STATISTICS (STAT)

STAT 240 — DATA SCIENCE MODELING I
4 credits.

Introduces reproducible data management, modeling, analysis, and statistical inference through a practical, hands-on case studies approach. Topics include the use of an integrated statistical computing environment, data wrangling, the R programming language, data graphics and visualization, random variables and concepts of probability including the binomial and normal distributions, data modeling, statistical inference in one- and two- sample settings for proportions and means, simple linear regression, and report generation using R Markdown with applications to a wide variety of data to address open-ended questions.
Requisites: Satisfied Quantitative Reasoning (QR) A requirement
Course Designation: Gen Ed - Quantitative Reasoning Part B
Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 301 — INTRODUCTION TO STATISTICAL METHODS
3 credits.

Distributions, measures of central tendency, dispersion and shape, the normal distribution; experiments to compare means, standard errors, confidence intervals; effects of departure from assumption; method of least squares, regression, correlation, assumptions and limitations; basic ideas of experimental design.
Requisites: Satisfied Quantitative Reasoning (QR) A requirement. Not open to students with credit for STAT 302, 324, or 371
Course Designation: Gen Ed - Quantitative Reasoning Part B
Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 302 — ACCELERATED INTRODUCTION TO STATISTICAL METHODS
3 credits.

Graphical and numerical exploration of data; standard errors; distributions for statistical models including binomial, Poisson, normal; estimation; hypothesis testing; randomization tests; basic principles of experimental design; regression; ANOVA; categorical data analysis; goodness of fit; application.
Requisites: MATH 217, 221, or 275. Not open to students with credit for STAT 324 or 371
Course Designation: Gen Ed - Quantitative Reasoning Part B
Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2020

STAT 303 — R FOR STATISTICS I
1 credit.

An understanding of the commonly used statistical language R. Topics will include using R to manipulate data and perform exploratory data analysis.
Requisites: STAT 240, 301, 302, 312, 324, 371, MATH/STAT 310, ECON 310, GEN BUS 303, 304, 306, 307, PSYCH 210, SOC/ C&E SOC 360, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 304 — R FOR STATISTICS II
1 credit.

Provides an understanding of the commonly used statistical language R. Topics will include writing conditional expressions, loops, and functions; manipulating data matrices and arrays; extracting data from text; and making high level visualizations of data.
Requisites: STAT 303
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 305 — R FOR STATISTICS III
1 credit.

Provides an understanding of the commonly used statistical language R. Learn to combine R with high performance computing tools to do scientific computing.
Requisites: STAT 304
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/MATH 309 — INTRODUCTION TO PROBABILITY AND MATHEMATICAL STATISTICS I
3 credits.

Probability and combinatorial methods, discrete and continuous, univariate and multivariate distributions, expected values, moments, normal distribution and derived distributions, estimation.
Requisites: MATH 234, 376, or concurrent enrollment. Not open to students with credit for STAT/MATH 431 or STAT 311
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/MATH 310 – INTRODUCTION TO PROBABILITY AND MATHEMATICAL STATISTICS II
3 credits.

Mathematical statistical inference aims at providing an understanding of likelihood's central role to statistical inference, using the language of mathematical statistics to analyze statistical procedures, and using the computer as a tool for understanding statistics. Specific topics include: samples and populations, estimation, hypothesis testing, and theoretical properties of statistical inference.
Requisites: (STAT/MATH 309, STAT 311, STAT/MATH 431, or MATH 531) and (STAT 240, STAT 301, STAT 302, STAT 324, STAT 371, or ECON 310), or graduate/professional standing
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 311 – INTRODUCTION TO THEORY AND METHODS OF MATHEMATICAL STATISTICS I
3 credits.

Elements of probability, important discrete distributions, acceptance sampling by attributes, sample characteristics, probability distributions and population characteristics, the normal distribution, acceptance sampling plans based on sample means and variances, sampling from the normal, the central limit theorem, point and interval estimation.
Requisites: MATH 234, 376, or concurrent enrollment or graduate/professsional standing. Not open to students with credit for STAT/MATH 309 or STAT/MATH 431
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 312 – INTRODUCTION TO THEORY AND METHODS OF MATHEMATICAL STATISTICS II
3 credits.

Unbiased estimation, maximum likelihood estimation, confidence intervals, tests of hypotheses, Neyman-Pearson lemma, likelihood ratio test, regression, analysis of variance with applications.
Requisites: STAT/MATH 309, STAT 311, STAT/MATH 431, MATH 531, or graduate/professional standing
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 324 – INTRODUCTORY APPLIED STATISTICS FOR ENGINEERS
3 credits.

Descriptive statistics, probability concepts and distributions, random variables. Hypothesis tests and confidence intervals for one- and two-sample problems. Linear regression, model checking, and inference. Analysis of variance and basic ideas in experimental design.
Requisites: MATH 211, 217, 221, or 275. Not open to students with credit for STAT 302 or 371
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 327 – LEARNING A STATISTICAL LANGUAGE
1 credit.

Introduction to commonly used statistical languages. (Two such languages commonly used in our Department -- and others -- are R and SAS.) Modules will be offered at the introductory, intermediate and advanced levels. Repeatable with different titles.
Requisites: STAT 301, 302, 324, 371, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2019

STAT 333 – APPLIED REGRESSION ANALYSIS
3 credits.

An introduction to regression with emphasis on the practical aspects. Topics include: straight-line model, role of assumptions, residual analysis, transformations, multiple regression (with some use of matrix notation), multicollinearity, subset selection, and a brief introduction to mixed models.
Requisites: (STAT 240, 301, 302, 312, 324, or 371) and (STAT 327 or 303, or concurrent enrollment)
Course Designation: Gen Ed - Quantitative Reasoning Part B
Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 340 – DATA SCIENCE MODELING II
4 credits.

Teaches how to explore, model, and analyze data using R. Topics include basic probability models; the central limit theorem; Monte Carlo simulation; one- and two-sample hypothesis testing; Bayesian inference; linear and logistic regression; ANOVA; the bootstrap; random forests and cross-validation. Features the analysis of real-world data sets and the communication of findings in a clear and reproducible manner within a project setting.
Requisites: (MATH 211, 217, 221, or 275) and STAT 240
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 349 — INTRODUCTION TO TIME SERIES
3 credits.

Autocorrelation; stationarity and non-stationarity; heteroscedasticity; dynamic models; auto-regressive and moving average models; identification and fitting; forecasting; seasonal adjustment; applications for financial time series, social sciences and environmental studies.
Requisites: STAT 333, 340, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 351 — INTRODUCTORY NONPARAMETRIC STATISTICS
3 credits.

Distribution free statistical procedures or methods valid under nonrestrictive assumptions: basic tools; counting methods; order statistics, ranks, empirical distribution functions; distribution free tests and associated interval and point estimators; sign test; signed rank tests; rank tests; Mann Whitney Wilcoxon procedures; Kolmogorov Smirnov tests; permutation methods; kernel density estimation; kernel and spline regression estimation; computer techniques and programs; discussion and comparison with parametric methods.
Requisites: STAT 333, 340, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 360 — TOPICS IN STATISTICS STUDY ABROAD
1-3 credits.

Credit is awarded for students having completed an advanced statistics course in a study abroad program for which there is no direct equivalence to the statistics department course offerings. The study abroad course must be pre-approved by the statistics department. Enrollment in a UW–Madison resident study abroad program.
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions

STAT 371 — INTRODUCTORY APPLIED STATISTICS FOR THE LIFE SCIENCES
3 credits.

Introduction to modern statistical practice in the life sciences, using the R programming language. Topics include: exploratory data analysis, probability and random variables; one-sample testing and confidence intervals, role of assumptions, sample size determination, two-sample inference; basic ideas in experimental design, analysis of variance, linear regression, goodness-of fit; biological applications.
Requisites: (MATH 112 and placed out of MATH 113), (MATH 113 and placed out of MATH 112), (MATH 112 and 113), MATH 114, 171, 211 or 221 or placement in MATH 221. Not open to students with credit for STAT 302 or 324
Course Designation: Gen Ed - Quantitative Reasoning Part B
Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/COMP SCI 403 — INTERNSHIP COURSE IN COMP SCI AND DATA SCIENCE
1 credit.

Enables students with outside internships to earn academic credit connected to their work experience related to the Computer Sciences or Data Science programs.
Requisites: Consent of instructor
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, for 3 number of completions
Last Taught: Spring 2024

STAT 405 — DATA SCIENCE COMPUTING PROJECT
3 credits.

The development of tools necessary for collecting, managing, and analyzing large data sets. Examples of techniques and programs used include Linux, R, distributed computing, text editor(s), git/github, and other related tools. Work in teams to research, develop, write, and make presentations related to a variety of data analysis projects.
Requisites: (STAT 240 or 303) and (COMP SCI 200, 220, 300, or placement into COMP SCI 300), or graduate/professional standing
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 411 – AN INTRODUCTION TO SAMPLE SURVEY THEORY AND METHODS
3 credits.

An introduction to the methods used to design sample surveys and analyze the results. Topics covered include: basic tools, simple random sampling, ratio and regression estimation, stratification, systematic sampling, cluster (area) sampling, two-stage sampling, unequal probability sampling, non-sampling errors, and missing data. For illustration and clarification, examples are drawn from diverse areas of application.
Requisites: STAT 333, 340, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 421 – APPLIED CATEGORICAL DATA ANALYSIS
3 credits.

Analysis of multidimensional contingency tables, Poisson regression, and logistic regression, with emphasis on practical applications. Use of computer programs for such analyses. Model selection, testing goodness of fit, estimation of parameters, measures of association and methods for detecting sources of significance.
Requisites: STAT 333, 340, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2022

STAT/M E 424 – STATISTICAL EXPERIMENTAL DESIGN
3 credits.

Introduction to statistical design and analysis of experiments. Topics include: principles of randomization, blocking and replication, randomized blocking designs, Latin square designs, full factorial and fractional factorial designs and response surface methodology. Substantial focus will be devoted to engineering applications.
Requisites: STAT 240, 301, 302, 312, 324, 371, or MATH/STAT 310
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/MATH 431 – INTRODUCTION TO THE THEORY OF PROBABILITY
3 credits.

Topics covered include axioms of probability, random variables, the most important discrete and continuous probability distributions, expectation and variance, moment generating functions, conditional probability and conditional expectations, multivariate distributions, Markov's and Chebyshev's inequalities, laws of large numbers, and the central limit theorem.
Requisites: MATH 234 or 376 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 433 – DATA SCIENCE WITH R
3 credits.

Perform Data Science as an iterative (back and forth) process of four different types of activities (data collection, data wrangling, data analysis, communication). Traverse through the five requisite stances (scientist, coder, mathematician, methodologist, skeptic). Develop and hone a broad set of computational tools in R (but not the broadest) and a broad set of statistical/machine learning tools (but not the broadest). Focus on doing these with agility to make the coding "transparent" and serve the large goals of the project.
Requisites: (STAT 333 or 340) and (MATH 320, 340, 341, or 375), graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2022

STAT 436 – STATISTICAL DATA VISUALIZATION
3 credits.

Techniques for visualization within data science workflows. Topics include data preparation; exploratory data analysis; spatial, tabular, and graph structured data; dimensionality reduction; model visualization and interpretability; interactive queries and navigation.
Requisites: (STAT 240 or 303), graduate professional/standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 443 – CLASSIFICATION AND REGRESSION TREES
3 credits.

Introduction to algorithms and applications of classification and regression trees. Recursive partitioning, pruning, and cross-validation estimation of prediction error. Class priors and misclassification costs. Univariate and linear splits. Linear and kernel discriminant analysis and nearest-neighbor classification. Unbiased variable selection and importance scoring of variables. Least-squares, quantile, Poisson, logistic, and proportional hazards regression tree models. Tree ensembles. Subgroup identification of differential treatment effects. Multiple and longitudinal response variables. Missing values and multiple missing value codes. Comparisons with neural networks, support vector machines, and other methods. Bootstrap calibration and post-selection inference. Applications to business, social science, engineering, biology, medicine, and other fields.
Requisites: STAT 333, 340, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Either Social Science or Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2022

STAT 451 – INTRODUCTION TO MACHINE LEARNING AND STATISTICAL PATTERN CLASSIFICATION
3 credits.

Introduction to machine learning for pattern classification, regression analysis, clustering, and dimensionality reduction. For each category, fundamental algorithms, as well as selections of contemporary, current state-of-the-art algorithms, are being discussed. The evaluation of machine learning models using statistical methods is a particular focus of this course. Statistical pattern classification approaches, including maximum likelihood estimation and Bayesian decision theory, are compared and contrasted to algorithmic and nonparametric approaches. While fundamental mathematical concepts underlying machine learning and pattern classification algorithms are being taught, the practical use of machine learning algorithms using open source libraries from the Python programming ecosystem will be of equal focus in this course.
Requisites: MATH 320, 321, 340, 341, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 453 – INTRODUCTION TO DEEP LEARNING AND GENERATIVE MODELS
3 credits.

Deep learning is a field that specializes in discovering and extracting intricate structures in large, unstructured datasets for parameterizing artificial neural networks with many layers. Since deep learning has pushed the state-of-the-art in many research and application areas, it's become indispensable for modern technology. Focuses on a understanding deep, artificial neural networks by connecting it to related concepts in statistics. Beyond covering deep learning models for predictive modeling, focus on deep generative models. Besides explanations on a mathematical and conceptual level, emphasize the practical aspects of deep learning. Open-source computing provides hands-on experience for implementing deep neural nets, working on supervised learning tasks, and applying generative models for dataset synthesis.
Requisites: MATH 320, 321, 340, 341, graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 456 – APPLIED MULTIVARIATE ANALYSIS
3 credits.

Theory and applications of multivariate statistical methods. Basic concepts and statistical reasoning which underlie the techniques of multivariate analysis. Ideas rather than derivations stressed although basic models discussed to give the student some feeling for their adequacy in particular situations. Acquaintance with and use of existing computer programs in the multivariate analysis area.
Requisites: (STAT 333 or 340) and (MATH 320, 340, 341, or 375), graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 461 – FINANCIAL STATISTICS
3 credits.

Stochastic models and statistical methodologies are widely employed in modern finance. The models and their inferences are very important for academic research and financial practices. This course will cover the financial stochastic models and their statistical inferences with applications to volatility analysis and risk management. It will introduce discrete models such as binomial trees and GARCH and stochastic volatility models as well as simple continuous models like the Black-Scholes model. The main focus of the course will be on statistical inference, data analysis and risk management regarding these models.
Requisites: (STAT 333 or 340 or ECON 410) and (MATH/STAT 309, STAT 311, or MATH/STAT 431), graduate/professional standing, or declared in Statistics VISP
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/COMP SCI 471 — INTRODUCTION TO COMPUTATIONAL STATISTICS
3 credits.

Classical statistical procedures arise where closed-form mathematical expressions are available for various inference summaries (e.g. linear regression; analysis of variance). A major emphasis of modern statistics is the development of inference principles in cases where both more complex data structures are involved and where more elaborate computations are required. Topics from numerical linear algebra, optimization, Monte Carlo (including Markov chain Monte Carlo), and graph theory are developed, especially as they relate to statistical inference (e.g., bootstrapping, permutation, Bayesian inference, EM algorithm, multivariate analysis).
Requisites: STAT/MATH 310 and (STAT 333 or 340), graduate/professional standing, or declared in Statistics VISP
Course Designation: Breadth - Natural Science
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2020

STAT/COMP SCI/MATH 475 — INTRODUCTION TO COMBINATORICS
3 credits.

Problems of enumeration, distribution, and arrangement. Inclusion-exclusion principle. Generating functions and linear recurrence relations. Combinatorial identities. Graph coloring problems. Finite designs. Systems of distinct representatives and matching problems in graphs. Potential applications in the social, biological, and physical sciences. Puzzles. Problem solving.
Requisites: (MATH 320, 340, 341, or 375) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 479 — SPECIAL TOPICS IN STATISTICS
1-3 credits.

Special topics of interest in undergraduate students.
Requisites: None
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2023

STAT/COMP SCI/I SY E/MATH 525 — LINEAR OPTIMIZATION
3 credits.

Introduces optimization problems whose constraints are expressed by linear inequalities. Develops geometric and algebraic insights into the structure of the problem, with an emphasis on formal proofs. Presents the theory behind the simplex method, the main algorithm used to solve linear optimization problems. Explores duality theory and theorems of the alternatives.
Requisites: MATH 320, 340, 341, 375, or 443 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/B M I 541 — INTRODUCTION TO BIOSTATISTICS
3 credits.

Course designed for the biomedical researcher. Topics include: descriptive statistics, hypothesis testing, estimation, confidence intervals, t-tests, chi-squared tests, analysis of variance, linear regression, correlation, nonparametric tests, survival analysis and odds ratio. Biomedical applications used for each topic.
Requisites: Graduate/professional standing. Not open to students with credit for STAT 511 or POP HLTH/B M I 551
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/B M I 542 — INTRODUCTION TO CLINICAL TRIALS I
3 credits.

Intended for biomedical researchers interested in the design and analysis of clinical trials. Topics include definition of hypotheses, measures of effectiveness, sample size, randomization, data collection and monitoring, and issues in statistical analysis.
Requisites: B M I/STAT 541
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/F&W ECOL/HORT 571 — STATISTICAL METHODS FOR BIOSCIENCE I
4 credits.

Descriptive statistics, distributions, one- and two-sample normal inference, power, one-way ANOVA, simple linear regression, categorical data, non-parametric methods; underlying assumptions and diagnostic work.
Requisites: Graduate/professional standing
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/F&W ECOL/HORT 572 – STATISTICAL METHODS FOR BIOSCIENCE II
4 credits.

Polynomial regression, multiple regression, two-way ANOVA with and without interaction, split-plot design, subsampling, analysis of covariance, elementary sampling, introduction to bioassay.
Requisites: STAT/F&W ECOL/HORT 571
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 575 – STATISTICAL METHODS FOR SPATIAL DATA
3 credits.

Detecting, quantifying, and modeling spatial patterns and structure in data. Variograms and covariance functions, linear predictions with uncertainty qualification, and conditional simulations. Spectral domain models and spectral densities. Spatial point processes. Contemporary applications and Gaussian process model fitting at scale.
Requisites: (STAT 333 or 340) and (MATH 320, 340, 341, or 375), graduate/professional standing, or declared in Statistics VISP
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 601 – STATISTICAL METHODS I
4 credits.

Provides a thorough grounding in modern statistical methods. The specific learning outcomes for the course are to understand data collection in context (how/why data were collected, key questions under study); explore data by effective graphical and numerical summaries; understand probability concepts and models as tools for studying random phenomena and for statistical inference; analyze data using appropriate, modern statistical models, methods, and software; understand the statistical concepts underlying methods; develop the ability to interpret results and critically evaluate the methods used; communicate data analysis and key findings in context.
Requisites: Graduate/professional standing or declared in Statistics VISP
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 602 – STATISTICAL METHODS II
4 credits.

Provides a thorough grounding in modern statistical methods. The specific learning outcomes for the course are to understand data collection in context (how/why data were collected, key questions under study); explore data by effective graphical and numerical summaries; understand probability concepts and models as tools for studying random phenomena and for statistical inference; analyze data using appropriate, modern statistical models, methods, and software; understand the statistical concepts underlying methods; develop the ability to interpret results and critically evaluate the methods used; communicate data analysis and key findings in context.
Requisites: STAT 601
Repeatable for Credit: No
Last Taught: Spring 2022

STAT 605 – DATA SCIENCE COMPUTING PROJECT
3 credits.

The development of tools necessary for collecting, managing, and analyzing large data sets. Examples of techniques and programs utilized include Linux, R, distributed computing, powerful editor(s), git/github, and other related tools. Work in the class will be done in teams to research, develop, write, and make presentations related to a variety of data analysis projects.
Requisites: Declared in Statistics MS or Statistics VISP
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 606 – COMPUTING IN DATA SCIENCE AND STATISTICS
3 credits.

A survey of some of the tools and frameworks that are currently popular among data scientists and statisticians working in both academia and industry. Begins with an accelerated introduction to the Python programming language and brief introductions to object-oriented and functional programming. Covers some of the scientific computing platforms available in Python, including tools for numerical and scientific computing; training basic machine learning models; and data visualization. Discusses collecting data from the web both by scraping and using APIs. Concludes with a brief survey of distributed computing platforms, focusing on the MapReduce framework.
Requisites: Declared in Statistics MS or Statistics VISP (undergraduate)
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 609 — MATHEMATICAL STATISTICS I
3 credits.

Review of probability, random variables and vectors and their distributions, moments and inequalities, generating functions, transformations of random variables, sampling and distribution theory, convergence concepts for sequences of random variables, laws of large numbers, central limit and other limit theorems.
Requisites: Graduate/professional standing or declared in Statistics VISP
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2023

STAT 610 — INTRODUCTION TO STATISTICAL INFERENCE
4 credits.

Conditioning, distribution theory, approximation to distributions, modes of convergence, limit theorems, statistical models, parameter estimation, comparision of estimators, confidence sets, theory of hypothesis tests, introduction to Bayesian inference and nonparametric estimation.
Requisites: Graduate/professional standing or declared in Statistics VISP
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 611 — STATISTICAL MODELS FOR DATA SCIENCE
3 credits.

Probability, random variables and their distributions, joint and conditional distributions, moments and inequalities, generating functions, transformations of random variables, sampling and distribution theory, convergence concepts and limit theorems for sequences of random variables.
Requisites: Declared in Data Science MS or Data Engineering MS
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 612 — STATISTICAL INFERENCE FOR DATA SCIENCE
3 credits.

Statistical models, methods and theory for parameter estimation, Bayesian approach to parameter estimation, methods and theory for hypothesis tests, confidence sets, two-sample testing and ANOVA, categorical data analysis, linear regression.
Requisites: STAT 611
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 613 — STATISTICAL METHODS FOR DATA SCIENCE
3 credits.

Provides a thorough grounding in modern statistical methods. Introduces statistical techniques and methods of data analysis, including data description, linear regression models, diagnostic tools, prediction and model selection, and experimental design.
Requisites: Declared in Data Science MS or Data Engineering MS
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 615 — STATISTICAL LEARNING
3 credits.

The development of a variety of mathematical theories and statistical concepts (1) to understand the properties of those models and methods used for the purpose of prediction from data or decision making from data, and (2) to criticize such models, methods and their consequences. Specifically, the theories and tools that will be developed will include complexity theory, Hilbert spaces, Gaussian processes, Variational Analysis, and concentration inequalities.
Requisites: Declared in Statistics: Statistics and Data Science MS, Data Science MS, Data Engineering MS, or Statistics VISP
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 627 — PROFESSIONAL SKILLS IN DATA SCIENCE
1-3 credits.

Covers important aspects of professional development in statistics, including skills with internet tools, sophisticated use of statistical languages (such as R) and other emerging topics.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 628 — DATA SCIENCE PRACTICUM
1-3 credits.

Provides an understanding of and experience with turning statistics concepts into practice through data science practicums inspired by realistic projects. Combine theory and methods expertise with communications skills to translate from a vaguely stated project description and complex data set into a concisely summarized analysis, including both written and graphical interpretation that can be used by decision makers in an organization.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT/I SY E/MATH/OTM 632 – INTRODUCTION TO STOCHASTIC PROCESSES
3 credits.

Topics include discrete-time Markov chains, Poisson point processes, continuous-time Markov chains, and renewal processes. Applications to queueing, branching, and other models in science, engineering and business.
Requisites: (STAT/MATH 431, 309, STAT 311 or MATH 531) and (MATH 320, 340, 341, 375, 421 or 531) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/B M I 641 – STATISTICAL METHODS FOR CLINICAL TRIALS
3 credits.

Statistical issues in the design of clinical trials, basic survival analysis, data collection and sequential monitoring.
Requisites: STAT/MATH 310 or graduate/professional standing
Course Designation: Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/B M I 642 – STATISTICAL METHODS FOR EPIDEMIOLOGY
3 credits.

Methods for analysis of case-control, cross sectional, and cohort studies. Covers epidemiologic study design, measures of association, rates, classical contingency table methods, and logistic and Poisson regression.
Requisites: STAT/MATH 310 or graduate/professional standing
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023

STAT 678 – INTRODUCTION TO STATISTICAL CONSULTING
3 credits.

Develop statistical consulting skills to be able to communicate design and analysis to non-technical research collaborators. Provides a supportive environment to experiment with statistical consulting in practice, which will sometimes be uncomfortable and strange. Consulting problems typically do not have a "right" answer, and mistakes are encouraged. Take risks in sharing developing ideas in class. Connections with external organizations, such as the private sector and government agencies, will be made through possible internship experiences.
Requisites: Declared in Statistics MS
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 679 – SPECIAL TOPICS IN STATISTICS
1-3 credits.

Special topics in statistics at the master's level. Subject matter varies.
Requisites: Graduate/professional standing or declared in Statistics VISP
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 681 – SENIOR HONORS THESIS
3 credits.

Mentored individual study for students writing honors thesis, as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 682 – SENIOR HONORS THESIS
3 credits.

Mentored individual study for students writing honors thesis, as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 698 – DIRECTED STUDY
1-6 credits.

Directed study projects as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 699 – DIRECTED STUDY
1-6 credits.

Directed study projects as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 701 – APPLIED TIME SERIES ANALYSIS, FORECASTING AND CONTROL I
3 credits.

Theory and application of discrete time series models illustrated with forecasting problems. Principles of iterative model building. Representation of dynamic relations by difference equations. Autoregressive integrated Moving Average models. Identification, fitting, diagnostic checking of models. Seasonal model application to forecasting in business, economics, ecology, and engineering used at each stage, which the student analyzes using computer programs which have been specially written and extensively tested.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/MATH 709 – MATHEMATICAL STATISTICS
4 credits.

Introduction to measure theoretic probability; derivation and transformation of probability distributions; generating functions and characteristic functions; conditional expectation, sufficiency, and unbiased estimation; methods of large sample theory including laws of large numbers and central limit theorems; order statistics.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/MATH 710 – MATHEMATICAL STATISTICS
4 credits.

Estimation, efficiency, Neyman-Pearson theory of hypothesis testing, confidence regions, decision theory, analysis of variance, and distribution of quadratic forms.
Requisites: STAT/MATH 709
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/COMP SCI/I SY E/MATH 726 – NONLINEAR OPTIMIZATION I
3 credits.

Theory and algorithms for nonlinear optimization, focusing on unconstrained optimization. Line-search and trust-region methods; quasi-Newton methods; conjugate-gradient and limited-memory methods for large-scale problems; derivative-free optimization; algorithms for least-squares problems and nonlinear equations; gradient projection algorithms for bound-constrained problems; and simple penalty methods for nonlinearly constrained optimization. Students are strongly encouraged to have knowledge of linear algebra and familiarity with basic mathematical analysis.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/B M I 727 – THEORY AND METHODS OF LONGITUDINAL DATA ANALYSIS
3 credits.

Theory and methods of fundamental statistical models for the analysis of longitudinal data, including repeated measures analysis of variance, linear mixed models, generalized linear mixed models, and generalized estimating equations. Introduction of how to implement these methods in statistical softwares such as in R and/or SAS, within the context of appropriate statistical models and carry out and interpret analyses.
Requisites: STAT 610
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 732 – LARGE SAMPLE THEORY OF STATISTICAL INFERENCE
3 credits.

Stochastic modes of convergence. Asymptotic theory of normed sums of random variables with applications to asymptotic normality of estimators. Methods for deriving limit distributions of nonlinear statistics. Asymptotic relative efficiencies. Asymptotic confidence regions and tests of hypotheses. Models of non-identically distributed or dependent random variables.
Requisites: STAT 610 or MATH/STAT 709
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2020

STAT/MATH 733 – THEORY OF PROBABILITY I
3 credits.

An introduction to measure theoretic probability and stochastic processes.Topics include foundations, independence, zero-one laws, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, random walks, conditional expectations. Familiarity with basic measure theory (e.g. MATH 629 or 721) or concurrent registration in MATH 721 is strongly recommended.
Requisites: Graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2023

STAT/MATH 734 – THEORY OF PROBABILITY II
3 credits.

Possible topics include martingales, weak convergence of measures, introduction to Brownian motion.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT/B M I 741 — SURVIVAL ANALYSIS THEORY AND METHODS
3 credits.

Theory and practice of analytic methods for censored survival data, including nonparametric and parametric methods, the proportional hazards regression model, and a review of current topics in survival analysis.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 760 — MULTIVARIATE ANALYSIS I
3 credits.

Multivariate normal distribution, estimation of mean and covariance matrix; Wishart distribution; distribution of partial and multiple correlation coefficients; Hotelling's T-squared, principal components.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 761 — DECISION TREES FOR MULTIVARIATE ANALYSIS
3 credits.

Tree construction, including finding splits, tree-pruning and error estimation. Categorical predictor variables, missing or censored data, prior class-probabilities, and unequal misclassification costs. Selection bias. Comparison with other statistics and machine-learning methods. Extensions to piecewise linear and non-least squares regression models.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/B M I 768 — STATISTICAL METHODS FOR MEDICAL IMAGE ANALYSIS
3 credits.

Introduce key statistical methods and concepts for analyzing various medical images. Analyze publicly available and student/instructor supplied imaging data using the most up-to-date methods and tools.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023

STAT 771 — STATISTICAL COMPUTING
3 credits.

The design of statistical software including special techniques for probability distributions, methods of simulation of random processes, numerical methods for linear models and multivariate analysis, and methods for nonlinear models.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 772 — LINEAR RANDOMIZED ALGORITHMS FOR DATA SCIENCE
3 credits.

Introduce new algorithms that leverage randomization to address the scale, speed, and sensitivity needs of modern data science. Develop the mathematical foundations of such randomized algorithms. Criticize these algorithms through the lens of computational resource utilization. Implement these algorithms to address linear problems in data science.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/ECON/GEN BUS 775 — INTRODUCTION TO BAYESIAN DECISION AND CONTROL I
3 credits.

Common sampling models in business and economic problems, information from data, likelihood function of parameters, choices of models, Bayes' Theorem, subjective basis for probability, sequential nature of Bayesian inference, prior and posterior distributions of parameters in binomial, poisson, exponential and normal populations, comparison of two normal distributions, predictive distributions, decision theory, utility, risk aversion, extensive form of analysis, two-action problems, point estimation, best population problems, economics of sampling.
Requisites: STAT 609 or STAT/MATH 709
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 801 — ADVANCED FINANCIAL STATISTICS
3 credits.

Statistical theory and methodology for modern financial data. Topics include financial stochastic models based on time series and stochastic calculus, modern statistical inference, and statistical learning for financial data as well as their applications to financial problems.
Requisites: STAT 601 or 701
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

STAT/MATH 803 – EXPERIMENTAL DESIGN I
3 credits.

Summary of matrix algebra required, theory of estimable functions, incomplete blocks, balanced incomplete block designs, partially balanced incomplete block designs.
Requisites: Graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

STAT 809 – NON PARAMETRIC STATISTICS
3 credits.

Statistical procedures valid under unrestrictive assumptions; sign test; confidence intervals; efficiency comparisons; signed rank procedures; Walsh sums; point estimators; two sample rank tests; zeros, ties, and other problems of discrete data; order statistics; Winsorized and truncated point estimators and connection with gross error models; permutation procedures; combinatorial problems, and computer applications.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

STAT 811 – SAMPLE SURVEY THEORY AND METHOD
3 credits.

Simple random sampling; systematic sampling; probability sampling; stratified sampling; subsampling with units of equal and unequal size; double sampling; multi-stage and multi-phase sampling; ratio and regression estimates; model-based and model-assisted approaches; variance estimation; non-response.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

STAT/MATH 833 – TOPICS IN THE THEORY OF PROBABILITY
3 credits.

Advanced topics in probability and stochastic processes.
Requisites: Graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2023

STAT 834 – EMPIRICAL PROCESSES AND SEMIPARAMETRIC INFERENCE
1-3 credits.

Empirical process methods in statistics; semiparametric models; stochastic convergence in metric spaces; Glivenko-Cantelli and Donsker theorems; entropy calculations; bootstrapped empirical processes; functional delta method; Z-estimators; M-estimators; rates of convergence; semiparametric efficiency; semiparametric estimating equations; nonparametric maximum likelihood.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2019

STAT 840 – STATISTICAL MODEL BUILDING AND LEARNING
3 credits.

Theory of reproducing kernel Hilbert spaces in statistical model building; bounded linear functionals and represter theory; smoothing splines; ANOVA spines; degees of freedom for signal and the bias-variance tradeoff; Bayesian confidence intervals; model selection.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2015

STAT 841 – NONPARAMETRIC STATISTICS AND MACHINE LEARNING METHODS
3 credits.

Statistical function estimation and classification; reproducing kernel machines, support vector machines; high dimensional model selection and estimation; Bayesian, empirical Bayesian interpretation of nonparametric learning methods; log density ANOVA and graphical models; tree ensemble methods including bagging, boosting, and random forest.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2019

STAT 849 – THEORY AND APPLICATION OF REGRESSION AND ANALYSIS OF VARIANCE I
3 credits.

Theory and applications of the general linear model; graphical methods; simultaneous inference; regression diagnostics; analysis of variance of fixed, random and mixed effects models; ANCOVA: violations of assumptions.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT 850 — THEORY AND APPLICATION OF REGRESSION AND ANALYSIS OF VARIANCE II
3 credits.

Theory and applications of the general linear model; graphical methods; simultaneous inference; regression diagnostics; analysis of variance of fixed, random and mixed effects models; ANCOVA: violations of assumptions.
Requisites: STAT 849
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT 860 — ESTIMATION OF FUNCTIONS FROM DATA
3 credits.

Statistical and appoximation theoretic methods of estimating functions and values of functionals from experimental data; experimental design and data analysis problems that arise as problems in approximation theory; convergence theorems; ill-posed inverse problems; Banach and Hilbert space penalty functionals.
Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

STAT/COMP SCI/E C E 861 — THEORETICAL FOUNDATIONS OF MACHINE LEARNING
3 credits.

Advanced mathematical theory and methods of machine learning. Statistical learning theory, Vapnik-Chevronenkis Theory, model selection, high-dimensional models, nonparametric methods, probabilistic analysis, optimization, learning paradigms.
Requisites: E C E/COMP SCI 761 or E C E 830
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

STAT/B M I 877 — STATISTICAL METHODS FOR MOLECULAR BIOLOGY
3 credits.

Statistical and computational methods in statistical genomics for human and experimental populations. Review methods for quality control, experimental design, clustering, network analysis, and other downstream analysis of next-generation sequencing studies along with methods for genome wide association studies.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

STAT/E C E/MATH 888 — TOPICS IN MATHEMATICAL DATA SCIENCE
1-3 credits.

Advanced topics in the mathematical foundations of data science
Requisites: Graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2023

STAT 990 — RESEARCH
1-12 credits.

Independent research and writing for graduate students under the supervision of a faculty member.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 992 — SEMINAR
1-3 credits.

Special topics in statistics at the graduate level. Subject matter varies.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

STAT 998 — STATISTICAL CONSULTING
3 credits.

Consulting apprenticeship.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024