STATISTICS (STAT)

STAT 280 - ELEMENTARY APPLIED STATISTICS
Short Title: ELEMENTARY APPLIED STATISTICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group III
Credit Hours: 4
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Description: Topics include basic probability, descriptive statistics, probability distributions, confidence intervals, significance testing, simple linear regression and correlation, association between categorized variables.

STAT 281 - HISTORY OF NUMBERS AND GAMES OF CHANCE
Short Title: NUMBER HISTORY/GAMES OF CHANCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Lower-Level
Description: Starting with the colorful history of numbers, we discover their use to characterize chance or luck through probability; students will participate in one major project and submit a report-application areas include physics, computer science, sports, finance, etc. The course is accessible to sophomores and juniors in science, engineering or business. Cross-list: COMP 281, ELEC 281.

STAT 305 - INTRODUCTION TO STATISTICS FOR BIOSCIENCES
Short Title: INTRO TO STAT FOR BIOSCIENCES
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group III
Credit Hours: 4
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): MATH 101 and MATH 102
Description: An introduction to statistics for Biosciences with emphasis on statistical models and data analysis techniques. Computer-assisted data analysis and examples, are explored in laboratory sessions. Topics include descriptive statistics, correlation and regression, categorical data analysis, statistical inference through confidence intervals and significance testing, rates, and proportions. Real-world examples are emphasized. Recommended Prerequisite(s): MATH 212.

STAT 310 - PROBABILITY AND STATISTICS
Short Title: PROBABILITY & STATISTICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): MATH 102
Description: Probability and the central concepts and methods of statistics including probability, distributions of random variables, expectation, sampling distributions, estimation, confidence intervals, and hypothesis testing. Cross-list: ECON 307. Recommended prerequisite(s): MATH 212.

STAT 312 - PROBABILITY & STATISTICS FOR ENGINEERS
Short Title: PROB & STAT FOR ENGINEERS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): MATH 102
Description: Probability and the central concepts and methods of statistics including probability, distributions of random variables, expectation, sampling distributions, estimation, confidence intervals, and hypothesis testing. Examples are predominantly from civil and environmental engineering. Recommended Prerequisite(s): MATH 212.

STAT 313 - UNCERTAINTY AND RISK IN URBAN INFRASTRUCTURES
Short Title: UNCERT & RISK IN URBAN INFRAST
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 312 or STAT 310 or ECON 307 or ECON 382 or STAT 331 or ELEC 331
Description: Practical applications and relevance of infrastructure risk are developed in the context of real engineering problems and phenomena, including unique systems and challenges of the gulf coast area. The course starts with a survey of the roles of probability in engineering and focuses on computer-based methods, the Bayesian approach, risk analysis tools, and infrastructure safety. Cross-list: CEVE 313. Repeatable for Credit.
STAT 376 - ECONOMETRICS
Short Title: ECONOMETRICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (ECON 209 or ECON 309 or ECON 446) and (ECON 308 or ECON 401 or ECON 477)
Description: Survey of estimation and forecasting models. Includes multiple regression time series analysis. A good understanding of linear algebra is highly desirable.
Cross-list: ECON 310. Mutually Exclusive: Credit cannot be earned for STAT 376 and ECON 409/STAT 400.

STAT 385 - METHODS OF DATA ANALYSIS AND SYSTEM OPTIMIZATION
Short Title: METHODS FOR DATA ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group III
Credit Hours: 4
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 280 or STAT 305 or STAT 310 or ECON 307 or STAT 312
Description: The three general topic areas covered in this methodology oriented course are statistical methods including regression, sampling, and experimental design; simulation based methods in statistics, queuing and inventory problems; and an introduction to optimization methods.
Excel will serve as the basic computing software.

STAT 405 - R FOR DATA SCIENCE
Short Title: R FOR DATA SCIENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 305 or STAT 312 or (STAT 310 or ECON 307 or ECON 382) or STAT 385
Description: Students will learn how to work through data science problems within the statistical programming language R. The course covers the complete analytical process, from getting your data into R, to applying appropriate exploratory and statistical analysis, and communicating the results. Important topics in data science (e.g. databases, web scraping, and big data) and efficient programming are integrated throughout the course. Graduate/Undergraduate Equivalency: STAT 605. Mutually Exclusive: Credit cannot be earned for STAT 405 and STAT 605.

STAT 410 - LINEAR REGRESSION
Short Title: LINEAR REGRESSION
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 4
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 310 or STAT 312 or ECON 307 or ECON 382
Description: An introduction to linear regression and its applications. Topics include simple and multiple linear regression, least squares, analysis of variance, model selection, diagnostics, remedial measures. Applications to real data using statistical software are emphasized.
Recommended Prerequisite(s): CAAM 335 or MATH 355.

STAT 411 - ADVANCED STATISTICAL METHODS
Short Title: ADVANCED STATISTICAL METHODS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (STAT 310 or STAT 312 or ECON 307 or ECON 382) and (STAT 410 or STAT 615)
Description: Advanced topics in statistical applications such as sampling, experimental design and statistical process control. STAT 411 will have assignments and examinations focusing more on basic concepts than on theoretical methods. Graduate/Undergraduate Equivalency: STAT 616.
Mutually Exclusive: Credit cannot be earned for STAT 411 and STAT 616.

STAT 413 - INTRODUCTION TO STATISTICAL MACHINE LEARNING
Short Title: INTRO TO STAT MACHINE LEARNING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 410 and STAT 405 or CAAM 210 or COMP 140 or COMP 130
Description: This course is an introduction to concepts, methods, and best practices in statistical machine learning. Topics covered include regularized regression, classification, kernels, dimension reduction, clustering, trees, and ensemble learning. Emphasis will be placed on applied data analysis and computation. Recommended Prerequisite(s): STAT 411 and CAAM 335 or MATH 354 or MATH 355.
STAT 415 - DATA SCIENCE CONSULTING
Short Title: DATA SCIENCE CONSULTING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 405 or COMP 140 or CAAM 210
Description: Students in this course will advise clients from across this Rice community in a data science consulting clinic, learn best practices in consulting, and gain exposure to a variety of real data science problems. Instructor Permission Required. Graduate/Undergraduate Equivalency: STAT 515. Recommended Prerequisite(s): STAT 413 or COMP 440 or COMP 540 or COMP 330 or STAT 411. Mutually Exclusive: Credit cannot be earned for STAT 415 and STAT 515. Repeatable for Credit.

STAT 418 - PROBABILITY
Short Title: PROBABILITY
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: Topics include random variables, distributions, transformations, moment generating functions, common families of distributions, independence, sampling distributions, and basic stochastic processes. STAT 418 will have assignments and examinations focusing more on basic concepts than on theoretical methods. Graduate/Undergraduate Equivalency: STAT 518. Mutually Exclusive: Credit cannot be earned for STAT 418 and STAT 518.

STAT 419 - STATISTICAL INFERENCE
Short Title: STATISTICAL INFERENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (MATH 354 or MATH 355 or CAAM 335) and STAT 410
Description: Topics include principles of data reduction, point estimation, hypothesis testing, interval estimation, Bayesian inference, Decision Theory, inference foundations of analysis of variance and regression. STAT 419 will have assignments and examinations focusing more on basic concepts than on theoretical methods. Graduate/Undergraduate Equivalency: STAT 519. Mutually Exclusive: Credit cannot be earned for STAT 419 and STAT 519.

STAT 421 - APPLIED TIME SERIES AND FORECASTING
Short Title: APPLIED TIME SERIES/FORECASTING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 410
Description: Applied time series modeling and forecasting, with applications to financial markets. STAT 621 is a graduate version of STAT 421 with advanced assignments. Graduate/Undergraduate Equivalency: STAT 621. Recommended Prerequisite(s): STAT 410. Mutually Exclusive: Credit cannot be earned for STAT 421 and STAT 621.

STAT 423 - PROBABILITY IN BIOINFORMATICS AND GENETICS
Short Title: PROB BIOINFORMATICS & GENETICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 310 or STAT 312 or STAT 418
Description: Course introduces the student to modern biotechnology and genomic data. Statistical methods to analyze genomic data are covered, including probability models, basic stochastic processes, and statistical modeling. Biological topics include DNA sequence analysis, phylogenetic inference, gene finding, and molecular evolution. Graduate/Undergraduate Equivalency: STAT 623. Mutually Exclusive: Credit cannot be earned for STAT 423 and STAT 623.

STAT 425 - INTRODUCTION TO BAYESIAN INFERENCE
Short Title: INTRO TO BAYESIAN INFERENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 410 and STAT 405 or COMP 210 or COMP 140 or COMP 130
Description: This course is an introduction to Bayesian inference, with emphasis on concepts and methods for analyzing data. We will consider a variety of models, including MCMC algorithms and methods for linear regression and hierarchical models. Computational methods will be emphasized. Recommended Prerequisite(s): STAT 411 or CAAM 335 or MATH 355.
STAT 440 - STATISTICS FOR BIOENGINEERING  
**Short Title:** STATISTICS FOR BIOENGINEERING  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hour:** 1  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** BIOE 252 (may be taken concurrently)  
**Description:** Course covers application of statistics to bioengineering. Topics include descriptive statistics, estimation, hypothesis testing, ANOVA, and regression. Offered first five weeks of the semester. BIOE 252 may be taken concurrently with STAT 440. BIOE 440/STAT 440 and BIOE 439 cannot both be taken for credit. Cross-list: BIOE 440. Mutually Exclusive: Credit cannot be earned for STAT 440 and BIOE 439.

STAT 449 - QUANTITATIVE FINANCIAL RISK MANAGEMENT  
**Short Title:** QUANT FINANCIAL RISK MANAGEMENT  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** MATH 211 and MATH 212 and (ECON 400 or STAT 400 or ECON 409 or STAT 410) or STAT 310 or ECON 307 or STAT 312 or STAT 331 or ELEC 331  
**Description:** This course covers the use of financial securities and derivatives to take or hedge financial risk positions. Most commonly used instruments, from simple forwards and futures to exotic options and swaptions are covered. The pricing of derivatives securities will also be studied, but the emphasis will be on the mechanics and uses of financial engineering methods. STAT 449 is mutually exclusive to ECON 449. Credit cannot be given for both. Graduate/Undergraduate Equivalency: STAT 649. Mutually Exclusive: Credit cannot be earned for STAT 449 and ECON 449.

STAT 450 - SENIOR CAPSTONE PROJECT  
**Short Title:** SENIOR CAPSTONE PROJECT  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 1-3  
**Restrictions:** Enrollment limited to students with a class of Senior. Enrollment is limited to students with a major in Statistics. Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Description:** Students engage in individual or team-oriented statistical projects to solve problems motivated by theory, computation, or application to real problems and data. Typical projects involve statistical modeling, data analysis, and computing to answer substantive questions in engineering or the physical, biological, or social sciences. Participants attend regular seminars addressing project development, research techniques and effective written and verbal communication skills in presenting statistical results. Repeatable for Credit.

STAT 453 - BIOSTATISTICS  
**Short Title:** BIOSTATISTICS  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** STAT 410  
**Description:** An overview of statistical methodologies useful in the practice of Biostatistics. Topics include epidemiology, rates, and proportions, categorical data analysis, regression, and logistic regression, retrospective studies, case-control studies, survival analysis. Real biomedical applications serve as context for evaluating assumptions of statistical methods and models. R serves as the computing software. Graduate/Undergraduate Equivalency: STAT 553. Mutually Exclusive: Credit cannot be earned for STAT 453 and STAT 553.

STAT 470 - FROM SEQUENCE TO STRUCTURE: AN INTRODUCTION TO COMPUTATIONAL BIOLOGY  
**Short Title:** FROM SEQUENCE TO STRUCTURE  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 4  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Description:** Contemporary introduction to problems in computational biology spanning sequence to structure. The course has three modules: the first introduces students to the design and statistical analysis of gene expression studies; the second covers statistical machine learning techniques for understanding experimental data generated in computational biology; and the third introduces problems in the modeling of protein structure using computational methods from robotics. The course is project oriented with an emphasis on computation and problem-solving. Cross-list: BIOE 470, COMP 470. Recommended Prerequisite(s): COMP 280 and (STAT 310 or STAT 331).

STAT 482 - QUANTITATIVE FINANCIAL ANALYTICS  
**Short Title:** QUANT FINANCIAL ANALYTICS  
**Department:** Statistics  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** COMP 280 and (STAT 310 or STAT 331).  
**Description:** A modern approach to fundamental analytics of securities, the classic works of Graham and Dodd. Deconstructing the Efficient Market Hypothesis Financial Statement Analysis, Capital Market Theory, CAPM, APT, Fama-French Empirical Financial Forecasting. Graduate/Undergraduate Equivalency: STAT 682. Mutually Exclusive: Credit cannot be earned for STAT 482 and STAT 682.
STAT 484 - ENVIRONMENTAL RISK ASSESSMENT & HUMAN HEALTH
Short Title: ENVIRON RISK ASSESS&HUMAN HLTH
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 305 or STAT 385
Description: Learn and apply quantitative risk assessment methodology to estimate human health risk from environmental exposure to contamination in air, soil and water. Students will conduct a series of team projects focused on toxicology, risk based screening levels, exposure concentration estimation and risk characterization. Cross-list: CEVE 484. Graduate/Undergraduate Equivalency: STAT 684. Mutually Exclusive: Credit cannot be earned for STAT 484 and STAT 684.

STAT 485 - ENVIRONMENTAL STATISTICS AND DECISION MAKING
Short Title: ENVIR STAT & DECISION MAKING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 305 or STAT 385
Description: A project oriented computer intensive course focusing on statistical and mathematical solutions and investigations for the purpose of environmental decisions. This course is the undergraduate version of STAT 685 with reduced requirements. Graduate/Undergraduate Equivalency: STAT 685. Recommended Prerequisite(s): STAT 305 and STAT 385. Mutually Exclusive: Credit cannot be earned for STAT 485 and STAT 685.

STAT 486 - MARKET MODELS
Short Title: MARKET MODELS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): STAT 310 or ECON 307 or ECON 382 or STAT 312
Description: This course takes the classical efficient market models and superimposes upon it models for other stochastic phenomena not generally accounted for in efficient market theory, showing how risk is lessened by portfolios and other mechanisms. This undergraduate course uses computer simulations as an alternative to closed form solutions. Graduate/Undergraduate Equivalency: STAT 686. Mutually Exclusive: Credit cannot be earned for STAT 486 and STAT 686.
Course URL: statistics.rice.edu/feed/Courses.aspx

STAT 491 - INDEPENDENT STUDY
Short Title: INDEPENDENT STUDY
Department: Statistics
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hours: 1-6
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: Repeatable for Credit.

STAT 492 - STATISTICS PRACTICUM
Short Title: STATISTICS PRACTICUM
Department: Statistics
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Internship/Practicum
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Statistics.
Course Level: Undergraduate Upper-Level
Description: Designed for undergraduate statistics majors. The course is to provide experience in real world applications and practice in statistics. An off-campus internship is required. Instructor Permission Required. Repeatable for Credit.

STAT 496 - RTG CROSS-TRAINING IN DATA SCIENCE
Short Title: RTG CROSS-TRAINING IN DATA SCI
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Computer Science or Statistics. Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: A seminar course to introduce students to topics in Data Science at the interface between Statistics and Computer Science. Students participate in the process of preparing, delivering and critiquing talks. Topics change each semester. Instructor Permission Required. Cross-list: COMP 496. Graduate/Undergraduate Equivalency: STAT 696. Mutually Exclusive: Credit cannot be earned for STAT 496 and STAT 696. Repeatable for Credit.

STAT 498 - RESEARCH THEMES IN THE MATHEMATICAL SCIENCES
Short Title: RESEARCH THEMES IN MATH. SCI.
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 1-3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: A seminar course that will cover selected theme of general research in the mathematical sciences from the perspectives of mathematics, computational and applied mathematics and statistics. The course may be repeated multiple times for credit. Cross-list: CAAM 498, MATH 498. Graduate/Undergraduate Equivalency: STAT 698. Mutually Exclusive: Credit cannot be earned for STAT 498 and STAT 698. Repeatable for Credit.
STAT 499 - MATHEMATICAL SCIENCES SEMINAR
Short Title: MATHEMATICAL SCIENCES
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 1-3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: This course prepares a student for research in the mathematical sciences. Topics will change each semester. Current topics include bioinformatics, biomathematics, computational finance, simulation, driven optimization, and data simulation. Each semester may introduce new topics. Graduate/Undergraduate Equivalency: STAT 699. Repeatable for Credit.
Course URL: www.statistics.rice.edu

STAT 502 - NEURAL MACHINE LEARNING I
Short Title: NEURAL MACHINE LEARNING I
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review of major neural machine learning (Artificial Neural Network) paradigms. Analytical discussion of supervised and unsupervised neural learning algorithms and their relation to information theoretical methods. Practical applications to data analysis such as pattern recognition, clustering, classification, function approximation/regression, non-linear PCA, projection pursuit, independent component analysis, with lots of examples from image and digital processing. Details are posted at www.ece.rice.edu/~erzsebet/ANNcourse.html. Cross-list: COMP 502, ELEC 502.
Course URL: www.ece.rice.edu/~erzsebet/ANNcourse.html

STAT 503 - TOPICS IN METHODS AND DATA ANALYSIS
Short Title: TOPICS METHODS & DATA ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Applications of least squares and general linear mode. Cross-list: POLI 503.

STAT 509 - ADVANCED PSYCHOLOGICAL STATISTICS I
Short Title: ADVANCED PSYC STATISTICS I
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment limited to students with a class of Graduate. Enrollment is limited to graduate level students.
Course Level: Graduate
Description: Introduction to inferential statistics, with emphasis on analysis of variance. Students who do not meet registration requirements as Graduate and Psychology Majors must receive instructor permission to register. Cross-list: PSYC 502.

STAT 510 - ADVANCED PSYCHOLOGICAL STATISTICS II
Short Title: ADVANCED PSYC STATISTICS II
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment limited to students with a class of Graduate. Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): PSYC 502 or STAT 509
Description: A continuation of PSYC 502, focusing on multiple regression. Other multivariate techniques and distribution-free statistics are also covered. Cross-list: PSYC 503.

STAT 514 - INTRODUCTION TO BIOSTATISTICS
Short Title: INTRODUCTION TO BIOSTATISTICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to students with a major in Bioengineering. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Presents basic and advanced methods of statistics as applied to problems in bioengineering. Demonstrates techniques for data organization, exploration, and presentation. Foundations of statistical estimation, inference, and testing are reviewed. Optimal planning of experiments is explored. Advanced techniques include multiple regression, variable selection, logistic regression, analysis of variance, survival analysis, multiple measurements and measurements over time. Additional topics, such as Bayesian methods, will be discussed as time allows. Labs will use the statistical software JMP and/or R. Cross-list: BIOE 514.

STAT 515 - DATA SCIENCE CONSULTING
Short Title: DATA SCIENCE CONSULTING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Students in this course will advise clients from across this Rice community in a data science consulting clinic, learn best practices in consulting, and gain exposure to a variety of real data science problems. Instructor Permission Required. Graduate/Undergraduate Equivalency: STAT 415. Recommended Prerequisite(s): STAT 413 or COMP 440 or COMP 540 or COMP 330 or STAT 411. Mutually Exclusive: Credit cannot be earned for STAT 515 and STAT 415. Repeatable for Credit.
STAT 519 - STATISTICAL INFERENCE
Short Title: STATISTICAL INFERENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Topics include principles of data reduction, point estimation, hypothesis testing, interval estimation, Bayesian inference, Decision Theory, inference foundations of analysis of variance and regression. STAT 519 will have more advanced assignments and examinations focusing on theoretical methods. Graduate/Undergraduate Equivalency. STAT 418. Mutually Exclusive: Credit cannot be earned for STAT 518 and STAT 418.

STAT 532 - FOUNDATIONS OF STATISTICAL INFERENCE I
Short Title: FOUNDATIONS OF STAT INF I
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519
Description: The first semester in a two-semester sequence in mathematical statistics: random variables, distributions, small and large sample theorems of decision theory and Bayesian methods, hypothesis testing, point estimation, and confidence intervals; topics such as exponential families, univariate and multivariate linear models, and nonparametric inference will also be discussed. Required for graduate students in statistics.

STAT 533 - FOUNDATIONS OF STATISTICAL INFERENCE II
Short Title: FOUNDATIONS OF STAT INF II
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 532
Description: A continuation of STAT 532. Required for Ph.D. students in statistics.

STAT 540 - INTERNSHIP IN STATISTICAL MODELING
Short Title: PRACTICUM IN STAT & DATA SCI
Department: Statistics
Grade Mode: Standard Letter
Course Type: Internship/Practicum
Credit Hours: 1-2
Restrictions: Enrollment is limited to students with a major in Statistics. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Designed for graduate students in statistics. This course introduces current theoretical and applied problems encountered in statistical practice through practical internships. Students will be required to complete a paid or unpaid off-campus internship. MSTAT students will be required to submit a written, 10-15 page report/document summarizing the statistical experience developed during the internship, as well documenting how the internship was instrumental to the Master’s in Statistical course of study. Repeatable for Credit.

STAT 541 - MULTIVARIATE ANALYSIS
Short Title: MULTIVARIATE ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 410 or STAT 615
Description: Study of multivariate data analysis and theory. Topics include normal theory, principal components, factor analysis, discrimination, estimation and hypothesis testing, multivariate analysis of variance and regression clustering.
STAT 542 - SIMULATION
Short Title: SIMULATION
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519 and (STAT 615 or STAT 410)
Description: Topics in stochastic simulation including; random number generators, Monte Carlo methods, resampling methods, Markov Chain Monte Carlo, importance sampling and simulation based estimation for stochastic processes.
Course URL: statistics.rice.edu/feed/Courses.aspx

STAT 545 - GLM & CATEG'ICAL DATA ANALYSIS
Short Title: GLM & CATEG'L DATA ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519 or STAT 615 or STAT 410
Description: Contingency tables, association parameters, chi-squared tests, general theory of generalized linear models, logistics regression, loglinear models, poisson regression.

STAT 547 - SURVIVAL ANALYSIS
Short Title: SURVIVAL ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519 and STAT 615
Description: Lifetime tables, cumulative distribution theory, censored data, Kaplan-Meier survival curves, log-rank tests, Cox proportional hazards models, parametric and non parametric estimation, hypothesis testing.

STAT 549 - FUNCTIONAL DATA ANALYSIS
Short Title: FUNCTIONAL DATA ANALYSIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 533 and STAT 581
Description: Statistical methods for functional data; spaces of functions; pre-processing of functional data; probability models for functional data; basis representations including spline functions, orthogonal bases such as wavelets, and functional principal components; methods of inference for functional data including both frequentist and Bayesian methods.

STAT 550 - NONPARAMETRIC FUNCTION ESTIMATION
Short Title: NONPARAMETRIC FUNCTION EST
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Survey of topics in data analysis including data visualization, multivariate density estimation, and nonparametric regression. Advanced applications will include clustering, discrimination, dimension reduction, and bump-hunting using nonparametric density procedures.

STAT 551 - ADVANCED TOPICS IN TIME SERIES
Short Title: ADVANCED TOPICS IN TIME SERIES
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 552 or STAT 621 or STAT 622
Description: The course will cover current topics in both modeling and forecasting discrete and continuous time series. A brief coverage will also be given to spatial and spatial-temporal processes.

STAT 552 - APPLIED STOCHASTIC PROCESSES
Course Level: Graduate
Restrictions: Enrollment is limited to Graduate level students.
Prerequisite(s): STAT 518
Description: This course covers the theory of some of the most frequently used stochastic processes in application; discrete and continuous time, Markov chains, Poisson and renewal processes, and Brownian motion.

STAT 553 - BIOSTATISTICS
Course Level: Graduate
Restrictions: Enrollment is limited to Graduate level students.
Prerequisite(s): STAT 552 or STAT 621 or STAT 622
Description: Same as STAT 453 with advanced problem sets. Graduate/Undergraduate Equivalency: STAT 453. Mutually Exclusive: Credit cannot be earned for STAT 553 and STAT 453.

STAT 581 - MATHEMATICAL PROBABILITY I
Course Level: Graduate
Restrictions: Enrollment is limited to Graduate level students.
Prerequisite(s): STAT 615
STAT 582 - MATHEMATICAL PROBABILITY II
Short Title: MATHEMATICAL PROBABILITY II
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 581
Description: Review of basic probability; Sequences of random variables; Random vectors and estimation; Basic concepts of random processes; Random processes in linear systems, expansions of random processes; Wiener filtering; Spectral representation of random processes, and white-noise integrals. Cross-list: CAAM 583, ELEC 533.

STAT 583 - INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS
Short Title: INTRO RANDOM PROCESSES & APPL
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Course Level: Graduate
Prerequisite(s): STAT 581
Description: Continuation of STAT 581.

STAT 590 - INDEPENDENT STUDY
Short Title: INDEPENDENT STUDY
Department: Statistics
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hours: 1-15
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

STAT 591 - INDEPENDENT STUDY
Short Title: INDEPENDENT STUDY
Department: Statistics
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hours: 1-6
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

STAT 600 - GRADUATE SEMINAR IN STATISTICS
Short Title: GRADUATE SEMINAR IN STATISTICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Statistics. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Students participate in the process of researching professional literature (journal articles, book chapters, dissertations), preparing, delivering and critiquing talks. Literature topics change each semester. Repeatable for Credit.

STAT 601 - STATISTICS COLLOQUIUM
Short Title: STATISTICS COLLOQUIUM
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

STAT 602 - NEURAL MACHINE LEARNING AND DATA MINING II
Short Title: NEURAL MACHINE LEARNING II
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): ELEC 502 or COMP 502 or STAT 502
Description: Advanced topics in ANN theories, with a focus on learning high-dimensional complex manifolds with neural maps (Self-Organizing Maps, Learning Vector Quantizers and variants). Application to data mining, clustering, classification, dimension reduction, sparse representation. The course will be a mix of lectures and seminar discussions with active student participation, based on most recent research publications. Students will have access to professional software environment to implement theories. Cross-list: COMP 602, ELEC 602. Repeatable for Credit.
Course URL: www.ece.rice.edu/~erzsebet/NMLcourseII.html

STAT 604 - COMPUTATIONAL ECONOMICS
Short Title: COMPUTATIONAL ECONOMICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment limited to students with a class of Graduate. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course covers numerical methods most commonly used in Economics, including solving systems of equations, numerical optimization, stochastic dynamic programming, numerical differentiation and integration, monte carlo methods, and solving ordinary and partial differential equations. Cross-list: ECON 504.

STAT 605 - R FOR DATA SCIENCE
Short Title: R FOR DATA SCIENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Students will learn how to work through data science problems within the statistical programming language R. The course covers the complete analytical process, from getting your data into R, to applying appropriate exploratory and statistical analysis, and communicating the results. Important topics in data science (e.g. databases, web scraping, and big data) and efficient programming are integrated throughout the course. STAT 605 includes more advanced assignments and/or examinations than STAT 405. Graduate/Undergraduate Equivalency: STAT 405. Mutually Exclusive: Credit cannot be earned for STAT 605 and STAT 405.
STAT 606 - SAS STATISTICAL PROGRAMMING
Short Title: SAS STATISTICAL PROGRAMMING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course will cover the following: (1) DATA step including arrays, merging, do-loop processing, if then else statements, set statements importing and exporting, space optimization, (2) PROC TABULATE and PROC REPORT, (3) Brief functions survey, e.g. random number generators, character and mathematical functions, time and data functions etc., (4) Formats, (5) Brief survey of statistical PROC's, (6) SAS ODS (Output Delivery System) from statistical procedures, (7) Output datasets from statistical procedures, (8) PROC GRAPH and Statistical Graphics Procedures (SGPLOT, SGPANEL, SGSCATTER), (9) PROC SQL (includes built-in short course on basic SQL), (10) PROC IML including functions, subroutines and optimization etc., (11) Macro programming facility. Priority registration is given to STAT majors.

STAT 610 - ECONOMETRICS I
Short Title: ECONOMETRICS I
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Estimation and inference in single equation regression models, multicollinearity, autocorrelated and heteroskedastic disturbances, distributed lags, asymptotic theory, and maximum likelihood techniques. Emphasis is placed on the ability to analyze critically the literature. Cross-list: ECON 510.

STAT 611 - ECONOMETRICS II
Short Title: ECONOMETRICS II
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment limited to students with a class of Graduate. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Topics in linear and nonlinear simultaneous equations estimation, including qualitative and categorical dependent variables models and duration analysis. Applied exercises use SAS and the Wharton Quarterly Econometric Model. Cross-list: ECON 511.

STAT 613 - STATISTICAL MACHINE LEARNING
Short Title: STAT MACHINE LEARNING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course is an advanced survey of statistical machine learning theory and methods. Emphasis will be placed methodological, theoretical, and computational aspects of tools such as regularized regression, classification, kernels, dimension reduction, clustering, graphical models, trees, and ensemble learning. Recommended Prerequisite(s): STAT 615 and STAT 605 and STAT 519.

STAT 615 - REGRESSION AND LINEAR MODELS
Short Title: REGRESSION AND LINEAR MODELS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): (STAT 310 or STAT 312 or ECON 307 or ECON 382) and (MATH 355 or CAAM 335)
Description: A survey of regression, linear models, and experimental design. Topics include simple and multiple linear regression, single- and multi-factor studies, analysis of variance, analysis of covariance, model selection, diagnostics. Data analysis using statistical software is emphasized.
Course URL: ece.rice.edu/~erzsebet/STAT615.html

STAT 616 - ADVANCED STATISTICAL METHODS
Short Title: ADVANCED STATISTICAL METHODS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 615
Description: Advanced topics in statistical applications such as sampling, experimental design and statistical process control. STAT 616 will have more advanced assignments and examinations focusing on theoretical methods. Graduate/Undergraduate Equivalency: STAT 411. Mutually Exclusive: Credit cannot be earned for STAT 616 and STAT 411.

STAT 620 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Seminar on advanced topics in Statistics. Repeatable for Credit.

STAT 621 - APPLIED TIME SERIES AND FORECASTING
Short Title: APPLIED TIME SERIES/FORECASTING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 615 (may be taken concurrently)
Description: Applied time series modeling and forecasting, with applications to financial markets with advanced problem sets. This is a graduate version of STAT 421 with advanced assignments. The courses STAT 615 and STAT 431 may be taken concurrently with STAT 621 if courses are not in history. Graduate/Undergraduate Equivalency: STAT 421. Mutually Exclusive: Credit cannot be earned for STAT 621 and STAT 421.
writing up the results of a clinical trial for publication.

options; interim monitoring; adaptive designs; multiple end points; and
protocol writing; randomization; sample size calculation; study design
knowledge and/or satisfy optimality considerations. Topics include
will introduce newer designs for clinical studies that incorporate prior
literature critically and to design clinical studies. Additionally, the faculty
(phase III). The goal is to prepare the student to read the clinical trial
to screening studies (phase II) to randomized comparative studies
of clinical studies, ranging from early dose-finding studies (phase I)
Description:
Prerequisite(s):
Course Level:
Restrictions:
Credit Hours:
Course Type:
Grade Mode:
Department:
Short Title:
STAT 630 - TOPICS IN CLINICAL TRIALS
Short Title: TOPICS IN CLINICAL TRIALS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519 and STAT 615
Description: This course deals with fundamental concepts in the design
of clinical studies, ranging from early dose-finding studies (phase I)
to screening studies (phase II) to randomized comparative studies
(phase III). The goal is to prepare the student to read the clinical trial
literature critically and to design clinical studies. Additionally, the faculty
will introduce newer designs for clinical studies that incorporate prior
knowledge and/or satisfy optimality considerations. Topics include
protocol writing; randomization; sample size calculation; study design
options; interim monitoring; adaptive designs; multiple end points; and
writing up the results of a clinical trial for publication.

STAT 648 - GRAPHICAL MODELS AND NETWORKS
Short Title: GRAPH MODELS & NETWORKS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519
Description: Graphical models – aka Bayes networks, Markov networks,
Gaussian networks, etc. – have been widely used to represent complex
phenomena with dependence. The course aims to stimulate interest in
graphical models and covers directed and undirected graphical models,
exponential-family representations of graphical models, statistical
inference, finite-sample and large-sample properties, and applications.

STAT 649 - QUANTITATIVE FINANCIAL RISK MANAGEMENT
Short Title: QUAN FINANCIAL RISK MANAGEMENT
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 519 or STAT 615
Description: This course covers the use of financial securities and
derivatives to take or hedge financial risk positions. Most commonly used
instruments, from simple forwards and futures to exotic options and
swaptions are covered. The pricing of derivatives securities will also be
studied, but the emphasis will be on the mechanics and uses of financial
ingering methods. Students receiving graduate credit in STAT 649 will
be expected to address additional homework and test questions targeting
a graduate level understanding of the material. Graduate/Undergraduate
Equivalency: STAT 449.

STAT 650 - STOCHASTIC MODELS IN POPULATION DYNAMICS AND
POPULATION GENETICS
Short Title: STOCH CONTRL & STOCH DIFF EQU
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 581
Description: This course is devoted to stochastic models of biological
phenomena at cell and molecular level, using tools of probability
and statistics. The course starts with a refresher on conditional
expectations and martingale convergence, Markov and point processes,
and generating functions and functionals. It continues with branching
process models of proliferations and then with Markov chain models
of population genetics. Most examples concern growth and mutation of
biological cells, with particular emphasis on cancer.

STAT 623 - PROBABILITY IN BIOINFORMATICS AND GENETICS
Short Title: PROB BIOINFORMATICS & GENETICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 305 or STAT 310 or STAT 331
Description: Course introduces the student to modern biotechnology
and genomic data. Statistical methods to analyze genomic data are
covered, including probability models, basic stochastic processes, and
statistical modeling. Biological topics include DNA sequence analysis,
phylogenetic inference, gene finding, and molecular evolution. Graduate/
Undergraduate Equivalency: STAT 423. Mutually Exclusive: Credit cannot
be earned for STAT 623 and STAT 423.

STAT 625 - ADVANCED BAYESIAN INFERENCE
Short Title: ADVANCED BAYESIAN INFERENCE
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 525
Description: This course focuses on the Bayesian inference with
emphasis on theory and applications. In this course, we will cover
advancements and challenges in modern Bayesian inference, and
illustrate a variety of theoretical and computational methods, simulation
techniques, and hierarchical models that are suitable to analyze complex
data. Repeatable for Credit.

STAT 650 - STOCHASTIC MODELS IN POPULATION DYNAMICS AND
POPULATION GENETICS
Short Title: STOCH CONTRL & STOCH DIFF EQU
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 581
Description: This course is devoted to stochastic models of biological
phenomena at cell and molecular level, using tools of probability
and statistics. The course starts with a refresher on conditional
expectations and martingale convergence, Markov and point processes,
and generating functions and functionals. It continues with branching
process models of proliferations and then with Markov chain models
of population genetics. Most examples concern growth and mutation of
biological cells, with particular emphasis on cancer.
STAT 682 - QUANTITATIVE FINANCIAL ANALYTICS
Short Title: QUANT FINANCIAL ANALYTICS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: A modern approach to fundamental analytics of securities, the classic works of Graham and Dodd. Deconstructing the Efficient Market Hypothesis Financial Statement Analysis, Capital Market Theory, CAPM, APT, Fama-French Empirical Financial Forecasting. Graduate/Undergraduate Equivalency: STAT 482. Mutually Exclusive: Credit cannot be earned for STAT 682 and STAT 482.

STAT 684 - ENVIRONMENTAL RISK ASSESSMENT & HUMAN HEALTH
Short Title: ENVIRON RISK ASSESS&HUMAN HLTH
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 280 or STAT 305
Description: Learn and apply quantitative risk assessment methodology to estimate human health risk from environmental exposure to contamination in air, soil and water. Students will conduct a series of team projects focused on toxicology, risk based screening levels, exposure concentration estimation and risk characterization. Cross-list: CEVE 684. Graduate/Undergraduate Equivalency: STAT 484. Mutually Exclusive: Credit cannot be earned for STAT 684 and STAT 484.

STAT 685 - ENVIRONMENTAL STATISTICS AND DECISION MAKING
Short Title: ENVIR STAT & DECISION MAKING
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 305 or STAT 385
Description: A project oriented computer intensive course focusing on statistical and mathematical solutions and investigations for the purpose of environmental decisions. This course is required for EADM students. Graduate/Undergraduate Equivalency: STAT 485. Mutually Exclusive: Credit cannot be earned for STAT 685 and STAT 485.

STAT 686 - MARKET MODELS
Short Title: MARKET MODELS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): STAT 518 and (STAT 615 or STAT 410)
Description: This course takes the classical efficient market models and superimposes upon it models for other stochastic phenomena not generally accounted for in efficient market theory, showing how risk is lessened by portfolios and other mechanisms. This graduate course uses computer simulations as an alternative to closed form solutions with advanced problem sets. Graduate/Undergraduate Equivalency: STAT 486. Mutually Exclusive: Credit cannot be earned for STAT 686 and STAT 486.

STAT 696 - RTG CROSS-TRAINING IN DATA SCIENCE
Short Title: RTG CROSS-TRAINING IN DATA SCI
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Computer Science or Statistics. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: A seminar course to introduce students to topics in Data Science at the interface between Statistics and Computer Science. Students participate in the process of preparing, delivering and critiquing talks. Topics change each semester. Instructor Permission Required. Cross-list: COMP 696. Graduate/Undergraduate Equivalency: STAT 496. Mutually Exclusive: Credit cannot be earned for STAT 696 and STAT 496. Repeatable for Credit.

STAT 698 - RESEARCH THEMES IN THE MATHEMATICAL SCIENCES
Short Title: RESEARCH THEMES IN MATH. SCI.
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 1-3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: A seminar course that will cover selected theme of general research in the mathematical sciences from the perspectives of mathematics, computational and applied mathematics and statistics. The course may be repeated multiple times for credit. Cross-list: CAAM 698, MATH 698. Graduate/Undergraduate Equivalency: STAT 498. Mutually Exclusive: Credit cannot be earned for STAT 698 and STAT 498. Repeatable for Credit.
STAT 699 - MATHEMATICAL SCIENCES SEMINAR
Short Title: MATHEMATICAL SCIENCES
Department: Statistics
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 1-3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course prepares a student for research in the mathematical sciences on a specific topic. Each section is dedicated to a different topic. Current topics include bioinformatics, biomathematics, computational finance, simulation driven optimization, and data simulation. The topics change each semester. Graduate/Undergraduate Equivalency: STAT 499. Repeatable for Credit.
Course URL: www.statistics.rice.edu

STAT 800 - THESIS
Short Title: THESIS
Department: Statistics
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 1-15
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.