Statistics Graduate Programs

Admission Contact Information
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About Statistics

The Statistics department has prided itself training students to meet this need since its creation in 1963. Our faculty is known for both cutting edge methodological and collaborative research and for outstanding teaching. Faculty members are currently investigating statistical problems in the fields of ecology, genetics, economics, meteorology, wildlife management, epidemiology, AIDS research, geophysics, and climatology. The program’s faculty members have ongoing collaborative programs across disciplines such as biostatistics, bioinformatics, economics, atmospheric science, psychology and with the Missouri Department of Conservation.

The graduate program provides opportunities for graduate study and thesis direction in various areas of probability and statistics, both theoretical and applied. A variety of consulting and collaborative opportunities allow both faculty and graduate students to conduct cooperative and interdisciplinary research. Regular statistics colloquia provide opportunities for faculty and outside speakers to present the results of their research. Faculty and graduate students also participate in weekly seminar series in Bayesian statistics, bioinformatics, and biostatistics.

Degrees Available

MA and PhD in statistics
MA in statistics with emphasis in biostatistics
Dual MA in statistics and economics

Career Opportunities

Statisticians are in demand in education, medicine, government, business and industry as well as in the biological, social and physical sciences.

Facilities & Resources

The Department of Statistics maintains a state-of-the-art computer network with Linux workstations and servers for research and personal productivity software on PCs. Students have access to the network through PCs in student offices and through the statistics department computer laboratory. An extensive library of software including R, S-PLUS, SAS, and common programming languages is maintained. Students also have access to the campus computing network. The Statistics Department is located in newly renovated space in Middlebush, with easy access to the main library’s outstanding collection of books and journals in statistics.

Financial Aid from the Program

Fellowships and teaching and research assistantships are available to qualified graduate students. Some programs require an extra form or statement from those who wish to be considered for internal assistantships, fellowships or other funding packages. Check the program Web site or ask the program contact for details.

Statistics Faculty

Dongchu Sun
chair, professor; PhD, Purdue University.
Application and Admission Information

Admission Criteria

Fall deadline: January 15
Spring deadline: October 15

Minimum TOEFL score for international applicants: 535/200 (paper/computer)
Minimum GPA: 3.0 in math and statistics courses to enter master’s program; 3.5 in math and statistics to enter PhD program
Bachelor's degree from accredited college or university in related area
Undergraduate courses in statistics are recommended but not required. Consideration also is given to rank in graduating class, trends in grade records, maturity and experience, and other criteria bearing on qualifications.
Before entering the graduate program, a student should have a background that includes matrix theory and calculus and some exposure to statistics. Some required courses at the 7000 level not taken as an undergraduate may be taken for graduate credit as part of the graduate program.

Required Application Materials

To the Graduate School
All required Graduate School documents

To the Program
Departmental application
3 letters of recommendation (use departmental form)
Letter of intent
GRE score report

Master of Arts in Statistics

Degree Requirements

The general requirements for receiving a master’s degree are at least 30 semester hours of course work at the 7000 level or higher, of which at least 18 hours must be from the Department of Statistics at MU. The 30 hours may not include credit hours of 7050, 7510, 7530 or 7710 or more than a total of six hours of 8090.

At least 15 semester hours of course work at the 8000 level or above must be taken from the Department of Statistics at MU. The 15 semester hours cannot include more than a total of three hours of 8090.

Additional courses recommended but not required are Statistics 7110, 7250, 7310, 7810, 7830, 7870, 8310, 8320, 8370, 9210, 9310, 9410 and 9320; Mathematics 7700 and 7900; Computer Science 1050 or 2050.

Remedial Courses

The following courses are required if equivalent courses were not taken as an undergraduate: Mathematics 7140, Statistics 7750 and 7760. These courses may not be used for more than six of the required 30 hours.

Original Written Work

All candidates must submit a written report on an independent effort toward producing original work. This report may, with the adviser’s consent, take the form of a thesis, a written review on a set of papers in statistics, or a written report on an independent study project, which may include an original application of statistics. For this work, a student must register for at least three semester hours of 8090.

Presenting the Work

All candidates are required to present an open seminar on the results of the written report. The report should be made available for public review, through the Department of Statistics office, for at least one week before the examination.

Examination

The MA examination covers material presented in the written report and the seminar and may also cover course work.

Satisfactory Progress

Length of Study
A master’s candidate is expected to complete the master’s degree within three calendar years beginning with the first semester of enrollment unless approval is obtained from the graduate faculty of the Department of Statistics.

Grade Requirements
Any student, while a graduate student in this program, who receives a grade of C or lower in six or more hours of courses offered by the Department of Statistics or a grade of C or lower in nine or more hours of all courses taken will be dismissed from the graduate program unless contrary action is taken by the graduate faculty of the department.

For each credit hour over three hours with a grade of C or lower in courses offered by the Department of Statistics at the 7000 level and above, the student must receive a credit hour with a grade of A in courses offered by the department at the 7000 level and above.

MA in Statistics with Emphasis in Biostatistics

Students who wish to specialize in biostatistics may obtain a degree with special emphasis. The general requirements are the same as those for the MA degree in statistics. In addition, students must satisfy the following:

(i) Take statistics 7410 and (ii) either 7420, 8410 or 9410 or the equivalent;

(ii) Submit a project or thesis related to biostatistics.

Dual Master’s Degree in Economics and Statistics

The department offers a cooperative MA degree with the Economics Department. Students may obtain MA degrees in economics and statistics with 48 hours of course work numbered 7000 or higher from the University of Missouri instead of the 52 or more required for separate degrees. (These 48 hours may not include any of the following: Economics 7351, 7353, or Statistics 7510, 7530, 7710.) Eighteen or more hours are required from the Department of Economics. At least 15 hours must be numbered 8000 or higher with no more than four hours of 8090. Students must take the core economics courses 8451 and 8453 and research workshop 8413 (2 credit hours). Eighteen or more hours are required from the Department of Statistics. At least 15 hours must be numbered 8000 or higher with no more than three hours of 8090. Statistics 7750 and 7760 and Mathematics 7140 are required if equivalent courses were not taken as an undergraduate.

All candidates must submit a thesis or written project demonstrating an independent effort towards producing original work satisfactory for each degree. The candidate may complete a separate thesis/project for both economics and statistics or a single joint thesis/project satisfying both requirements.

Master’s Minor

To receive a designated minor in statistics for a master’s degree, at least 12 credit hours of course work at the 7000 level or higher must be completed from the Department of Statistics at MU. The courses should be unified in theme and must be approved by the director of graduate studies in the Department of Statistics.

The courses must be completed with an average grade of B (3.0) or higher; shall not include Statistics 7002, 7070, 7085, 8085 or 9085; and shall not include more than one course from Statistics 7710 and 7750.

Doctorate in Statistics

Qualifying Examination

The Qualifying exam will be offered to students in the statistics department doctoral program or to masters students in statistics who are approved by the Admissions Committee. All graduate students who expect to be in the Ph.D. program must take the qualifying exam at the earliest possible time after completing the courses required for the exam. Any exceptions to these time limits must be obtained in writing from the Director of Graduate Studies with approval from the voting faculty. The qualifying exam will be offered two times per year, once at the beginning of the Fall semester (August) and once at the beginning of the Spring semester (January). The exam will consist of two parts, to be given on separate days. Each part will be designed to be completed within a four-hour period. Part I will cover Stat 7750 (Introduction to Probability Theory) and 7760 (Statistical Inference). Part II will cover Stat 8310 (Data Analysis I) and 8320 (Data Analysis II). Students who fail a part of the qualifying exam on the first try must take that part of the exam again the next time the exam is offered if they choose to
continue in the Ph.D. program. On the second attempt, students are expected to take only the parts of the exam that they
failed on the first attempt. In general, a student may attempt all or part of the exam at most two times. In rare and special
situations, a student may appeal to the Director of Graduate Studies for a third attempt and be given the opportunity with
approval from the voting faculty.

Doctoral Committee

Within one semester of passing the qualifying examination, a student must choose a doctoral program committee in
consultation with his or her adviser. This committee consists of at least five members, at least three of whom are members of
the doctoral faculty in statistics and at least one from another MU doctoral program.

Preliminary Examination

Before taking the preliminary exam, the student is required to have passed the qualifying exams and chosen his/her major
professor. Students must take the preliminary exam at the earliest possible time after the student has passed the qualifying
exam and completed the courses required for the preliminary exam. Any exceptions to these time limits must be obtained in
writing from the Director of Graduate Studies with approval from the voting faculty. The preliminary exam will be offered two
times per year, once at the beginning of the Fall semester (August) and once at the beginning of the Spring semester
(January). The exam will consist of two parts, to be given on separate days. Part I will cover Stat 9710 (Mathematical Statistics
I) and Stat 9720 (Mathematical Statistics II), and part II will cover Stat 9310 (Theory of Linear Models). Part I will be designed
to be completed in four hours and Part II will be designed to be completed in three hours. Students who fail a part of the
preliminary exam on the first try must take that part of the exam again the next time the exam is offered if they choose to
continue in the Ph.D. program. On the second attempt, students are expected to take only the parts of the exam that they
failed on the first attempt. In general, a student may attempt all or part of the exam at most two times. However, if it is the
student’s second attempt and the student fails one or both parts of the exam, the voting faculty may, upon consideration of
the exam performance and other information deemed relevant, vote that the student be allowed to take the failed portion(s)
of the exam a third (and final) time.

Grading and Evaluating of the Qualifying and Preliminary Examinations

A “blinded” approach will be used when grading and evaluating the qualifying and preliminary examinations. Specifically, each
student taking the exam will be given a unique ID that will be used throughout the entire grading and evaluating process. Each
blinded part of the exam will be evaluated individually as pass or fail. The blinded method of evaluation will be strictly
adhered to. That is, no conditional passes/fails will be given and no information other than the performance on the exam will
be used to determine a pass or fail on each part of the examination.

Required Course Work

Before taking the comprehensive examination, students should complete six courses from the following: Statistics 9100, 9320,
9370, 9210, 9410, 9510, 9810 and 9820 taken at MU or at comparable institutions. (Different 9100s can be counted more
than once.) Other courses may be substituted at the discretion of the student’s doctoral program committee.

Comprehensive Examination

After successfully completing the preliminary exam and the required coursework, the student is eligible to take the
comprehensive examination. This examination consists of a written and oral section as specified in the Graduate School
catalog. This examination must be completed at least seven months prior to the final defense of the dissertation.

Dissertation

A dissertation, prepared under the direction of a dissertation supervisor, is required. The dissertation should be presented in
an open seminar as part of the final examination, which is be conducted by the final examination committee. The dissertation
should be made available for public review, through the Department of Statistics office, for at least one week before the
examination.
Additional Requirements

Additional requirements for the PhD in statistics are determined by the student’s program committee and the director of graduate studies.

PhD Minor

To receive a designated minor in statistics for a PhD degree, at least 15 credit hours of course work at the 7000 level or higher must be completed from the Department of Statistics at MU. The courses must include Statistics 8310 and 8320, but may not include Statistics 7002, 7020, 7050, 7070, 7085, 7510, 7530, 8085, 8090, or 9085. Students must have taken a calculus based mathematical statistics course at the level of Stat 7710 or 7760 or above, but no more than 6 hours of Stat 7710, 7750, and 7760 can be counted towards the 15 hours. The plan of study must be approved by the Director of Graduate Studies of the Statistics Department and be completed with an average grade of B (3.0) or higher. Each student is encouraged to seek approval of his/her plan of study as soon as possible.

STATISTICS COURSES

STAT 7002--Topics in Statistics-Biological/Physical/Mathematics (cr.arr.). Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent. Prerequisites: graduate standing and instructor’s consent.

STAT 7020--Statistical Methods in the Health Sciences (3). Basic inference methods, both parametric and non-parametric, appropriate for answering questions arising in health sciences research. Computer exercises involving data from real experiments from health science area. Prerequisites: MATH 1100 or 1120 and graduate standing or instructor’s consent.

STAT 7050--Connecting Statistics to Middle and Secondary Schools (3). Primarily for middle and secondary mathematics education majors. Uses standards-based curricular materials to demonstrate connections between college-level statistics and content taught in middle and secondary schools. No credit toward a graduate degree in statistics. Prerequisites: graduate standing and an introductory course in statistics or MATH 2320 or instructor’s consent.

STAT 7070--Statistical Methods for Research (3). Designed for graduate students who have no previous training in statistics. Topics include descriptive statistics, probability distributions, estimation, hypothesis testing, regression, and ANOVA. No credit toward a degree in statistics. Prerequisites: graduate standing and MATH 1100 or 1120.

STAT 7085--Problems in Statistics for Non-majors (cr.arr.). Approved reading and study, independent investigations, and reports on approved topics. Prerequisites: graduate standing and instructor’s consent.

STAT 7110--Statistical Software and Data Analysis (3). Programming with major statistical packages emphasizing data management techniques and statistical analysis for regression, analysis of variance, categorical data, descriptive statistics, non-parametric analyses, and other selected topics. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7150--Applied Categorical Data Analysis (3). The study of statistical models and methods used in analyzing categorical data. The use of computing is emphasized and calculus is not required. No credit for students who have previously completed STAT 4830. No credit toward a graduate degree in statistics. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, or 4760/7760 or instructor’s consent.

STAT 7210--Applied Nonparametric Methods (3). Statistical methods when the functional form of the population is unknown. Applications emphasized. Comparisons with parametric procedures, Goodness of-fit, chi-square, comparison of several populations, measures of correlation. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.
STAT 7310--Sampling Techniques (3). Theory of probability sampling designs; Unrestricted random sampling; Stratified sampling; Cluster sampling; Multistage or sub sampling; Ratio estimates; Regression estimates; Double sampling. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7410--Biostatistics (3). Study of statistical techniques for the design and analysis of clinical trials, laboratory studies and epidemiology. Topics include randomization, power and sample size calculation, sequential monitoring, carcinogenicity bioassay and case-cohort designs. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7420--Applied Survival Analysis (3). Parametric models; Kaplan-Meier estimator; nonparametric estimation of survival and cumulative hazard functions; log-rank test; Cox model; Stratified Cox model; additive hazards model partial likelihood; regression diagnostics; multivariate survival data. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710 or 4760/7760 or instructor’s consent.

STAT 7430--Applied Longitudinal Data Analysis (3). Repeated measurements; event history studies; linear and nonlinear mixed effects models; growth models; marginal mean and rate models; pattern-mixture models; selection models; non-informative and informative drop-out; joint analysis of longitudinal and survival data. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, or 4760/7760 or instructor’s consent.

STAT 7450--Applied Statistical Methods for Bioinformatics (3). Random variables; Point estimation; Multiple t-test; Likelihood principle; Analysis of variance; Probabilistic methods for sequence modeling; Gene expression analysis; Protein structure prediction; Genome analysis; Hierarchical clustering and Gene classification. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7510—Applied Statistical Models I (3). Introduction to applied linear models including regression (simple and multiple, subset selection, estimation and testing) and analysis of variance (fixed and random effects, multifactor models, contrasts, multiple testing). No credit towards a graduate degree in statistics. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7530--Analysis of Variance (3). Study of analysis of variance and related modeling techniques for cases with fixed, random, and mixed effects. Exposure to designs other than completely randomized designs including factorial arrangements, repeated measures, nested, and unequal sample size designs. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710, 4760/7760, or instructor’s consent.

STAT 7540--Experimental Design (3). Examination and analysis of modern statistical techniques applicable to experimentation in social, physical, or biological sciences. Prerequisites: graduate standing and STAT 3500 or 4510/7510 or 4530/7530 or instructor’s consent.

STAT 7560--Applied Multivariate Data Analysis (3). Testing mean vectors; discriminant analysis; principal components; factor analysis; cluster analysis; structural equation modeling; graphics. Prerequisites: graduate standing and STAT 3500, 7070, 4710/7710 or 4760/7760. No credit toward a graduate degree in statistics.

STAT 7610--Applied Spatial Statistics (3). Introduction to spatial random processes, spatial point patterns, kriging, simultaneous and conditional autoregression, and spatial data analysis. Prerequisites: graduate standing and STAT 4510/7510 or instructor’s consent. Recommended: Basic knowledge of calculus and matrices.

STAT 7640--Introduction to Bayesian Data Analysis (3). Bayes formulas; choices of prior; empirical Bayesian methods; hierarchical Bayesian methods; statistical computation; Bayesian estimation; model selection; predictive analysis; applications; Bayesian software. Prerequisites: graduate standing and STAT 3500 or 4510/7510 or instructor’s consent.

STAT 7710--Introduction to Mathematical Statistics (3). (same as Mathematics [MATH] 7315). Introduction to theory of probability and statistics using concepts and methods of calculus. Prerequisites: graduate standing and MATH 2300 or instructor’s consent. No credit MATH 7315.

STAT 7750--Introduction to Probability Theory (3). (same as Mathematics [MATH] 7320). Probability spaces; random variables and their distributions; repeated trials; probability limit theorems. Prerequisites: graduate standing and MATH 2300 or instructor’s consent.
STAT 7760—Statistical Inference (3). (same as Mathematics [MATH] 7520). Sampling; point estimation; sampling distribution; tests of hypotheses; regression and linear hypotheses. Prerequisite: STAT 4750/7750 or instructor’s consent.

STAT 7810—Nonparametric Methods (3). A first course in Non-parametric statistical methods based on ranks. Both theory and application are emphasized. Two-sample problems; K-sample problems; Tests for independence; Contingency tables; Goodness-of-fit tests. Prerequisites: graduate standing and STAT 4710/7710 or instructor’s consent.

STAT 7830—Categorical Data Analysis (3). Discrete distributions; frequency data; multinominal data; chi-square and likelihood ratio tests; logistic regression; log linear models; rates; relative risks; random effects; case studies. Prerequisites: graduate standing and STAT 4710/7710 or instructor’s consent.

STAT 7850—Introduction to Stochastic Processes (3). Study of random processes selected from: Markov chains, birth and death processes, random walks, Poisson processes, renewal theory, Brownian motion, Gaussian processes, white noise, spectral analysis, applications such as queuing theory, and sequential tests. Prerequisites: graduate standing and STAT 4710/7710 or instructor’s consent.

STAT 7870—Time Series Analysis (3). A study of univariate and multivariate time series models and techniques for their analyses. Emphasis is on methodology rather than theory. Examples are drawn from a variety of areas including business, economics, and soil science. Prerequisites: graduate standing and STAT 7710 or 7760 or instructor’s consent.

STAT 8085—Problems in Statistics for Majors - Masters (cr.arr.). Approved reading and study, independent investigations, and reports on approved topics. Prerequisites: graduate standing and instructor’s consent.

STAT 8090—Master’s Thesis Research in Statistics (cr.arr.). Graded on a S/U basis only.

STAT 8100—Special Topics in Statistics (cr.arr.). Prerequisites: graduate standing and instructor’s consent.

STAT 8310—Data Analysis I (3). Applications of linear models including regression (simple and multiple, subset selection, regression diagnostics), analysis of variance (fixed, random and mixed effects, contrasts, multiple comparisons) and analysis of covariance; alternative nonparametric methods. Prerequisites: graduate standing and STAT 4710/7710 or 4760/7760 or instructor’s consent.

STAT 8320—Data Analysis II (3). Advanced applications including analysis of designs (e.g. repeated measures, hierarchical models, missing data), multivariate analysis (Hotelling’s T2, MANOVA, discriminant analysis, principal components, factor analysis), nonlinear regression, generalized linear models, and categorical data analysis. Prerequisites: graduate standing and STAT 8310 or instructor’s consent.

STAT 8370—Statistical Consulting (3). Participation in statistical consulting under faculty supervision; Formulation of statistical problems; Planning of surveys and experiments; Statistical computing; Data analysis; Interpretation of results in statistical practice. Prerequisites: graduate standing and STAT 4760/7760 and 8320 or instructor’s consent.

STAT 8410—Statistical Theory of Bioinformatics (3). Study of statistical theory and methods underpinning bioinformatics. Topics include statistical theory used in biotechnologies such as gene sequencing, gene alignments, microarrays, phylogenetic trees, evolutionary models, proteomics and imaging. Prerequisites: graduate standing and STAT 4760/7760.

STAT 8640—Bayesian Analysis I (3). Bayes’ theorem, subjective probability, non-informative priors, conjugate prior, asymptotic properties, model selection, computation, hierarchical models, hypothesis testing, inference, predication, applications. Prerequisites: graduate standing and STAT 4760/7760 and MATH 4140/7140 or instructor’s consent.

STAT 9085—Problems in Statistics for Majors - PhD (cr.arr.). Approved reading and study, independent investigations, and reports on approved topics. Prerequisites: graduate standing and instructor’s consent.

STAT 9090—Doctoral Dissertation Research in Statistics (cr.arr.). Graded on a S/U basis only.

STAT 9100—Recent Developments in Statistics (3). The content of the course which varies from semester to semester, will be the study of some statistical theories or methodologies which are currently under development, such as bootstrapping, missing data, non-parametric regression, statistical computing, etc. Prerequisites: graduate standing, STAT 4760/7760 and instructor’s consent.
STAT 9250—Statistical Computation and Simulation (3). Random number generation, acceptance/rejection methods; Monte Carlo; Laplace approximation; the EM algorithm; importance sampling; Markov chain Monte Carlo; Metropolis-Hastings algorithm; Gibbs sampling, marginal likelihood. Prerequisites: graduate standing and STAT 4760/7760 or instructor’s consent.

STAT 9310—Theory of Linear Models (3). Theory of multiple regression and analysis of variance including matrix representation of linear models, estimation, testing hypotheses, model building, contrasts, multiple comparisons, and fixed and random effects. Prerequisites: graduate standing, STAT 4760/7760 and MATH 4140/7140, and instructor’s consent.

STAT 9320—Advanced Linear Models (3). Advanced topics in the theory and application of linear models. Specific content varies with instructor. Prerequisites: graduate standing and STAT 9310 or instructor’s consent.

STAT 9370—Multivariate Analysis (3). Distribution of sample correlation coefficients; Derivation of generalized T-squared and Wishart distributions; Distribution of certain characteristic roots, vectors; Test of hypotheses about covariance matrices and mean vectors; Discriminant analysis. Prerequisites: graduate standing and STAT 4760/7760 and MATH 4140/7140 or instructor’s consent.

STAT 9410—Survival Analysis (3). Statistical failure models, Kaplan-Meier estimator, Log-rank test, Cox’s regression model, Multivariate failure time data analysis, Counting process approaches. Prerequisites: graduate standing and STAT 4760/7760 or instructor’s consent.

STAT 9510—Theory of Nonparametric Statistics (3). Estimation, hypothesis testing, confidence intervals, etc., when functional form of the population distribution is unknown. Prerequisites: graduate standing and STAT 4760/7760 or instructor’s consent.

STAT 9530—Data Mining and Machine Learning Methods (3). Approaches to estimating unspecified relationships and findings unexpected patterns in high dimensional data. Computationally intensive methods including splines, classifications, tree-based and bagging methods, and support vector machines. Prerequisites: Stat 4110/7110, 4760/7760 and 8320 or instructor’s consent.

STAT 9640—Bayesian Analysis II (3). Likelihood principle, decision theory, asymptotic properties, advanced topics in Bayesian analysis at the instructor’s discretion. Prerequisites: graduate standing and STAT 8640 and 9710 or instructor’s consent.

STAT 9710—Mathematical Statistics I (3). Theory of estimation and tests of hypotheses including sufficiency, completeness and exponential families; Neyman-Pearson lemma, most powerful tests, similarity and invariance; Bayes and minimum variance unbiased estimates; Confidence intervals and ellipsoids. Prerequisite: graduate standing and STAT 4760/7760 or instructor’s consent.

STAT 9720—Mathematical Statistics II (3). Asymptotic distributions of maximum likelihood estimators, chi-square and likelihood ratio test statistics. EM algorithm, bootstrap, and introduction to generalized linear models. Prerequisites: graduate standing and STAT 9710, MATH 4700/7700 or instructor’s consent.

STAT 9810—Advanced Probability (3). (same as Mathematics 8480). Measure theoretic probability theory. Characteristic functions; conditional probability and expectation; sums of independent random variables including strong law of large numbers and central limit problem. Prerequisites: graduate standing and STAT 4750/7750 or MATH 4700/7700 or instructor’s consent.

STAT 9820—Stochastic Processes (3). (same as Mathematics 8680). Markov processes, martingales, orthogonal sequences, processes with independent and orthogonal increments, stationary, linear prediction. Prerequisite: graduate standing and STAT 9810 or instructor’s consent.