

SDS - Statistics and Data Sciences

Statistics and Data Sciences: SDS

Lower-Division Courses

SDS 301 (TCCN: MATH 1342). Elementary Statistical Methods.

Covers the fundamental procedures for data organization and analysis. Subjects include frequency distributions, graphical presentation, sampling, experimental design, inference, and regression. Three lecture hours a week for one semester. Only one of the following may be counted: Educational Psychology 308, Statistics 309, 309H or Statistics and Data Sciences 301.

SDS 302F. Foundations of Data Analysis.

Introduction to data analysis and statistical methods. Subjects include random sampling; principles of observational study and experimental design; data summaries and graphics; and statistical models and inference, including the simple linear regression model and one-way analysis of variance. Three lecture hours and one laboratory hour a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 302, 302F, 306.

SDS 311C. Numbering Race.

Same as African and African Diaspora Studies 302M. Subjects include conceptualization and operationalization in quantitative measurement, the calculation and interpretation of descriptive statistics and statistical relationships, the application of statistical techniques to understand social phenomenon, and techniques for presenting results from quantitative analysis. Three lecture hours a week for one semester. Only one of the following may be counted: African and African Diaspora Studies 302M, 317D (Topic: Numbering Race), Statistics and Data Sciences 310T (Topic: Numbering Race), 311C.

SDS 313. Introduction to Data Science.

Introduction to the principles and practice of data science. Explore R and reproducible data analysis; summarizing data using descriptive statistics; data visualization and storytelling; data wrangling and relational data; basic prediction and classification using regression models; and programming in R. The equivalent of three lecture hours a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 313, 322E, 348.

SDS 315. Statistical Thinking.

Introduction to the fundamental ideas of statistical thinking with R programming. Explore survey, experimental, and observational study design; common sources of random and systematic error in data; the bootstrap as a tool for quantifying uncertainty; hypothesis testing; regression; and the role of statistics in an ethical and just society. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 313 with a grade of at least C-.

SDS 119S, 219S, 319S, 419S, 519S, 619S, 719S, 819S, 919S. Topics in Statistics and Data Sciences.

This course is used to record credit the student earns while enrolled at another institution in a program administered by the University's Study Abroad Office. Credit is recorded as assigned by the study abroad adviser in the Department of Statistics and Data Sciences. University credit is awarded for work in an exchange program; it may be counted as coursework taken in residence. Transfer credit is awarded for work in an

affiliated studies program. May be repeated for credit when the topics vary.

Upper-Division Courses

SDS 320E. Elements of Statistics.

Introduction to statistics. Subjects include probability; principles of observational study and experimental design; statistical models and inference, including the multiple linear regression model and one-way analysis of variance. R programming is introduced. Three lecture hours and one laboratory hour a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 320E, 320H, and 328M.

SDS 320H. Elements of Statistics: Honors.

Introduction to statistics. Subjects include probability; principles of observational study and experimental design; statistical models and inference, including the multiple linear regression model and one-way analysis of variance. R programming is introduced. Three lecture hours and one laboratory hour a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 320E, 320H, and 328M.

SDS 321. Introduction to Probability and Statistics.

Covers fundamentals of probability, combinatorics, discrete and continuous random variables, jointly distributed random variables, and limit theorems. Using probability to introduce fundamentals of statistics, including Bayesian and classical inference. The equivalent of four lectures hours a week. Statistics and Data Sciences 321 and 431 may not both be counted. Prerequisite: Mathematics 408C, 408L, 408R, 408S, or 408Q with a grade of at least C-.

SDS 322E. Elements of Data Science.

Explore data science tools and examine data wrangling; exploratory data analysis and data visualization; markdown and data workflow; simulation-based inference; and classification methods. R programming is emphasized and Python programming is introduced. Three lecture hours and one laboratory hour a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 313, 322E, 348. Prerequisite: An introductory statistics course.

SDS 324E. Elements of Regression Analysis.

Explore the use of regression analysis in applied research and learn about multiple linear regression; ANOVA; logistic regression; random and mixed-effects models; and models for dependent data. Engage in the identification of appropriate statistical methods and interpretation of software output. R programming is introduced. Three lecture hours a week for one semester. Statistics and Data Sciences 324E and 332 may not both be counted. Prerequisite: Statistics and Data Sciences 302F and Statistics and Data Sciences 322E or Statistics and Data Sciences 320E.

SDS 325H. Honors Statistics.

An introduction to the fundamental theories, concepts, and methods of statistics. Emphasizes probability models, exploratory data analysis, sampling distributions, confidence intervals, hypothesis testing, correlation and regression, and the use of statistical software. Three lecture hours a week for one semester. Statistics and Data Sciences 325H and Statistics and Scientific Computation 325H may not both be counted. Prerequisite: Admission to the Dean's Scholars Honors Program in the College of Natural Sciences or consent of instructor.

SDS 326E. Elements of Statistical Machine Learning.

Explore basic concepts and tools in data science, statistics, and machine learning, including classification, resampling methods, model selection and regularization, and unsupervised methods (clustering and dimension reduction). Three lecture hours a week for one semester. Statistics and

Data Sciences 323 and 326E may not both be counted. Prerequisite: Statistics and Data Sciences 320E; or 321 and 322E

SDS 129S, 229S, 329S, 429S, 529S, 629S, 729S, 829S, 929S. Topics in Statistics and Data Sciences.

This course is used to record credit the student earns while enrolled at another institution in a program administered by the University's Study Abroad Office. Credit is recorded as assigned by the study abroad adviser in the Department of Statistics and Data Sciences. University credit is awarded for work in an exchange program; it may be counted as coursework taken in residence. Transfer credit is awarded for work in an affiliated studies program. May be repeated for credit when the topics vary.

SDS 431. Probability and Statistical Inference.

Introduction to probability and statistical inference. Examine events and random experiments; basic rules of probability; joint, conditional, and marginal probability and independence; discrete and continuous random variables; random sampling and estimation; large-sample theory results and central limit theorem-based inferential summaries; and maximum likelihood estimation. Three lecture hours and two laboratory hours a week for one semester. Statistics and Data Sciences 321 and 431 may not both be counted. Prerequisite: Statistics and Data Sciences 315 with a grade of at least C-; and credit with a grade of at least C- or registration for Mathematics 408D, 408L, or 408S.

SDS 334. Intermediate Statistical Methods.

Introduction to applied regression analysis. Explore estimation and inference in multiple regression models; logistic regression; regression for count data; time-to-event models; and case studies in regression modeling in published work, emphasizing both the use and limitations of regression modeling in advancing scientific knowledge. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 431 with a grade of at least C-; Mathematics 340L or 341 or Statistics and Data Sciences 329C with a grade of at least C-; and Computer Science 303E or 312 with a grade of at least C-.

SDS 336. Practical Machine Learning.

Introduction to machine learning for data science with an emphasis on Python programming. Explore comparing algorithm performance; decision-tree algorithms; classification algorithms; model averaging; unsupervised learning; and neural network. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 334 with a grade of at least C-; and Computer Science 327E with a grade of at least C-.

SDS 354. Advanced Statistical Methods.

Explore advanced methods in statistics and data science. Examine modeling data with multilevel (hierarchical) structure and causal inference, including design and analysis strategies. Discuss smoothing methods; spatial and time series models; additive models; and models for network data. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 334 with a grade of at least C-.

SDS 357. Case Studies in Data Science.

Explore advanced case studies in data science, with an emphasis on the full data analysis pipeline. Examine data collection, identification of data limitations; data privacy; data preparation and exploration; building, using, and evaluating models; creating data products; and communication and persuasion with data. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 334 with a grade of at least C-; credit with a grade of at least C- or registration for Statistics and Data Sciences 336.

SDS 364. Bayesian Statistics.

Introduction to the Bayesian approach for statistical inference. Explore prior, posterior, and predictive distributions: conjugate priors; informative and non-informative priors; models for normal, categorical, and count data; Bayesian computation, including MCMC and the Gibbs sampler; hierarchical models; and Bayesian model checking and model selection. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 431 or 321 with a grade of at least C-; Mathematics 340L or 341 or Statistics and Data Sciences 329C with a grade of at least C-; and credit with a grade of at least C- or registration for Statistics and Data Sciences 334.

SDS 366. Data Visualization.

Explore how to visualize data sets. Reason about, and communicate with, data visualizations. Three lecture hours a week for one semester. Statistics and Data Sciences 366 and 375 (Topic: Data Viz in R) may not both be counted. Prerequisite: Statistics and Data Sciences 320E; 322E; or 313 and 315.

SDS 368. Statistical Theory.

Introduction to the mathematical theory of statistics. Explore maximum likelihood estimation, confidence intervals, hypothesis tests and statistical decision theory, tail and concentration bounds, concentration of measure, and nonparametric statistics. The equivalent of three lecture hours a week for one semester. Prerequisite: Statistics and Data Sciences 431 with a grade of at least C-; Mathematics 340L or 341 or Statistics and Data Sciences 329C with a grade of at least C-; and credit with a grade of at least C- or registration for Statistics and Data Sciences 334; and a solid foundation in calculus, probability theory, and linear algebra.

SDS 374C. Parallel Computing for Science and Engineering.

Study of parallel computing principles, architectures, and technologies; and parallel application development, performance, and scalability. Designed to help prepare students to formulate and develop parallel algorithms to implement effective applications for parallel computing systems. Three lecture hours a week for one semester. Statistics and Data Sciences 374C and Statistics and Scientific Computation 374C may not both be counted. Prerequisite: Mathematics 408D or 408M, 340L, and prior programming experience using C or Fortran on Linux or Unix systems.

SDS 374E. Visualization and Data Analysis for Science and Engineering.

Scientific visualization principles, practices, and technologies, including remote and collaborative visualization. Introduces statistical analysis, data mining, and feature detection. Three lecture hours a week for one semester. Statistics and Data Sciences 374E and Statistics and Scientific Computation 374E may not both be counted. Prerequisite: Mathematics 408D or 408M, 340, and prior programming experience using C or Fortran on Linux or Unix systems.

SDS 375. Special Topics in Scientific Computation.

Three lecture hours a week for one semester. Statistics and Data Sciences 375 and Statistics and Scientific Computation 375 may not both be counted unless topics vary. May be repeated for credit when the topics vary. Prerequisite: Upper-division standing; additional prerequisites may vary with the topic.

SDS 378. Introduction to Mathematical Statistics.

Same as Mathematics 378K. Sampling distributions of statistics, estimation of parameters (confidence intervals, method of moments, maximum likelihood, comparison of estimators using mean square error and efficiency, sufficient statistics), hypothesis tests (p-values, power, likelihood ratio tests), and other topics. Three lecture hours a week for

one semester. Mathematics 378K and Statistics and Data Sciences 378 may not both be counted. Prerequisite: Mathematics 362K with a grade of at least C-.

SDS 378P. Decision Analytics.

Examine decision theory with utility functions, including the use of probability, optimization, constrained optimization, and linear algebra. Three lecture hours a week for one semester. Only one of the following may be counted: Mathematics 375T (Topic: Decision Analytics), 378P, Statistics and Data Sciences 378P. Prerequisite: Mathematics 362K and Mathematics 378K with a grade of at least C-, or consent of the instructor.

SDS 179R, 279R, 379R, 479R. Undergraduate Research.

Students work on an individual research project under the supervision of one or more faculty members. For each semester hour of credit earned, the equivalent of one lecture hour a week for one semester. May be repeated for credit. Prerequisite: Upper-division standing and consent of instructor.

Graduate Courses

SDS 380C. Statistical Methods I.

Introduction to the fundamental concepts and methods of statistics. Includes descriptive statistics, sampling distributions, confidence intervals, and hypothesis testing. May include simple and multiple linear regression, analysis of variance, and categorical analysis. Use of statistical software is emphasized. Three lecture hours a week for one semester. Statistics and Data Sciences 380C and Statistics and Scientific Computation 380C may not both be counted. Prerequisite: Graduate standing.

SDS 380D. Statistical Methods II.

Continuation of Statistics and Data Sciences 380C (or Statistics and Scientific Computation 380C). Surveys advanced statistical modeling and may include random and mixed effects models, time series analysis, survival analysis, Bayesian methods, and multivariate analysis of variance. Use of statistical software is emphasized. Three lecture hours a week for one semester. Statistics and Data Sciences 380D and Statistics and Scientific Computation 380D may not both be counted. Prerequisite: Graduate standing, and Statistics and Data Sciences 380C (or Statistics and Scientific Computation 380C) or the equivalent.

SDS 381M. Topics in Statistics and Data Science Foundations.

Examine core concepts of statistics and data science. Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing; Calculus, linear algebra, and introductory statistics course; or consent of instructor. Additional prerequisites vary with the topic.

SDS 383C. Statistical Modeling I.

Restricted to students in the PhD Statistics program. An introduction to core applied statistical modeling ideas from a probabilistic, Bayesian perspective. Topics include exploratory data analysis, programming in R, Bayesian probability models, an introduction to the Gibbs sampler, applied regression analysis, and hierarchical models. Three lecture hours a week for one semester. Only one of the following may be counted: Statistics and Data Sciences 391P (Topic 1), Statistics and Data Sciences 383C, Statistics and Scientific Computation 383C. Prerequisite: Graduate standing.

SDS 383D. Statistical Modeling II.

Use of structured, probabilistic models that incorporate multiple layers of uncertainty to describe real-world systems. Topics include multivariate normal distribution, mixture models, nonparametric Bayesian analysis,

advanced hierarchical models and latent-variable models, generalized linear models, and advanced topics in linear and nonlinear regression. Three lecture hours per week for one semester. Only one of the following may be counted: Statistics and Data Sciences 391P (Topic 2), Statistics and Data Sciences 383D, Statistics and Scientific Computation 383D. Prerequisite: Graduate standing; Economics 392M (Topic 19), Statistics and Data Sciences 384 (or Statistics and Scientific Computation 384), or the equivalent; and 383C (or Statistics and Scientific Computation 383C).

SDS 183K. Topics in Data Analysis Applications.

Introduction to the use of statistical or mathematical applications for data analysis. Two lecture hours a week for eight weeks. Statistics and Data Sciences 183K and Statistics and Scientific Computation 183K may not both be counted unless the topics vary. May be repeated for credit when the topics vary. Offered on the credit/no credit basis only. Prerequisite: Graduate standing.

SDS 384. Topics in Statistics and Probability.

Concepts of probability and mathematical statistics with applications in data analysis and research. Three lecture hours a week for one semester. Statistics and Data Sciences 384 and Statistics and Scientific Computation 384 may not both be counted unless topics vary. May be repeated for credit when the topics vary. Prerequisite: Graduate standing; and Statistics and Data Sciences 382 (or Statistics and Scientific Computation 382), an introductory probability course and a statistics course, or consent of instructor.

Topic 1: Applied Probability. Basic probability theory, combinatorial analysis of random phenomena, conditional probability and independence, parametric families of distributions, expectation, distribution of functions of random variables, and limit theorems. Statistics and Data Sciences 384 (Topic 1) and Statistics and Scientific Computation 384 (Topic 1) may not both be counted.

Topic 2: Mathematical Statistics I. Same as Computational Science, Engineering, and Mathematics 384R and Mathematics 384C. The general theory of mathematical statistics. Includes distributions of functions of random variables, properties of a random sample, principles of data reduction, an overview of hierarchical models, decision theory, Bayesian statistics, and theoretical results relevant to point estimation, interval estimation, and hypothesis testing. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 384R, Mathematics 384C, Statistics and Data Sciences 384 (Topic 2). Additional prerequisite: Graduate standing; and Mathematics 362K and 378K, or consent of instructor.

Topic 3: Mathematical Statistics II. Same as Computational Science, Engineering, and Mathematics 384S and Mathematics 384D. Continuation of Computational Science, Engineering, and Mathematics 384R and Mathematics 384C. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 384S, Mathematics 384D, Statistics and Data Sciences 384 (Topic 3). Additional prerequisite: Graduate standing; Computational Science, Engineering, and Mathematics 384R, or Mathematics 384C; and Mathematics 362K and 378K, Statistics and Data Sciences 382, or consent of instructor.

Topic 4: Regression Analysis. Same as Computational Science, Engineering, and Mathematics 384T and Mathematics 384G. Simple and multiple linear regression, inference in regression, prediction of new observations, diagnosis and remedial measures, transformations, and model building. Emphasis on both understanding the theory and applying theory to analyze data. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 384T, Mathematics 384G, Statistics and Data Sciences 384 (Topic 4). Additional prerequisite:

Graduate standing; and Mathematics 362K and 378K, Statistics and Data Sciences 382, or consent of instructor.

Topic 6: Design and Analysis of Experiments. Same as Computational Science, Engineering, and Mathematics 384U and Mathematics 384E. Design and analysis of experiments, including one-way and two-way layouts; components of variance; factorial experiments; balanced incomplete block designs; crossed and nested classifications; fixed, random, and mixed models; and split plot designs. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 384U, Mathematics 384E, Statistics and Data Sciences 384 (Topic 6). Additional prerequisite: Graduate standing; and Mathematics 362K and 378K, Statistics and Data Sciences 382, or consent of instructor.

Topic 7: Bayesian Statistical Methods. Fundamentals of Bayesian inference in single-parameter and multi-parameter models for inference and decision making, including simulation of posterior distributions, Markov chain Monte Carlo methods, hierarchical models, and empirical Bayes models. Statistics and Data Sciences 384 (Topic 7) and Statistics and Scientific Computation 384 (Topic 7) may not both be counted.

Topic 8: Time Series Analysis. Introduction to statistical time series analysis. Includes autoregressive integrated moving average (ARIMA) and more general models, forecasting, spectral analysis, time domain regression, model identification, estimation of parameters, and diagnostic checking. Statistics and Data Sciences 384 (Topic 8) and Statistics and Scientific Computation 384 (Topic 8) may not both be counted. Additional prerequisite: Mathematics 384D.

Topic 9: Computational Statistics. Modern, computation intensive statistical methods, including simulation, optimization methods, Monte Carlo integration, maximum likelihood estimation and expectation-maximization parameter estimation, Markov chain Monte Carlo methods, resampling methods, and nonparametric density estimation. Statistics and Data Sciences 384 (Topic 9) and Statistics and Scientific Computation 384 (Topic 9) may not both be counted.

Topic 10: Stochastic Processes. Concepts and techniques of stochastic processes, with emphasis on the nature of change of variables with respect to time. Includes characterization, structural properties, and inference. Statistics and Data Sciences 384 (Topic 10) and Statistics and Scientific Computation 384 (Topic 10) may not both be counted.

Topic 11: Theoretical Statistics. Examination of asymptotic theory and empirical processes. The former would include minimax theory, Bernstein von Mises theorem, and Bayesian asymptotics. The latter, would include U statistics and robust estimation. Statistics and Data Sciences 391P (Topic 6) and 384 (Topic 11) may not both be counted. Additional prerequisite: Statistics and Data Sciences 384 (Topic 3) or the equivalent; and advanced probability.

SDS 385. Topics in Applied Statistics.

Theories, models, and methods for the analysis of quantitative data. Three lecture hours a week for one semester. Statistics and Data Sciences 385 and Statistics and Scientific Computation 385 may not both be counted unless topics vary. May be repeated for credit when the topics vary. Prerequisite: Graduate standing; and Statistics and Data Sciences 380C (or Statistics and Scientific Computation 380C), 382 (or Statistics and Scientific Computation 382), or consent of instructor.

SDS 386M. Topics in Statistics and Data Science Extensions.

Examine concepts of statistics and data science. Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing; Calculus, linear algebra, and introductory statistics course; or consent of instructor. Additional prerequisites vary with the topic.

Topic 1: Data Visualization. Statistics and Data Sciences 386M (Topic 1) and 395 (Topic: Data Viz in R) may not both be counted.

SDS 387. Linear Models.

An exploration of practical applications of the projection approach to linear models, building from a review of essential linear algebra concepts to the theory of linear models from a projection-based perspective. Introduction to Bayesian ideas. Additional topics include analysis of variance, generalized linear models, and variable selection techniques. Three lecture hours a week for one semester. Statistics and Data Sciences 387 and Statistics and Scientific Computation 387 may not both be counted. Prerequisite: Graduate standing; Economics 392M (Topic 19: Probability and Statistics), Statistics and Data Sciences 384 (or Statistics and Scientific Computation 384), or the equivalent; and basic coding skills in R, Matlab, or Stata.

SDS 189R, 289R, 389R, 489R. Graduate Research.

Individual research project supervised by one or more faculty members. For each semester hour of credit earned, the equivalent of one lecture hour a week for one semester. May be repeated for credit. Prerequisite: Graduate standing.

SDS 190. Readings in Statistics.

Faculty directed research seminar. Activities may vary, but will include readings of cutting-edge research papers, discussion of on-going student and faculty projects, and consulting projects. May be repeated for credit. Prerequisite: Graduate standing.

SDS 391P. Topics in Statistics and Data Science Foundations.

Restricted to students in the PhD statistics program. Examine advanced core concepts of statistics and data science. Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing. Additional prerequisites vary with the topic.

Topic 1: Advanced Statistical Modeling and Applications I. Only one of the following may be counted: Statistics and Data Sciences 391P (Topic 1), Statistics and Data Sciences 383C, Statistics and Scientific Computation 383C.

Topic 2: Advanced Statistical Modeling and Applications II. Examine the use of structured, probabilistic models that incorporate multiple layers of uncertainty to describe real-world systems. Analyze generalized linear models, Gaussian processes, advanced hierarchical models and latent-variable models, and advanced linear and nonlinear regression. Only one of the following may be counted: Statistics and Data Sciences 391P (Topic 2), Statistics and Data Sciences 383D, Statistics and Scientific Computation 383D. Additional prerequisite: Statistics and Data Sciences 383C or 381P.1; or consent of instructor.

Topic 3: Theory of the Linear Model. Explore the mathematical underpinnings and theory of linear regression modeling in likelihood and assumption-lean settings. Discuss linear algebra, regularization, asymptotic statistics, and minimax optimality.

Topic 4: Computational Inference. Examine computational methods for inference in statistical models. Explore inference methods, their properties, and their applicability. Discuss deterministic and stochastic optimization, Monte Carlo methods, and variational inference. Three lecture hours a week for one semester. Statistics and Data Sciences 391P (Topic 4) and 386D may not both be counted. Additional prerequisite: Statistics and Data Sciences 391P (Topic 1) or 383D or consent of instructor.

Topic 5: Concepts in Mathematical Statistics. Examine key concepts and ideas behind the mathematics associated with statistical procedures. Analyze derivations of well-known practices, such as point estimation, uncertainty quantification, hypothesis testing,

nonparametric methods, and the analysis of various types of models, and their asymptotic properties.

Topic 6: Theoretical Statistics and Machine Learning. Examine concentration inequalities and asymptotic theory. Explore Hoeffding, Chernoff, Bernstein, Martingale-based methods, the Efron-Stein inequality, the Gaussian Lipschitz theorem, U statistics, uniform laws of large numbers, VC dimension, covering and packing. Practice high-dimensional covariance estimation and resampling. Statistics and Data Sciences 391P (Topic 6) and 384 (Topic 11) may not both be counted. Additional prerequisite: Statistics and Data Sciences 391P (Topic 5) or Statistics and Data Sciences 384 (Topic 3) or equivalent; or consent of instructor.

SDS 393C. Numerical Analysis: Linear Algebra.

Same as Computational Science, Engineering, and Mathematics 383C, Computer Science 383C, and Mathematics 383E. Survey of numerical methods in linear algebra: floating-point computation, solution of linear equations, least squares problems, algebraic eigenvalue problems. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 383C, Computer Science 383C, Mathematics 383E, Statistics and Data Sciences 393C. Prerequisite: Graduate standing; Computer Science 367 or Mathematics 368K; and Mathematics 340L, 341, or consent of instructor.

SDS 393D. Numerical Analysis: Interpolation, Approximation, Quadrature, and Differential Equations.

Same as Computational Science, Engineering, and Mathematics 383D, Computer Science 383D, and Mathematics 383F. Survey of numerical methods for interpolation, functional approximation, integration, and solution of differential equations. Three lecture hours a week for one semester. Only one of the following may be counted: Computational Science, Engineering, and Mathematics 383D, Computer Science 383D, Mathematics 383F, Statistics and Data Sciences 393D. Prerequisite: Graduate standing; Computational Science, Engineering, and Mathematics 383C, Computer Science 383C, Mathematics 383E, or Statistics and Data Sciences 393C; and Mathematics 427K and 365C, or consent of instructor.

SDS 396P. Topics in Statistics and Data Science Extensions.

Restricted to students in the PhD statistics program. Examine advanced concepts of statistics and data science. Three lecture hours a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing. Additional prerequisites vary with the topic.

Topic 1: Statistical Machine Learning Optimization. Introduction to machine learning and optimization methods from a statistical perspective with an emphasis on mathematical theory and applications. Three lecture hours a week for one semester. Statistics and Data Sciences 396P.1 and 384 (Topic: Stat Mach Learnng Optimization) may not both be counted.

SDS 398R. Master's Report.

Preparation of a report to fulfill the requirement for the master's degree under the report option. The equivalent of three lecture hours a week for one semester. Statistics and Data Sciences 398R and Statistics and Scientific Computation 398R may not both be counted. Offered on the credit/no credit basis only. Prerequisite: Graduate standing in statistics and data sciences, consent of supervising professor, and consent of graduate adviser.

SDS 398T. Supervised Teaching in Statistics and Data Sciences.

Supervised teaching experience; weekly group meetings, individual consultations, and reports. Three lecture hours a week for one semester. Statistics and Data Sciences 398T and Statistics and Scientific Computation 398T may not both be counted. Offered on the credit/no credit basis only. Prerequisite: Graduate standing and appointment as a teaching assistant.

SDS 399W, 699W, 999W. Dissertation.

Statistics and Data Sciences 399W, 699W, 999W and Statistics and Scientific Computation 399W, 699W, 999W may not both be counted. May be repeated for credit. Offered on the credit/no credit basis only. Prerequisite: Admission to candidacy for the doctoral degree.

Professional Courses