The University of Connecticut  
Department of Statistics  
Graduate Program

Founded in 1963, the Department is one of the major statistics departments in the Northeast and has national and international recognition in both teaching and research. Core faculty have research interests in major areas of probability and statistics, spanning virtually all modern areas of statistical applications.

Graduate education has been a traditional strength of the Department with over 50 Ph.D. and 108 M.S. degrees awarded in the last 10 years. The graduate program balances theory, methods and applications, including a solid foundation in mathematical statistics, probability theory, statistical methodology and modeling, data analysis, and computational statistics. Elective courses are regularly given in active areas of research with emphasis on modern and model based statistical methodology.

Graduates of the program promptly move into attractive positions in academics, government, and industry, specific areas including biology, medicine, business, economics, engineering, and the social sciences.

Programs of Study

The Department of Statistics offers work leading to the M.S. and Ph.D. degrees. Both programs include training in statistical application and in theory, and both give students sufficient flexibility to pursue their special interests and time to take courses in other departments.

The M.S. program in Statistics requires 8-10 courses, depending on the student’s undergraduate record. While completing the M.S. degree within a year is possible, most students take three or four semesters. The core courses include mathematical statistics, linear models, design of experiments, and applied statistics. Students are encouraged to become involved in the statistical consulting work done by members of the department.

M.S. program with Biostatistics concentration requires 10 courses, of which six of the core courses are the same as in our M.S. program in Statistics, four of the other include Introduction to Biostatistics, Clinical Trials, Survival Analysis and one elective course, which should be a biostatistics related course such as bioinformatics, epidemiology or genetics, chosen with the approval of the major advisor.

The doctoral program emphasizes development of the ability to create new results in statistical methods, statistical theory, and probability. The course work typically consists of at least sixteen courses beyond the bachelor’s degree, including mathematical statistics, linear models, statistical inference, applied statistics, real analysis, and probability. After completing the necessary course work and a sequence of examinations, the Ph.D. candidate must write a dissertation providing an original contribution to the field of statistics or probability. The dissertation may be predominantly the development of novel statistical methodology for an area of application.

Research Facilities

The Department is housed in the College of Liberal Arts and Sciences Building. The Department has a teaching computer lab and a research computer lab. Recently, the Department has installed in the research lab three Intel-based Linux workstations dedicated to large scale numerical computing and statistical simulation. It has also received a SCREMS grant from the National Science Foundation with matching support from the
College and the University. With the funding, the Department has replaced all the PCs in the research lab with 15 new Dell OptiPlex double dual-cores PCs with Windows XP operating systems. Within the next year, the Department will also use the funding to purchase a Linux based computer cluster with 30 or more computing nodes, each with double quad-cores. With these changes, the computing facilities of the Department that are accessible to the graduate students, the visiting scholars, and the faculty members are operated by Windows XP or Linux operating systems.

The Department has transferred all its email, web and file sharing services to an Intel-based Linux server named MERLOT, which is a Dell PowerEdge 2550 rack mounted server with dual 3 GHz Xeon processors and a RAID disk array.

A large software base is now available in either the PCs or the Linux workstations in both labs, which includes SAS, S-Plus, SPSS, GLIM, MINITAB, Mathematica, Maple, IMSL (FORTRAN and C), R, WinBUGS, as well as other packages and languages.

The Department's computers are managed and maintained by four lab managers: one Linux quarter time operations manager (Tim Ruggerieri), one PC quarter time operations manager from the office of the Dean of the College of Liberal Arts and Sciences, one student Linux cluster manager, and one student Webmaster. The computer management team maintains, installs, and upgrades the operating systems and software, and provides the service of weekly tape-backing up as well as daily trouble-shooting of system problems.

Financial Aid

Graduate teaching and research assistantship and fellowship-assistantship combinations are available (to qualified students in the Ph.D. program) covering tuition and health benefits and pay a stipend between $19,300 and $22,600 for the academic year 2012-2013. Some internships and financial aid are available in the summer. Students with full aid generally take three courses a semester. Those with a fellowship-assistantship may take four courses. Outstanding students may be awarded University predoctoral fellowships. Advanced students are considered for research assistantship.

Cost of Study/Living and Housing Costs

Please refer to the Graduate School website for information on tuition and housing.
http://www.grad.uconn.edu/tuition.html

Student Group

There are roughly 100 graduate students in the department, approximately 60 working for the M.S. degree and 40 for the Ph.D. degree. The department has been granting 7-9 Ph.D. degrees a year. All graduate students and faculty have office space within the departmental area, creating an open, informal environment. Of the 28 Ph.D. recipients in the last five years, 8 have academic tenure track positions, 3 in the government and
17 are in industry. The M.S. recipients have positions with the government, industry and business, and academic research centers. As predicted by the National Science Foundation, employment opportunities for persons with degrees in statistics continue to be excellent.

**Location**

The University of Connecticut’s main campus is in northeastern Connecticut, 25 miles from Hartford, in an attractive rural area. It is about 1-1/2 hours by car from Boston and 3 hours from New York City.

**The University**

The University of Connecticut, which celebrated its centennial in 1981, is the state of Connecticut’s land-grant institution. It has about 30,000 students, including more than 8,000 in graduate study. Its substantial, but not overwhelming, size allows the University to offer a broad curriculum and an excellent program of concerts, plays, and other cultural events.

The Department of Statistics was founded in 1963. Its faculty members conduct an active and prolific research program in which students are involved as soon as possible.

**Application**

Most of our students come from undergraduate mathematics or statistics majors. Persons with degrees in fields other than statistics and mathematics are encouraged to apply. While there are no official course requirements for admission to the M.S. program, a level of mathematical sophistication is necessary for acceptable progress. In our experience, at the minimum, this amounts to three semesters of calculus and one semester of linear algebra. Course work to remedy deficiencies can be taken while in the program.

Admission to the Graduate School normally requires an undergraduate cumulative grade point average of 3.0 or higher out of 4.0, either for the entire undergraduate career or last two years of undergraduate study or its equivalent. An outstanding final undergraduate year can earn regular graduate status.

All applicants are required to submit Graduate Record Examinations (GRE) general test scores taken within five years from the date of application. With regard to the GRE scores, we consider applicants with a verbal score above median and a quantitative score ranked in the top twenty five percent for financial support. Also, note especially the need for scores on the TOEFL (or IELTS) taken within 2 years from the date of application. These are essential before your application can be considered. A minimum score of 550 for the paper-based TOEFL, 213 for the computer-based TOEFL or 80 for the internet-based TOEFL is necessary for admission to The University of Connecticut. A minimum score of 6.5 of IELTS may be used to substitute for TOEFL. While the fall application deadline is June 1 (April 1 for international applicants), financial aid decisions are usually made in March. A completed application by February 1 is required for consideration of financial aid. Only students admitted to the Ph.D. program will be considered for financial aid.

Application for Graduate School can be found at the Graduate School website (http://www.grad.uconn.edu) or by contacting the Graduate Admissions Office, 438 Whitney Road, Ext. Unit 1016, Storrs, CT 06269-1006; telephone: 860-486-3617; fax: 860-486-6739.
The Faculty and their Research

Haim Bar, Assistant Professor.

Richard Bass, Professor, (joint with the Department of Mathematics). Probability Theory, PDE, Harmonic Analysis.

Joseph C. Cappelleri, Pfizer, Inc., Global Research and Development. Adjunct Faculty. Meta Analysis, Psychometry and Epidemiology.

Kun Chen, Assistant Professor.

Ming-Hui Chen, Professor. Bayesian Statistical Methodology, Bayesian Computation, Bayesian Phylogenetics, Categorical Data Analysis, Design of Bayesian Clinical Trials, DNA Microarray Data Analysis, Meta-analysis, Missing Data Analysis (EM, MCEM, and Bayesian), Monte Carlo Methodology, Prior Elicitation, Statistical Methodology and Analysis for Prostate Cancer Data, Statistical Modeling, Survival Data Analysis, and Variable Selection.

Zhiyi Chi, Professor, Associate Department Head and Director of Graduate Studies. Applied Probability, Stochastic Processes, Large Deviations.

Dipak K. Dey, Board of Trustees Distinguished Professor and Associate Dean, CLAS. Bayesian Modeling, Categorical Data Analysis, Computational Statistics, Decision Theory, Econometrics, Environmetrics, Multivariate Analysis, Psychometry, Reliability and Survival Analysis, Spatial Statistics, Statistical Genetics, Statistical Image and Shape Analysis.


Joseph Glaz, Professor and Department Head. Applied probability, geometrical probability, probability approximations, probability inequalities, parametric bootstrap, sequential analysis, simultaneous inference.


Kent Holsinger, Professor (joint with the Department of Ecology and Evolutionary Biology). Statistical Genetics.

Sangwook Kang, Assistant Professor. Survival Analysis, Biostatistics, Design and Analysis of Epidemiological Studies, Statistics in Sports.
Lynn Kuo, Professor. Bioinformatics and Biostatistics, Bayesian Computation, Survival Analysis, Nonparametric Bayesian Statistics, Software Reliability, Longitudinal Data Analysis, Survey Sampling.

Suman Majumdar, Associate Professor (Stamford Campus). Metrization of Weak Convergence, posterior asymptotics, psychometry, inference in SDEs.

Nitis Mukhopadhyay, Professor. Applied Probability, Clinical Trial, Environmental Sampling, Multiple Comparisons, Multivariate Analysis, Selection and Ranking, Sequential Analysis, Simultaneous Inference.

Vladimir Pozdnyakov, Associate Professor (Hartford Campus) and Director of Graduate Admissions. Limit Theorems, Sequential Analysis, Mathematical Finance, Occurrence of Patterns.


Nalini Ravishanker, Professor and Director of Undergraduate Program. Time Series modeling; Times-to-events Analysis; Inference for Stable Processes; Signal Processing; Simultaneous Inference Procedures; Statistical Methods in Actuarial Science, Marketing, Environmental Engineering and Transportation Engineering.

Elizabeth Schifano, Assistant Professor. Biostatistics, Statistical Genomics, High-dimensional Data Analysis, Variable Selection.

Alexander Tartakovsky, Assistant Professor

Richard A. Vitale, Professor. Convex-geometric methods in probability and statistics, stochastic geometry, inequalities.

Stephen Walsh, UConn Health Center, Adjunct Faculty. Biostatistics, assessment of diagnostic tests, clinical trials.


Recent Faculty Publications

Richard Bass


Ming-Hui Chen


Zhiyi Chi


Dipak K. Dey


Evarist Giné


Joseph Glaz


Ofer Harel


Sangwook Kang


Lynn Kuo


Suman Majumdar


Nitis Mukhopadhyay


Vladimir Pozdnyakov


Nalini Ravishanker


Elizabeth Schifano


Richard A. Vitale


Jun Yan


Published Books

Ming-Hui Chen


Dipak K. Dey


Joseph Glaz


Ofer Harel


Nitis Mukhopadhyay


Nalini Ravishanker

<table>
<thead>
<tr>
<th>Student</th>
<th>Dissertation</th>
<th>Current Affiliation</th>
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<tbody>
<tr>
<td>Yingmei Xi, 2008</td>
<td>New Development of Bayesian Mature Models for Survival and Survey Data</td>
<td>Averion International Corp. Massachusetts</td>
</tr>
<tr>
<td>Sourish Das, 2008</td>
<td>Generalized Linear Models and Beyond: An Innovative Approach from Bayesian Perspective</td>
<td>SAS Research &amp; Development Pune, India</td>
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<tr>
<td>Wangang Xie, 2009</td>
<td>Bayesian Phylogenetic Model Selection and Applications</td>
<td>Abbots Lab, Chicago</td>
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<tr>
<td>Yifang Zhao, 2009</td>
<td>Contributions to Microarray Data Analysis</td>
<td>SAS Research &amp; Development Pune, India</td>
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<tr>
<td>Xia Wang, 2009</td>
<td>Generalized Functions for Binary Response Data</td>
<td>NISS, North Carolina</td>
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<tr>
<td>Jian Zou, 2009</td>
<td>Volatility Estimation and Option Pricing</td>
<td>IUPUI, Indianapolis</td>
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<tr>
<td>Balaji Raman, 2009</td>
<td>On Gaussian HFM Framework for Eurodollar Futures</td>
<td>FinIQ Pune, India</td>
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<tr>
<td>Yuchen Fama, 2010</td>
<td>A Self-Exciting Switching Model</td>
<td>Travelers Insurance Hartford, CT</td>
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<tr>
<td>Sylvie Tchumtchoua, 2010</td>
<td>Bayesian Semiparametric Models for Discrete Longitudinal Data</td>
<td>SAMSI North Carolina</td>
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<tr>
<td>Jeff Stratton, 2011</td>
<td>Diagnostic Accuracy of a Binary Test in the Presence of Two Types of Missing Values</td>
<td>Dept. of Math &amp; Stat UMass Amherst</td>
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<tr>
<td>Marcos Prates, 2011</td>
<td>A General Class of Link Function with Application to Spatio and Spatio-Temporal Data</td>
<td>University of Campinas Sao Paulo, Brazil</td>
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<tr>
<td>Sandra Hurtado-Rua, 2011</td>
<td>A New Class of Bayesian Survival Models and Beyond</td>
<td>Dept. of Public Health, Biostat &amp; Epidemiology, Cornell University</td>
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<tr>
<td>Gregory Matthews, 2011</td>
<td>Selected Topics of Statistical Disclosure Limitation</td>
<td>University of Massachusetts, Amherst</td>
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<td>Institution</td>
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<td>Debanjan Bhattacharjee, 2011</td>
<td>Statistical Inference for a Normal Distribution with Variance as a Multiple of Its Mean</td>
<td>Utah Valley University</td>
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<td>Xiaojing Wang, 2011</td>
<td>Edynamic Regression Models for Interval Censored and Panel Count Survival Data</td>
<td>Google</td>
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<tr>
<td>Miaomiao Ge, 2011</td>
<td>Bayesian Modeling and Inference of Survival Data with Competing Risks</td>
<td>Boehringer-Ingelheim</td>
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<tr>
<td>Arijit Sinha, 2011</td>
<td>Bayesian Inference of Survival Data with Gamma Process Priors</td>
<td>Novartis</td>
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<tr>
<td>Karthik Bharath, 2012</td>
<td>On Inference for Discretely Observed Processes</td>
<td>Ohio State University</td>
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<td>Bhargab Chattopadhyay, 2012</td>
<td>Performance of U-Statistics Having Kernels of Degree Higher Than Two in Inference Problems with Applications</td>
<td>University of Texas, Dallas</td>
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<td>Shan Hu, 2012</td>
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<td>Plymouth Rock Insurance</td>
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<td>Wenqing Li, 2012</td>
<td>Bayesian Design of Non-Inferiority Clinical Trials</td>
<td>Novartis, NJ</td>
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<td>Ran Liu, 2012</td>
<td>Segmentation, Classification and Tracking of 3-D Images using Bayesian Methods</td>
<td>Merck &amp; Co.</td>
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<tr>
<td>Ziwen Wei, 2012</td>
<td>On Applications of Bayesian Methodologies in Bioinformatics and Biostatistics</td>
<td>Merck &amp; Co.</td>
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<tr>
<td>Hui Yao, 2012</td>
<td>Bayesian Modeling and Inference for Meta Data</td>
<td>Ernst &amp; Young, NY</td>
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<tr>
<td>Yuanye Zhang, 2012</td>
<td>Bayesian Modeling and Inference of Survival Data with Semi-Competing Risks</td>
<td>Novartis, NJ</td>
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</table>
Department of Statistics Ph.D. Program

For students entering the program after a Bachelor’s Degree, typically 16 to 18 courses are required. An individual plan of study is developed by the student and his or her Advisory Committee.

Knowledge of a sequence of core courses is required for all Ph.D. students. These courses are 5585-5685 (Mathematical Statistics), 5505-5605 (Applied Statistics), 5725, 6694 (Linear Models), 6315, 6515 (Theory of Statistics), 6325-6894 (Measure Theory and Probability Theory), 5515 (Design of Experiments), giving a total of 33 credits for core courses. Additional credits can be earned from the list of elective courses.

In general, Ph.D. students are required to elect 1 – 2 courses from other departments. However, it is sufficient to take one graduate level course from the Department of Mathematics. Ph.D. students are also encouraged to take courses in Computer Science as well as in application areas such as Biology or Economics. The elected course(s) must be approved by the major advisor of a student. Under certain circumstances, a major advisor can exempt his/her student from the above requirement, if the student has had internships or RA’s in interdisciplinary areas. The Department has no requirement on foreign languages.

The first formal departmental requirement for the Ph.D. program is successfully passing the Ph.D. Qualifying Examination which is a written test of certain basic courses to the program. The next requirement is passing of the General Examination which is given as an oral test and covers aspects of Applied Statistics, Linear Models, Probability Theory and Statistics. The preparation of a dissertation then follows which must present an original contribution to the general area of Statistics and/or Probability. The final requirement of the program is a defense of the Ph.D. dissertation before an audience of interested members of the department.

The Department expects every Ph.D. student to strive to finish his or her study within 4 years. For students arriving without a M.S. degree in Mathematics or Statistics, the Department may provide up to 5 years of financial support. For those arriving with such a degree, the Department may provide up to 4 years of financial support.

NOTE:

1. In order to receive continuous support, Ph.D. students with financial support should maintain suitable course load. Each should take at least 3 courses in each semester until taking the Ph.D. Qualifying Examination.
2. For students arriving with a Bachelor’s Degree and receiving financial support from the Department, we propose the following timetable for these examinations:

   Ph.D. Qualifying Examination : within 3 semesters from start of program.
   General Examination : within 6 semesters from start of program.
   Ph.D. Thesis Defense : no later than 5 years from start of program.
3. In order for a student currently enrolled in our M.S. program to switch to the Ph.D. program or to be considered for financial support, he or she must first pass both parts of the Ph.D. Qualifying Exam at Ph.D. level.
Department of Statistics Master’s Degree Program Information

Master's Degree in Statistics

The Master’s program emphasizes applied statistics, encouraging students to take one course in areas of application. Plans of Study for this degree may be formulated with related work in almost any area, e.g., Biology, Business, Economics, Nutrition, and Psychology to name a few.

Individuals with a Bachelor's Degree in any major are encouraged to apply. Approximately three semesters of full time study are required to complete the Master’s Degree, although it is possible for a student with a strong background to finish in a year. A student holding an assistantship, or who is otherwise prevented from carrying a full load of graduate work (normally four courses per semester), generally requires an additional semester to finish.

**Note:** In order to switch to the Ph.D. program or to be considered for financial support, a M.S. student must first pass both parts of the **Ph.D. Qualifying Exam** at Ph.D. level. For international students, in order to be considered for financial support, passing UCONN's **English Speak Test** is also required.

**Prerequisites**

Although there are no official course requirements for admission to graduate study, a degree of mathematical sophistication is necessary for acceptable progress through the program. This mathematical maturity may be achieved by successful completion of three semesters of calculus and a semester of linear algebra. A background in statistics will be helpful, but is not assumed.

**Structure of the Master's Program**

Depending on a student's background, he or she should take eight (8) to ten (10) 3-credit courses, with the following ones being required: STAT 5585, 5685, 5505, 5605, 5725 and 5515. In addition, the 1-credit seminar course STAT 5099 is required. The elective courses normally consist of four additional courses, two to three in the Department of Statistics and at least one in an area of application from other departments. Choices are made with the approval of the candidate's major and associate advisors. Up to 6 credits may be transferred subject to the approval of the Department, provided that the student has taken equivalent graduate level courses that have not been counted towards any academic degree. After taking all required 3-credit courses, the student must take and pass a Master's Examination. He or she must also demonstrate proficiency in statistical computing. There is no thesis requirement for the Master's Degree.
Two Semesters Knowledge of Statistics 5585-5685 and some applied statistics is assumed.
  o Statistics 5505, Statistics 5725, 2 Elective or Area of Application Courses
  o Statistics 5099, Statistics 5605, Statistics 5515, 2 Elective or Area of Application Courses

Three Semesters
  o Statistics 5585, Statistics 5505, 1 Elective Course
  o Statistics 5685, Statistics 5515, Statistics 5605, 1 Elective Course
  o Statistics 5725, 2 Elective or Area of Application Courses, Statistics 5099 (1 credit)

Four Semesters
  o Statistics 5585, Statistics 5505, 1 Elective Course
  o Statistics 5685, Statistics 5515, 1 Elective Course
  o Statistics 5725, 1 or 2 Elective or Area of Application Courses
  o Statistics 5605, 1 or 2 Elective or Area of Application Courses, Statistics 5099 (1 credit)

Note: Remedial work in Mathematics may replace elective courses in the first year of a three or four semester program.

Typical Plans of Study for the Master's Degree with Biostatistics Concentration

Three Semesters
  o Statistics 5585, Statistics 5505, Statistics 5635 (or Statistics 5625, 5645)
  o Statistics 5685, Statistics 5605, Statistics 5515, Statistics 5625 (or Statistics 5635, 5645)
  o Statistics 5725, Statistics 5645 (or Statistics 5625, 5635), 1 Elective Course, Statistics 5099 (1 credit)

Four Semesters
  o Statistics 5585, Statistics 5505, Statistics 5635 (or Statistics 5625, 5645)
  o Statistics 5685, Statistics 5515, Statistics 5625 (or Statistics 5635, 5645), 1 Elective Course
  o Statistics 5725, Statistics 5645 (or Statistics 5625, 5635)
  o Statistics 5605, 1 Elective Course (or Statistics 5625, 5635 or 5645), Statistics 5099 (1 credit)
**COURSE DESCRIPTIONS**

(Subject to change)

**Statistics 3965. Elementary Stochastic Processes**
Prerequisite: Statistics 3025Q or 3375Q or 5585 or consent of instructor.

Conditional probability and expectation, moments and distribution of random sums, transition probabilities of Markov chains, first step analysis of Markov chains, long run behavior of Markov chains, classification of states, homogeneous and nonhomogeneous Poisson processes, interarrival time and waiting time distributions, spatial Poisson process, compound Poisson process, birth and death processes, branching processes, queueing processes with exponential interarrival times and service times.

**Statistics 3515Q/5515. Design of Experiments**
Prerequisite: A previous statistical methods course and consent of instructor.

Completely randomized, randomized block, Latin squares, nested and repeated measures designs, multiple comparisons, factorial experiments, random and mixed models, confounding and fractional factorials, analysis using SAS computer package.

**Statistics 4875. Nonparametric Methods**
Prerequisite: Statistics 3375Q or 5585 or consent of instructor.

Intuitive approach and basic concepts, one and two-sample problems, estimation, testing and confidence procedures, small sample and asymptotic distribution theory, Pitman efficiency, K sample problems, rank correlation.

**Statistics 5099. Student Seminar/Internship**

**Statistics 5015. Distribution Theory for Statistics**
Prerequisite: Consent of Instructor.

Mathematical foundations for advanced courses in the department, with special reference to the advanced probability sequence Statistics 6325, 6894. Topics will vary but will typically center on real analysis: sequences, series, limits and continuity of functions, differentiation, sequences and series of functions. As time permits, other topics such as metric spaces and vector spaces will be treated.

**Statistics 5585-5685. Mathematical Statistics.**
Prerequisite: 3 semesters of calculus, the third possibly concurrent.

Distribution and density functions of random variables, conditional probability and independence, moment generating functions and moments, common families of distributions, multi-parameter exponential family, multiple random variables, change-of-variable techniques, models of convergence, central limit theorem, distribution of order statistics, sufficiency principle, minimal sufficiency, ancillarity, completeness, likelihood principle, point estimation, interval estimation, hypothesis testing, evaluation of estimators and tests.
Statistics 5505-5605. Applied Statistics
Prerequisites: A previous statistical methods course, calculus, and/or consent of instructor.

Statistics from a data analytic viewpoint incorporating parametric and nonparametric methods, exploratory data analysis, graphical methods, one-sample problems, jackknifing, bootstrapping, robustness, two-sample problems, k-sample problems including one-way ANOVA, randomized block designs, two-way ANOVA, additivity, simple linear regression, multiple linear regression, analysis of covariance, categorical data.

Statistics 6315. Inference I
Prerequisite: Statistics 5685.

Exponential families, sufficient statistics, loss, decision rules and risk, convexity, prior information, unbiasedness (including multi-parameter case), Bayesian analysis, minimax analysis, minimaxity and admissibility in exponential families, simultaneous estimation and shrinkage estimators, efficient likelihood estimations, equivariant estimation.

Statistics 6515. Inference II
Prerequisite: Statistics 6315 and consent of instructor.

Real analysis for inference, statistics and subfields, conditional expectations and probability distributions, UMP tests with applications to normal distributions and confidence sets, invariance, asymptotic theory of estimation and likelihood based inference.

Statistics 5725. Linear Models I
Prerequisites: Statistics 5685 or 3445, linear algebra, consent of instructor.

Introduction to matrices with applications in statistics, multivariate distribution theory, distribution of quadratic forms, theory for the full rank and less than full rank model (including geometric developments), analysis of covariance, comparison of regression and dummy variable modeling.

Statistics 6325-6894. Probability Theory
Prerequisite: Statistics 5015 and consent of instructor.

Concepts from abstract analysis, Lebesgue measure, abstract measures, extension of measures, Lebesgue-Stieltjes measures, measurable functions and integration. Radon-Nikodym Theorem, product measures and Fubini's Theorem, measures on infinite product spaces, basic concepts of probability theory, conditional probability and expectation, regular conditional probability, strong law of large numbers, martingale theory, martingale convergence theorems, uniform integrability, optional sampling theorems, Kolmogorov's Three series Theorem, weak convergence of distribution functions, the fundamental weak compactness theorems, convergence to a normal distribution, Lindeberg's Theorem.
Statistics 5525. Sampling Theory
Prerequisite: Statistics 5685 or 3445.

Concepts of sampling error, non-sampling error, bias, sampling designs, simple random sampling with replacement, simple random sampling without replacement, sampling with unequal probabilities stratified sampling, optimum allocation, proportional allocation, ratio estimators, regression estimators, systematic sampling, super population approaches, inference in finite sampling.

Statistics 5361. Statistical Computing
Prerequisite: Statistics 3025Q, 3445 or 5685 and/or consent of instructor.

An introduction to computing for statistical problems and research. Topics covered are basic numerical methods, nonlinear statistical methods, numerical integration and differentiation, random generation, and simulation. Should time allow, statistical graphics is considered.

Statistics 5625. Introduction to Biostatistics

Rates and proportions, sensitivity, specificity, two-way tables, odds ratios, relative risk, ordered and non-ordered classifications, trends, case-control studies, elements of regression including logistic and Poisson, additivity and interaction, combination of studies and meta-analysis.

Statistics 5635. Clinical Trials

Basic concepts of clinical trial analysis: controls, randomization, blinding, surrogate endpoints, sample size calculations, sequential monitoring, side-effect evaluation and intention-to-treat analyses. Also, experimental designs including dose response study, multicenter trials, clinical trials for drug development, stratification, and cross-over trials.

Statistics 5645. Concepts and Analysis of Survival Data

Survival models, censoring and truncation, nonparametric estimation of survival functions, comparison of treatment groups, mathematical and graphical methods for assessing goodness of fit, parametric and nonparametric regression models.

Statistics 5825. Applied Time Series


Statistics 5665. Applied Multivariate Analysis

Prerequisite: Matrix algebra, a prior statistical methods course, Statistics 3375Q or 5585 or consent of instructor. Multinormal techniques with applications, topics covered: Hotelling's T² test, multivariate analysis of variance, discriminant analysis, principal components, factor analysis, cluster analysis, introduction to and use of SAS computer package.
Statistics 6694. Linear Models II  
Prerequisite: Statistics 5725.

Further topics in regression (including robust, ridge & reverse regression). Models not of full rank (including design models). Multi-way crossed classification, variance components, simultaneous inference, analysis of covariance, cross validation, regression diagnostics, generalized linear models.

In addition, special topics courses are offered in areas such as: bioinformatics, categorical data analysis, time series methods, generalized linear models, Bayesian data analysis, spatial and longitudinal data modeling, sequential analysis, stochastic geometry, survival analysis, approximations and inequalities, nonparametric methods, and advanced topics in inference.