the abundance of large databases in fields like computer science (Internet and Web traffic), business and marketing (transaction records), and biology (the human genome and related data). It is the substantive questions in such areas of application that drive the development of new statistical methods and motivate the mathematical study of the properties of these methods.

- Data Science, B.S.
- Statistics, M.S.
- Statistics, Minor
- Statistics, Ph.D.

Faculty

David Armstrong, M.S. San Diego State University, *Lecturer of Statistics*

Brigitte Baldi, Ph.D. Massachusetts Institute of Technology, *Senior Lecturer of Statistics*

Scott Bartell, Ph.D. University of California, Davis, *Professor of Environmental and Occupational Health; Health, Society, and Behavior; Population Health and Disease Prevention; Statistics*

Veronica Berrocal, Ph.D. University of Washington, *Professor of Statistics*

Carter Butts, Ph.D. Carnegie Mellon University, *Chancellor's Professor of Sociology; Computer Science; Electrical Engineering and Computer Science; Statistics* (mathematical sociology, social networks, quantitative methodology, human judgment and decision making, economic sociology)

Hengrui Cai, Ph.D. North Carolina State University, *Assistant Professor of Statistics*

Mine Dogucu, Ph.D. Ohio State University, *Assistant Professor of Teaching of Statistics*

Daniel L. Gillen, Ph.D. University of Washington, *Department Chair and Chancellor's Professor of Statistics; Epidemiology and Biostatistics*

Sevan Gulesserian, Ph.D. University of California, Irvine, *Lecturer of Statistics*

Matthew Harding, Ph.D. Massachusetts Institute of Technology, *Professor of Economics; Statistics*

Ivan G. Jeliazkov, Ph.D. Washington University, *Associate Professor of Economics; Statistics*

Wesley O. Johnson, Ph.D. University of Minnesota, *Professor Emeritus of Statistics*

Ana Kenney, Ph.D. Pennsylvania State University, *Assistant Professor of Statistics*

Stephan Mandt, Ph.D. University of Cologne, *Associate Professor of Computer Science; Statistics* (artificial intelligence and machine learning, probabilistic modeling, Bayesian deep learning, variational inference)

Volodymyr Minin, Ph.D. University of California, Los Angeles, *Professor of Statistics*

Bin Nan, Ph.D. University of Washington, *Chancellor's Professor of Statistics; Epidemiology and Biostatistics*

Tianchen Qian, Ph.D. Johns Hopkins University, *Assistant Professor of Statistics*

Annie Qu, Ph.D. The Pennsylvania State University, *Chancellor's Professor of Statistics*

Babak Shahbaba, Ph.D. University of Toronto, *Chancellor's Fellow and Professor of Statistics; Computer Science*

Weining Shen, Ph.D. North Carolina State University, *Associate Professor of Statistics*

Padhraic J. Smyth, Ph.D. California Institute of Technology, *Chancellor's Professor of Computer Science; Education; Statistics* (artificial intelligence and machine learning, pattern recognition, applied statistics, data mining, information theory)

Hal S. Stern, Ph.D. Stanford University, *Chancellor's Professor of Statistics; Cognitive Sciences*

Erik B. Sudderth, Ph.D. Massachusetts Institute of Technology, *Professor of Computer Science; Statistics* (artificial intelligence and machine learning, computer vision, statistics and statistical theory)

Jessica Utts, Ph.D. Pennsylvania State University, *Professor Emeritus of Statistics*

Joachim S. Vandekerckhove, Ph.D. University of Leuven, *Professor of Cognitive Sciences; Logic and Philosophy of Science; Statistics* (response time modeling, model fitting, computational statistics, psychometrics, bayesian statistics)

Yaming Yu, Ph.D. Harvard University, *Associate Professor of Statistics*

Zhaoxia Yu, Ph.D. William Marsh Rice University, *Professor of Statistics; Epidemiology and Biostatistics*

Data Science Courses

DATA 200AP. Intermediate Probability and Statistical Theory I. 4 Units.
Fundamental probability and distribution theory needed for statistical inference. Topics include axiomatic foundations of probability theory, discrete and continuous distributions, expectation and moment generating functions, multivariate distributions, transformations, sampling distributions, and limit theorems.

Prerequisite: Knowledge of basic statistics and linear algebra; Calculus I-III.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 200BP. Intermediate Probability and Statistical Theory II. 4 Units.
Fundamental theory and methods for statistical inference. Topics include data reduction (sufficient, ancillary, and complete statistics), estimation (method of moments, maximum likelihood estimators, Bayes estimators), evaluating methods (mean squared error, best unbiased estimators, asymptotic evaluations), hypothesis testing, and confidence intervals.

Prerequisite: DATA 200AP. DATA 200AP with a grade of B or better.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 200P. Data Science Career Seminar.
Covers one or more emerging topics in data science from industry professionals. The course content may vary.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Master of Data Science Degree students only.

DATA 210P. Statistical Methods I. 4 Units.
Statistical methods for analyzing data from multi-variable observational studies and experiments. Topics include model selection and model diagnostics for simple and multiple linear regression and generalized linear models.

Corequisite: DATA 200BP
Prerequisite: DATA 200AP. DATA 200AP with a grade of B- or better. Required: Knowledge of basic statistics and linear algebra.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 211P. Statistical Methods II. 4 Units.
Statistical methods for designing experiments, visualizing, and analyzing experimental and observational data using generalized regression models, multivariate analysis, and methods suitable for dependent data.

Prerequisite: DATA 210P. DATA 210P with a grade of B- or better

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 220P. Databases and Data Management. 4 Units.
Introduction to the design of databases and the use of database management systems (DBMS) for managing and utilizing data. Topics include entity-relationship modeling for design, relational data model, relational algebra, relational schema design, and use of SQL (Structured Query Language).

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 260P. Fundamentals of Algorithms in Data Science. 4 Units.
Covers fundamental concepts in the design and analysis of algorithms and is geared toward data science applications. Topics include greedy algorithms, deterministic and randomized graph algorithms, models of network flow, fundamental algorithmic techniques, and NP-completeness.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 280P. Data Science Career Seminar .
Covers one or more emerging topics in data science from industry professionals. Provides students with the opportunity to learn from experts in the data science industry through guest speaker presentations and Q&A sessions.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Master of Data Science Degree students only.

DATA 294P. Hypothesis and Project Development. 4 Units.
Supervised individual study on data science project development. Under instructor's supervision, students either develop their own projects or undertake projects from industry which have potential to become their capstone projects for DATA 296P or DATA 297P.

Grading Option: In Progress (Letter Grade with S/U).

Restriction: Graduate students only. Master of Science Degree students only.

DATA 295P. Special Topics in Data Science. 4 Units.
Covers one or more emerging topics in data science. Course content may vary.

Repeatability: May be taken for credit 4 times as topics vary.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 296P. Capstone Writing and Communication. 4 Units.
Written and oral communication for data science careers. Production of a detailed document describing the design, methods, analytic strategy, interpretation, and conclusions as related to the concurrent capstone design and analysis class and refinement of written documents and oral communications.

Prerequisite: Required: Completion of at least 24 units in the Master of Data Science program.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 297P. Capstone Design and Analysis. 4 Units.
Complete implementation of a data science analytic strategy for obtaining empirically-driven solutions to problems from science and industry. Focuses on the problem definition and analysis, data representation, algorithm selection, solution validation, and presentation of results.

Corequisite: DATA 296P

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 298P. Curricular Practical Training. 2 Units.
Internship in which students work individually at an outside organization to gain experience with the challenges involved in data-related work.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Master of Data Science Degree students only.

DATA 299P. Individual Study. 2 Units.
Supervised individual study in data science.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be taken for credit 4 times.

Restriction: Graduate students only. Master of Data Science Degree students only.

Statistics Courses

STATS 5. Seminar in Data Science. 1 Unit.
An introduction to the field of Data Science; intended for entering freshman and transfers.

Grading Option: Pass/no pass only.

Restriction: Information Computer Science Majors only.

STATS 6. Introduction to Data Science. 4 Units.
Introduces the full data cycle. Topics include data collection and retrieval, data cleaning, exploratory analysis and visualization, introduction to statistical modeling, inference, and communicating findings. Applications include real data from a wide-range of fields with emphasis on understanding reproducible practices.

(Vb)

STATS 7. Basic Statistics. 4 Units.
Introduces basic inferential statistics including confidence intervals and hypothesis testing on means and proportions, t-distribution, Chi Square, regression and correlation. F-distribution and nonparametric statistics included if time permits.

Overlaps with STATS 8, MGMT 7, SOCECOL 13.

Restriction: STATS 7 may not be taken for credit concurrently with or after STATS 110, STATS 111, STATS 112.

(Va)

STATS 8. Introduction to Biological Statistics . 4 Units.
Introductory statistical techniques used to collect and analyze experimental and observational data from health sciences and biology. Includes exploration of data, probability and sampling distributions, basic statistical inference for means and proportions, linear regression, and analysis of variance.

Overlaps with SOCECOL 13, MGMT 7, STATS 7.

Restriction: STATS 8 may not be taken for credit concurrently with or after STATS 110, STATS 111, STATS 112.

(Va)

STATS 67. Introduction to Probability and Statistics for Computer Science. 4 Units.
Introduction to the basic concepts of probability and statistics with discussion of applications to computer science.

Prerequisite: MATH 2B

Restriction: School of Info & Computer Sci students have first consideration for enrollment. Computer Science Engineering Majors have first consideration for enrollment. STATS 67 may not be taken for credit concurrently with or after STATS 120B.

(Va)

STATS 68. Statistical Computing and Exploratory Data Analysis. 4 Units.
Introduces key concepts in statistical computing. Techniques such as exploratory data analysis, data visualization, simulation, and optimization methods, are presented in the context of data analysis within a statistical computing environment.

Prerequisite: STATS 7 and (I&C SCI 31 or I&C SCI 32A)

STATS 110. Statistical Methods for Data Analysis I. 4 Units.
Introduction to statistical methods for analyzing data from experiments and surveys. Methods covered include two-sample procedures, analysis of variance, simple and multiple linear regression.

Prerequisite: STATS 7 or STATS 8 or AP Statistics or (STATS 120A and STATS 120B and STATS 120C). AP Statistics with a minimum score of 3

Restriction: School of Info & Computer Sci students only.

STATS 111. Statistical Methods for Data Analysis II. 4 Units.
Introduction to statistical methods for analyzing data from surveys or experiments. Emphasizes application and understanding of methods for categorical data including contingency tables, logistic and Poisson regression, loglinear models.

Prerequisite: STATS 110

Concurrent with STATS 202.

STATS 112. Statistical Methods for Data Analysis III. 4 Units.
Introduction to statistical methods for analyzing longitudinal data from experiments and cohort studies. Topics covered include survival methods for censored time-to-event data, linear mixed models, non-linear mixed effects models, and generalized estimating equations.

Prerequisite: STATS 111

Concurrent with STATS 203.

STATS 115. Introduction to Bayesian Data Analysis. 4 Units.
Basic Bayesian concepts and methods with emphasis on data analysis. Prior and posterior probability distributions, modeling, and Markov Chain Monte Carlo techniques are presented in the context of data analysis within a statistical computing environment.

Prerequisite: STATS 120C. Recommended: STATS 110.

STATS 120A. Introduction to Probability and Statistics I. 4 Units.
Introduction to basic principles of probability and statistical inference. Axiomatic definition of probability, random variables, probability distributions, expectation.

Prerequisite: MATH 2A and MATH 2B and (MATH 2D or MATH 4)

Restriction: Data Science Majors have first consideration for enrollment. Quantitative Economics majors have second consideration.

Concurrent with STATS 281A.

STATS 120B. Introduction to Probability and Statistics II. 4 Units.
Introduction to basic principles of probability and statistical inference. Point estimation, interval estimating, and testing hypotheses, Bayesian approaches to inference.

Prerequisite: STATS 120A

Restriction: Data Science Majors have first consideration for enrollment. Quantitative Economics majors have second consideration.

Concurrent with STATS 281B.

STATS 120C. Introduction to Probability and Statistics III. 4 Units.
Introduction to basic principles of probability and statistical inference. Linear regression, analysis or variance, model checking.

Prerequisite: STATS 120B and (MATH 3A or MATH 6G or I&C SCI 6N)

Restriction: Data Science Majors have first consideration for enrollment. Quantitative Economics majors have second consideration.

Concurrent with STATS 281C.

STATS 140. Multivariate Statistical Methods. 4 Units.
Theory and application of multivariate statistical methods. Topics include statistical inference for the multivariate normal model and its extensions to multiple samples and regression, use of statistical packages for data visualization and reduction, discriminant analysis, cluster analysis, and factor analysis.

Prerequisite: STATS 120C and (MATH 3A or I&C SCI 6N)

Concurrent with STATS 240.

STATS 170A. Project in Data Science I. 4 Units.
Problem definition and analysis, data representation, algorithm selection, solution validation, and results presentation. Students do team projects and lectures cover analysis alternatives, project planning, and data analysis issues. First quarter emphasizes approach selection, project planning, and experimental design.

Corequisite: STATS 111
Prerequisite: STATS 68 and IN4MATX 43 and COMPSCI 122A and COMPSCI 178 and I&C SCI 46 and STATS 111

Grading Option: In Progress (Letter Grade with P/NP).

Restriction: Seniors only. Data Science Majors have first consideration for enrollment.

STATS 170B. Project in Data Science II. 4 Units.
Problem definition and analysis, data representation, algorithm selection, solution validation, and results presentation. Students do team projects and lectures cover analysis alternatives, project planning, and data analysis issues. Second quarter emphasizes project execution and analysis, and presentation of results.

Corequisite: STATS 112
Prerequisite: STATS 170A and STATS 112. In Progress (IP) grade for STATS 170A is also accepted.

Restriction: Seniors only. Data Science Majors have first consideration for enrollment.

STATS 199. Individual Study. 2-5 Units.
Individual research or investigations under the direction of an individual faculty member.

Repeatability: May be repeated for credit unlimited times.

STATS 200A. Intermediate Probability and Statistical Theory. 4 Units.
Basics of probability theory, random variables and basic transformations, univariate distributions—discrete and continuous, multivariate distributions.

Prerequisite: STATS 120C. STATS 120C with a grade of B- or better

STATS 200B. Intermediate Probability and Statistical Theory. 4 Units.
Random samples, transformations, limit laws, normal distribution theory, introduction to stochastic processes, data reduction, point estimation (maximum likelihood).

Prerequisite: STATS 200A. STATS 200A with a grade of B- or better

STATS 200C. Intermediate Probability and Statistical Theory. 4 Units.
Interval estimation, hypothesis testing, decision theory and Bayesian inference, basic linear model theory.

Prerequisite: STATS 200B. STATS 200B with a grade of B- or better

STATS 201. Statistical Methods for Data Analysis I. 4 Units.
Introduction to statistical methods for analyzing data from experiments and surveys. Methods covered include two-sample procedures, analysis of variance, simple and multiple linear regression.

Prerequisite: STATS 7 or STATS 8

Restriction: STATS 201 cannot be taken for credit after taking STATS 210.

STATS 202. Statistical Methods for Data Analysis II. 4 Units.
Introduction to statistical methods for analyzing data from surveys or experiments. Emphasizes application and understanding of methods for categorical data including contingency tables, logistic and Poisson regression, loglinear models.

Prerequisite: STATS 201 or STATS 210. STATS 201 with a grade of B- or better. STATS 210 with a grade of B- or better

Concurrent with STATS 111.

STATS 203. Statistical Methods for Data Analysis III. 4 Units.
Introduction to statistical methods for analyzing longitudinal data from experiments and cohort studies. Topics covered include survival methods for censored time-to-event data, linear mixed models, non-linear mixed effects models, and generalized estimating equations.

Prerequisite: STATS 202. STATS 202 with a grade of B- or better

Concurrent with STATS 112.

STATS 205. Introduction to Bayesian Data Analysis. 4 Units.
Basic Bayesian concepts and methods with emphasis on data analysis. Special emphasis on specification of prior distributions. Development for one-two samples and on to binary, Poisson and linear regression. Analyses performed using free OpenBugs software.

Prerequisite: STATS 120C. Recommended: STATS 201 or STATS 210.

STATS 205P. Bayesian Data Analysis. 4 Units.
Covers basic Bayesian concepts and methods with emphasis on data analysis. Special emphasis on specification of prior distributions. Development of methods and theory for one and two samples, binary, Poisson, and linear regression.

Prerequisite: DATA 200AP and DATA 200BP and DATA 210P. DATA 200AP with a grade of B or better. DATA 200BP with a grade of B or better. DATA 210P with a grade of B or better

Restriction: Graduate students only. Master of Data Science Degree students only.

STATS 210. Statistical Methods I: Linear Models. 4 Units.
Statistical methods for analyzing data from surveys and experiments. Topics include randomization and model-based inference, two-sample methods, analysis of variance, linear regression and model diagnostics.

Prerequisite: Knowledge of basic statistics, calculus, linear algebra.

STATS 210A. Statistical Methods I: Linear Models. 4 Units.
Statistical methods for analyzing data from surveys and experiments. Topics include randomization and model-based inference, two-sample methods, analysis of variance, linear regression, and model diagnostics.

Prerequisite: Knowledge of basic statistics (at the level of STATS 7), calculus, and linear algebra.

Restriction: Graduate students only.

STATS 210B. Statistical Methods II: Categorical Data. 4 Units.
Introduction to statistical methods for analyzing discrete and non-normal outcomes. Emphasizes the development and application of methods for categorical data, including contingency tables, logistic and Poisson regression, loglinear models.

Prerequisite: STATS 210. STATS 210 with a grade of B- or better. May not be taken for graduate credit by Ph.D. students in Statistics.

Restriction: Graduate students only.

STATS 210C. Statistical Methods III: Longitudinal Data. 4 Units.
Introduction to statistical methods for analyzing longitudinal outcomes. Emphasizes the development and application of regression methods for correlated and censored outcomes. Methods for continuous and discrete correlated outcomes, as well as censored outcomes, are covered.

Prerequisite: STATS 210B. STATS 210B with a grade of B- or better. May not be taken for graduate credit by Ph.D. students in Statistics.

Restriction: Graduate students only.

STATS 211. Statistical Methods II: Generalized Linear Models. 4 Units.
Development of the theory and application of generalized linear models. Topics include likelihood estimation and asymptotic distributional theory for exponential families, quasi-likelihood and mixed model development. Emphasizes methodological development and application to real scientific problems.

Prerequisite or corequisite: STATS 210. STATS 210 with a grade of B- or better

STATS 212. Statistical Methods III: Methods for Correlated Data. 4 Units.
Development and application of statistical methods for analyzing corrected data. Topics covered include repeated measures ANOVA, linear mixed models, non-linear mixed effects models, and generalized estimating equations. Emphasizes both theoretical development and application of the presented methodology.

Prerequisite: STATS 211. STATS 211 with a grade of B- or better

STATS 220A. Advanced Probability and Statistics Topics. 4 Units.
Advanced topics in probability and statistical inference including measure theoretic probability, large sample theory, decision theory, resampling and Monte Carlo methods, nonparametric methods.

Prerequisite: STATS 200C. STATS 200C with a grade of B- or better

STATS 220B. Advanced Probability and Statistics Topics. 4 Units.
Advanced topics in probability and statistical inference, including measure theoretic probability, large sample theory, decision theory, resampling and Monte Carlo methods, nonparametric methods.

Prerequisite: STATS 220A and MATH 140B. STATS 220A with a grade of B- or better

STATS 225. Bayesian Statistical Analysis. 4 Units.
Introduction to the Bayesian approach to statistical inference. Topics include univariate and multivariate models, choice of prior distributions, hierarchical models, computation including Markov chain Monte Carlo, model checking, and model selection.

Prerequisite: STATS 205 and STATS 230. STATS 205 with a grade of B- or better. STATS 230 with a grade of B- or better

STATS 230. Statistical Computing Methods. 4 Units.
Numerical computations and algorithms with applications in statistics. Topics include optimization methods including the EM algorithm, random number generation and simulation, Markov chain simulation tools, and numerical integration.

Prerequisite: Two quarters of upper-division or graduate training in probability and statistics.

Overlaps with COMPSCI 206.

STATS 240. Multivariate Statistical Methods. 4 Units.
Theory and application of multivariate statistical methods. Topics include statistical inference for the multivariate normal model and its extensions to multiple samples and regression, use of statistical packages for data visualization and reduction, discriminant analysis, cluster analysis, and factor analysis.

Prerequisite: STATS 120C and (MATH 3A or I&C SCI 6N)

Concurrent with STATS 140.

STATS 240P. Multivariate Statistical Methods. 4 Units.
Theory and application of multivariate statistical methods. Topics include statistical inference for the multivariate normal model and its extensions to multiple samples and regression, use of statistical packages for data visualization and dimension reduction, discriminant analysis, cluster analysis, factor analysis.

Prerequisite: DATA 200AP and DATA 200BP. DATA 200AP with a grade of B- or better. DATA 200BP with a grade of B- or better

Restriction: Graduate students only. Master of Data Science Degree students only.

STATS 245. Time Series Analysis. 4 Units.
Statistical models for analysis of time series from time and frequency domain perspectives. Emphasizes theory and application of time series data analysis methods. Topics include ARMA/ARIMA models, model identification/estimation, linear operators, Fourier analysis, spectral estimation, state space models, Kalman filter.

Corequisite: STATS 200C
Prerequisite or corequisite: STATS 201 or STATS 210. STATS 201 with a grade of B- or better. STATS 210 with a grade of B- or better

STATS 245P. Time Series Analysis. 4 Units.
Statistical models for time series. Topics include linear models for trends; stationary time-series; non-stationary time series; forecasting and Kalman filtering; time-series smoothing; seasonal models; ARCH, GARCH and stochastic volatility models; multivariate time series; vector autoregressive models; spectral analysis; case studies.

Prerequisite: DATA 200AP and DATA 200BP. DATA 200AP with a grade of B- or better. DATA 200BP with a grade of B- or better

Restriction: Graduate students only. Master of Data Science Degree students only.

STATS 255. Statistical Methods for Survival Data. 4 Units.
Statistical methods for analyzing survival data from cohort studies. Topics include parametric and nonparametric methods, the Kaplan-Meier estimator, log-rank tests, regression models, the Cox proportional hazards model and accelerated failure time models, efficient sampling designs, discrete survival models.

Corequisite: STATS 202 or STATS 211.
Prerequisite: STATS 210. STATS 210 with a grade of B- or better

Restriction: Graduate students only.

STATS 260. Inference with Missing Data. 4 Units.
Statistical methods and theory useful for analysis of multivariate data with partially observed variables. Bayesian and likelihood-based methods developed. Topics include EM-type algorithms, MCMC samplers, multiple imputation, and general location model. Applications from economics, education, and medicine are discussed.

Corequisite: STATS 200C
Prerequisite: STATS 210 or STATS 200C. STATS 230

STATS 262P. Theory and Practice of Sample Survey. 4 Units.
Basic techniques and statistical methods for designing surveys and analyzing collected survey data. Topics include simple random sampling, ratio and regression estimates, stratified sampling, cluster sampling, sampling with unequal probabilities, multistage sampling, and methods to handle nonresponse.

Prerequisite: DATA 200AP and DATA 200BP. DATA 200AP with a grade of B or better. DATA 200BP with a grade of B or better

Restriction: Graduate students only. Master of Data Science Degree students only.

STATS 265. Causal Inference. 4 Units.
Various approaches to causal inference focusing on the Rubin causal model and propensity-score methods. Topics include randomized experiments, observational studies, non-compliance, ignorable and non-ignorable treatment assignment, instrumental variables, and sensitivity analysis. Applications from economics, politics, education, and medicine.

Prerequisite: STATS 200C and STATS 210. STATS 200C with a grade of B- or better. STATS 210 with a grade of B- or better

STATS 270. Stochastic Processes. 4 Units.
Introduction to the theory and application of stochastic processes. Topics include Markov chains, continuous-time Markov processes, Poisson processes, and Brownian motion. Applications include Markov chain Monte Carlo methods and financial modeling (for example, option pricing).

Prerequisite: STATS 120C

Overlaps with MATH 271A, MATH 271B, MATH 271C.

STATS 270P. Stochastic Processes. 4 Units.
Introduction to the theory and application of stochastic processes. Topics include Poisson processes, Markov chains, continuous-time Markov processes, and Brownian motion. Applications include Markov chain Monte Carlo methods and financial modeling (e.g. option pricing).

Prerequisite: DATA 200AP and DATA 200BP. DATA 200AP with a grade of B or better. DATA 200BP with a grade of B or better

Restriction: Graduate students only. Master of Data Science Degree students only.

STATS 275. Statistical Consulting. 4 Units.
Training in collaborative research and practical application of statistics. Emphasis on effective communication as it relates to identifying scientific objectives, formulating a statistical analysis plan, choice of statistical methods, and interpretation of results and their limitations to non-statisticians.

Prerequisite: STATS 203 or STATS 212 or STATS 210C. STATS 203 with a grade of B or better. STATS 212 with a grade of B or better. STATS 210C with a grade of B or better

Restriction: Graduate students only.

STATS 280. Seminar in Statistics. 0.5 Units.
Periodic seminar series covering topics of current research in statistics and its application.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

STATS 281A. Introduction to Probability and Statistics I. 4 Units.
Introduction to basic principles of probability and statistical inference. Axiomatic definition of probability, random variables, probability distributions, expectation.

Restriction: Graduate students only.

Concurrent with STATS 120A.

STATS 281B. Introduction to Probability and Statistics II. 4 Units.
Introduction to basic principles of probability and statistical inference. Point estimation, interval estimating, and testing hypotheses, Bayesian approaches to inference.

Restriction: Graduate students only.

Concurrent with STATS 120B.

STATS 281C. Introduction to Probability and Statistics III. 4 Units.
Introduction to basic principles of probability and statistical inference. Contingency table analysis, linear regression, analysis of variance, model checking.

Restriction: Graduate students only.

Concurrent with STATS 120C.

STATS 295. Special Topics in Statistics. 4 Units.
Studies in selected areas of statistics. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

STATS 298. Thesis Supervision. 2-12 Units.
Individual research or investigation conducted in preparation for the M.S. thesis option or the dissertation requirements for the Ph.D. program.

Repeatability: May be repeated for credit unlimited times.

STATS 299. Individual Study. 1-12 Units.
Individual research or investigation under the direction of an individual faculty member.

Repeatability: May be repeated for credit unlimited times.