Statistics (STAT)

STAT 1006: Topics in Statistics-Mathematical Science
Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent.

Credit Hour: 1-5
Prerequisites: Instructor's consent

STAT 1200: Introductory Statistical Reasoning
Statistical concepts for critically evaluation quantitative information. Descriptive statistics, probability, estimation, hypothesis testing, correlation and regression. Students may not receive credit if they have received or are concurrently receiving credit for a higher numbered course offered by the Statistics Department. Math Reasoning Proficiency Course. Mathematical Sciences distribution course (requirement terms prior to fall 2019).

Credit Hours: 3
Prerequisites: C- or higher in MATH _0110 or MyMathTest Intermediate Algebra score of 70% or higher
STAT 1200 - MOTR MATH 110: Statistical Reasoning

STAT 1300: Elementary Statistics
Collection, presentation of data; averages; dispersion; introduction to statistical inference, correlation and regression. Students may not receive credit if they have received or are concurrently receiving credit for another course offered by the Statistics Department. Math Reasoning Proficiency Course.

Credit Hours: 3
Prerequisites: grade in C - or higher in MATH 1100 or MATH 1120 or MATH 1160 or MATH 1180 or exemption from college algebra by examination

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STAT 1300H: Elementary Statistics - Honors
Collection, presentation of data; averages; dispersion; introduction to statistical inference, correlation and regression. Students may not receive credit if they have received or are concurrently receiving credit for another course offered by the Statistics Department. Math Reasoning Proficiency course.

Credit Hours: 3
Prerequisites: grade of C-or higher in MATH 1100 or MATH 1120 or MATH 1160 or MATH 1180 or exemption from college algebra by examination. Honors eligibility required

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STAT 1400: Elementary Statistics for Life Sciences
Designed for students studying agriculture and other life sciences. Descriptive statistics, probability, estimation, hypothesis testing, correlation and regression. Students may not receive credit if they have received or are concurrently receiving credit for another course offered by the Statistics Department. Math Reasoning Proficiency Course.

Credit Hours: 3
Prerequisites: grade in C- or higher in MATH 1050 or MATH 1100 or MATH 1120 or MATH 1160 or MATH 1180 or exemption from college algebra by examination

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STAT 2006: Topics in Statistics-Mathematical Science
Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent.

Credit Hour: 1-5
Prerequisites: Instructor's consent

STAT 2200: Introductory Statistical Methods
Designed to upgrade the curriculum of STAT 1200 or STAT 1300 or STAT 1400 to the level of STAT 2500. Students may not receive credit for STAT 2200 if they have completed a course from the Department of Statistics numbered 2500 or higher.

Credit Hour: 1
Prerequisites: grade in C- or higher in STAT 1200 or STAT 1300 or STAT 1400

STAT 2500: Introduction to Probability and Statistics I
Designed primarily for students in College of Business. Descriptive statistics, probability, random variables, sampling distributions, estimation, confidence intervals, hypothesis tests.

Credit Hours: 3
Prerequisites: C- or better in MATH 1100 or MATH 1160
Recommended: MATH 1300. Students who will take MATH 1300 would be best-served to take it prior to enrollment in STAT 2500

STAT 2500H: Introduction to Probability and Statistics I - Honors
Designed primarily for students in College of Business. Descriptive statistics, probability, random variables, sampling distributions, estimation, confidence intervals, hypothesis tests.

Credit Hours: 3
Prerequisites: C- or better in MATH 1100 or MATH 1160. Honors eligibility required

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STAT 2530: Statistical Methods in Natural Resources
Statistical methods, with emphasis on applications to natural resources and including computer exercises. Math Reasoning Proficiency Course.

Credit Hours: 3

Prerequisites: a college-level computing course and a grade in the C range or better in MATH 1100, MATH 1120, MATH 1160, or MATH 1180

STAT 2800: Intuition, Simulation, and Data
This course develops the probabilistic foundations of inference in data science and builds a comprehensive view of modeling and decision-making. Emphasis is on the nature of randomness, the power and limitations of inference, and the consequences of decision making. Students will experience probability, statistical inference, and the modeling of processes through the lens of simulation using the statistical programming language R.

Credit Hours: 3
Prerequisites: Any one of DATA_SCI 1030 or STAT 1200 or STAT 2500 or instructor's consent

STAT 3006: Topics in Statistics-Mathematical Science
Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent.

Credit Hour: 1-5
Prerequisites: Consent of instructor required

STAT 3500: Introduction to Probability and Statistics II
Continuation of STAT 2500. Coverage of additional topics including: Regression; model building; ANOVA; nonparametic methods; use of a statistical computer package.

Credit Hours: 3
Prerequisites: grade in the C- or higher in STAT 2200 or STAT 2500 or STAT 2530, or STAT 4710 or concurrent enrollment in STAT 2200

STAT 4006: Topics in Statistics-Mathematical
Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent.

Credit Hour: 1-5
Prerequisites: Consent of instructor required

STAT 4050: Connecting Statistics to Middle and Secondary Schools
(cross-leveled with STAT 7050). 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.

Credit Hours: 3
Prerequisites: STAT 1200 or STAT 1300 or STAT 1400 or STAT 2500 or STAT 4710 or ESC_PS 4170 or MATH 2320

STAT 4085: Problems in Statistics for Undergraduates
Independent investigations. Reports on approved topics.

Credit Hour: 1-3
Prerequisites: instructor's consent

STAT 4110: Statistical Software and Data Analysis
(cross-leveled with STAT 7110). 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.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4150: Applied Categorical Data Analysis
(cross-leveled with STAT 7150). 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 toward a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4210: Applied Nonparametric Methods
(cross-leveled with STAT 7210). 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.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4310: Sampling Techniques
(cross-leveled with STAT 7310). Theory of probability sampling designs. Unrestricted random sampling. Stratified sampling. Cluster sampling. Multistage or subsampling. Ratio estimates. Regression estimates. Double sampling.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

STAT 4330: Methods in Sports Analytics I
(cross-leveled with STAT 7330). Introductory course on collecting, processing, visualizing, and analyzing data in sports. Technologies used in data collection and processing will be explored, along with methods for measuring and comparing individual and team performance.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

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STAT 4340: Methods in Sports Analytics II
(cross-leveled with STAT 7340). Advanced course in methods for analyzing individual and team based performance in sports and the use of data to drive strategy and tactics. Emphasis will be put on analytical methods to improve skills and optimize the performance of athletes.

Credit Hours: 3
Prerequisites: Both STAT 4330/7330 and STAT 4510/7510

STAT 4410: Biostatistics and Clinical Trials
(cross-leveled with STAT 7410). 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.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

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STAT 4420: Applied Survival Analysis
(cross-leveled with STAT 7420). 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.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

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STAT 4510: Applied Statistical Models I
(cross-leveled with STAT 7510). Introduction to applied statistical models including regression and ANOVA, logistic regression, discriminant analysis, tree-based methods, semi-parametric regression, support vector machines, and unsupervised learning through principal component and clustering. No credit toward a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4520: Applied Statistical Models II
(cross-leveled with STAT 7520). Advanced course in applied statistical modeling focusing on extensions of the linear model. Topics include generalized linear models, such as logistic and Poisson regression. Random effects models will also be introduced, with emphasis on linear and generalized linear mixed models, repeated measures, and longitudinal data. These methods will extend to general models for dependent data, such as spatially-referenced data and time series. Lastly, nonlinear models through neural networks and deep learning will also be discussed.

Credit Hours: 3
Prerequisites: Stat 4510 or 7510 or instructor's consent

STAT 4540: Experimental Design
(cross-leveled with STAT 7540). Examination and analysis of modern statistical techniques applicable to experimentation in social, physical or biological sciences.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510 or STAT 4530 or STAT 7530

STAT 4560: Applied Multivariate Data Analysis
(cross-leveled with STAT 7560). Testing mean vectors; Discriminant analysis; Principal components; Factor analysis; Cluster analysis; Structural equation modeling; Graphics. No credit towards a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent
Recommended: Basic understanding of matrices and linear algebra

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STAT 4580: Introduction to Statistical Methods for Customized Pricing
(cross-leveled with STAT 7580). Introduction to basic concepts of and statistical methods used in customized pricing. Focuses on applying statistical methods to real customized pricing problems. Students will gain an understanding of customized pricing and some hands on experience with SAS Enterprise Miner.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510 or instructor's consent

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STAT 4610: Applied Spatial Statistics
(cross-leveled with STAT 7610). Introduction to spatial random processes, spatial point patterns, kriging, simultaneous and conditional autoregression, and spatial data analysis.

Credit Hours: 3
Prerequisites: STAT 4510 or instructor's consent
Recommended: basic knowledge of calculus and matrices

STAT 4640: Introduction to Bayesian Data Analysis
(cross-leveled with STAT 7640). Bayes formulas, choices of prior, empirical Bayesian methods, hierarchal Bayesian methods, statistical computation, Bayesian estimation, model selection, predictive analysis, applications, Bayesian software.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510

STAT 4710: Introduction to Mathematical Statistics
(same as MATH 4315; cross-leveled with STAT 7710, MATH 7315). Introduction to theory of probability and statistics using concepts and methods of calculus. No credit for Math 4315.

Credit Hours: 3
Prerequisites: MATH 2100 or MATH 2300

STAT 4750: Introduction to Probability Theory
(same as MATH 4320; cross-leveled with STAT 7750, MATH 7320). Probability spaces; random variables and their distributions; repeated trials; probability limit theorems.

Credit Hours: 3
Prerequisites: MATH 2300

STAT 4760: Statistical Inference
(same as MATH 4520; cross-leveled with STAT 7760, MATH 7520). Sampling; point estimation; sampling distribution; tests of hypotheses; regression and linear hypotheses.

Credit Hours: 3
Prerequisites: STAT 4750 or STAT 7750

STAT 4830: Categorical Data Analysis
(cross-leveled with STAT 7830). Discrete distributions, frequency data, multinomial data, chi-square and likelihood ratio tests, logistic regression, log linear models, rates, relative risks, random effects, case studies.

Credit Hours: 3
Prerequisites: STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4850: Introduction to Stochastic Processes
(cross-leveled with STAT 7850). 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, sequential tests.

Credit Hours: 3
Prerequisites: STAT 4750 or STAT 7750

STAT 4870: Time Series Analysis
(cross-leveled with STAT 7870). 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.

Credit Hours: 3
Prerequisites: STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760

STAT 4887: Experiential Learning in Statistics
Learning experience combining observation, reflection, and application of statistical concepts in an internship setting. Course appears on transcript for zero credit and does not count toward full-time enrollment. No tuition or fees are charged. Graded on S/U basis only.

Credit Hours: 0
Prerequisites: Consent of the department required

STAT 4940: Statistics Internship
Used to provide credit and transcription of an undergraduate internship experience in a role that utilizes statistical methods.

Credit Hour: 1-3
Recommended: Students should have completed sufficient statistics coursework so that the internship experience involves meaningful applications of their coursework

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STAT 4970: Junior/Senior Seminar
A capstone course required of and open only to junior or senior statistics majors. Students will participate in statistical consulting, attend colloquia, and review articles in professional journals. Writing of reports will be emphasized.

Credit Hours: 3
Prerequisites: Statistics major with Junior or Senior class standing or instructor's consent
Recommended: 12 completed hours of statistics courses with grade of C or better; STAT 4110

STAT 4970W: Junior/Senior Seminar - Writing Intensive
A capstone course required of and open only to junior or senior statistics majors. Students will participate in statistical consulting, attend colloquia, and review articles in professional journals. Writing of reports will be emphasized.

Credit Hours: 3
Prerequisites: Statistics major with Junior or Senior class standing or instructor's consent
Recommended: 12 completed hours of statistics courses with grade of C or better; STAT 4110

STAT 4999: Departmental Honors in Statistics
Special work for Honors candidates in statistics. May be repeated for credit.

Credit Hour: 1-3

STAT 7006: Topics in Statistics-Mathematics
Organized study of selected topics. Subjects and earnable credit may vary from semester to semester. Repeatable with departmental consent.

Credit Hour: 1-5
Prerequisites: instructor's consent

STAT 7020: Statistical Methods in the Health Sciences
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.

Credit Hours: 3
Prerequisites: MATH 1100 or MATH 1120 and instructor's consent

STAT 7050: Connecting Statistics to Middle and Secondary Schools
(cross-leveled with STAT 4050). 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.

Credit Hours: 3
Prerequisites: an introductory course in statistics or MATH 2320 or instructor's consent

STAT 7070: Statistical Methods for Research
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.

Credit Hours: 3
Prerequisites: either MATH 1100 or MATH 1120

STAT 7085: Problems in Statistics for Non-majors
Approved reading and study, independent investigations, and reports on approved topics.

Credit Hour: 1-99
Prerequisites: instructor's consent

STAT 7110: Statistical Software and Data Analysis
(cross-leveled with STAT 4110). 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.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

STAT 7150: Applied Categorical Data Analysis
(cross-leveled with STAT 4150). 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 toward a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710, or STAT 4760 or STAT 7760 or instructor's consent

STAT 7210: Applied Nonparametric Methods
(cross-leveled with STAT 4210). 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.

Credit Hours: 3
Prerequisites: STAT 3500, STAT 7070, STAT 4710 or STAT 7710, STAT 4760 or STAT 7760, or instructor's consent

STAT 7310: Sampling Techniques
(cross-leveled with STAT 4310). Theory of probability sampling designs. Unrestricted random sampling. Stratified sampling. Cluster sampling. Multistage or subsampling. Ratio estimates. Regression estimates. Double sampling.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent

STAT 7330: Methods in Sports Analytics I
(cross-leveled with STAT 4330). Introductory course on collecting, processing, visualizing, and analyzing data in sports. Technologies used in data collection and processing will be explored, along with methods for measuring and comparing individual and team performance.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7020 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent

STAT 7340: Methods in Sports Analytics II
(cross-leveled with STAT 4340). Advanced course in methods for analyzing individual and team based performance in sports and the use of data to drive strategy and tactics. Emphasis will be put on analytical methods to improve skills and optimize the performance of athletes.

Credit Hours: 3
Prerequisites: Both STAT 4330 or STAT 7330 and STAT 4510 or STAT 7510

STAT 7410: Biostatistics and Clinical Trials
(cross-leveled with STAT 4410). 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, carcinogenicty bioassay and case-cohort designs.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent

STAT 7420: Applied Survival Analysis
(cross-leveled with STAT 4420). 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.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or STAT 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent

STAT 7510: Applied Statistical Models I
(cross-leveled with STAT 4510). Introduction to applied statistical models including regression and ANOVA, logistic regression, discriminant analysis, tree-based methods, semi-parametric regression, support vector machines, and unsupervised learning through principal component and clustering. No credit toward a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or STAT 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760, or instructor's consent

STAT 7520: Applied Statistical Models II
(cross-leveled with STAT 4520). Advanced course in applied statistical modeling focusing on extensions of the linear model. Topics include generalized linear models, such as logistic and Poisson regression. Random effects models will also be introduced, with emphasis on linear and generalized linear mixed models, repeated measures, and longitudinal data. These methods will extend to general models for dependent data, such as spatially-referenced data and time series. Lastly, nonlinear models through neural networks and deep learning will also be discussed.

Credit Hours: 3
Prerequisites: STAT 4510 or STAT 7510 or instructor's consent

STAT 7530: Analysis of Variance
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.

Credit Hours: 3
Prerequisites: STAT 3500, STAT 7070, STAT 4710 or STAT 7710, STAT 4760 or STAT 7760, or instructor's consent

STAT 7540: Experimental Design
(cross-leveled with STAT 4540). Examination and analysis of modern statistical techniques applicable to experimentation in social, physical or biological sciences.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510 or STAT 4530 or STAT 7530 or instructor's consent

STAT 7560: Applied Multivariate Data Analysis
(cross-leveled with STAT 4560). Testing mean vectors; discriminant analysis; principal components; factor analysis; cluster analysis; structural equation modeling; graphics. No credit toward a graduate degree in statistics.

Credit Hours: 3
Prerequisites: Any one of STAT 2800 or STAT 3500 or STAT 7070 or STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent
Recommended: Basic understanding of matrices and linear algebra

STAT 7580: Introduction to Statistical Methods for Customized Pricing
(cross-leveled with STAT 4580). Introduction to basic concepts of and statistical methods used in customized pricing. Focuses on applying statistical methods to real customized pricing problems. Students will gain an understanding of customized pricing and some hands on experience with SAS Enterprise minor.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510 or instructor's consent

STAT 7610: Applied Spatial Statistics
(cross-leveled with STAT 4610). Introduction to spatial random processes, spatial point patterns, kriging, simultaneous and conditional autoregression, and spatial data analysis.

Credit Hours: 3
Prerequisites: STAT 4510 or STAT 7510 or instructor's consent
Recommended: Basic knowledge of calculus and matrices

STAT 7640: Introduction to Bayesian Data Analysis
(cross-leveled with STAT 4640). Bayes formulas, choices of prior, empirical Bayesian methods, hierarchal Bayesian methods, statistical computation, Bayesian estimation, model selection, predictive analysis, applications, Bayesian software.

Credit Hours: 3
Prerequisites: STAT 3500 or STAT 4510 or STAT 7510 or instructor's consent

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STAT 7710: Introduction to Mathematical Statistics
(same as MATH 7315; cross-leveled with MATH 4315, STAT 4710). Introduction to theory of probability and statistics using concepts and methods of calculus.

Credit Hours: 3
Prerequisites: MATH 2100 or MATH 2300. No credit MATH 7315

STAT 7750: Introduction to Probability Theory
(same as MATH 7320; cross-leveled with STAT 4750, MATH 4320). Probability spaces; random variables and their distributions; repeated trials; probability limit theorems.

Credit Hours: 3
Prerequisites: MATH 2300 or instructor's consent

STAT 7760: Statistical Inference
(same as MATH 7520; cross-leveled with STAT 4760, MATH 4520). Sampling; point estimation; sampling distribution; tests of hypotheses; regression and linear hypotheses.

Credit Hours: 3
Prerequisites: STAT 4750 or STAT 7750 or instructor's consent

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STAT 7830: Categorical Data Analysis
(cross-leveled with STAT 4830). Discrete distributions, frequency data, multinomial data, chi-square and likelihood ratio tests, logistic regression, log linear models, rates, relative risks, random effects, case studies.

Credit Hours: 3
Prerequisites: STAT 4710 or STAT 7710 or instructor's consent

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STAT 7850: Introduction to Stochastic Processes
(cross-leveled with STAT 4850). 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, sequential tests.

Credit Hours: 3
Prerequisites: STAT 4750 or STAT 7750 or instructor's consent

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STAT 7870: Time Series Analysis
(cross-leveled with STAT 4870). 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.

Credit Hours: 3
Prerequisites: STAT 7710 or STAT 7760 or instructor's consent

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STAT 8085: Problems in Statistics for Majors - Masters
Approved reading and study, independent investigations, and reports on approved topics.

Credit Hour: 1-99
Prerequisites: instructor's consent

STAT 8090: Master's Thesis Research in Statistics
Graded on a S/U basis only.

Credit Hour: 1-99

STAT 8100: Special Topics in Statistics

Credit Hour: 1-99
Prerequisites: instructor's consent

STAT 8110: Software for Statistical Learning
Advanced use of R and Python for data analysis, including statistical programming, data manipulation, database operations, and interfacing between languages. Course will provide critical tools for the practice and application of statistics to data from a wide variety of fields using up-to-date tooling.

Credit Hours: 3
Recommended: Prior completion of the equivalent of at least two undergraduate statistics courses

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STAT 8120: Software for Statistical Learning II
Study of the application of advanced statistical learning models in Python. Topics include: Generalized linear models, random effects models, and generalized linear mixed models. Nonlinear models will be explored through applications of select deep learning architectures using PyTorch.

Credit Hours: 3
Prerequisites: STAT 8110 or instructor's consent required
Recommended: STAT 7520 or STAT 8320 or equivalent

STAT 8310: Data Analysis I
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.

Credit Hours: 3
Prerequisites: STAT 4710 or STAT 7710 or STAT 4760 or STAT 7760 or instructor's consent

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STAT 8320: Data Analysis II
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, categorical data analysis.

Credit Hours: 3
Prerequisites: STAT 8310 or instructor's consent

STAT 8330: Data Analysis III
An introduction to data analysis techniques associated with supervised and unsupervised statistical learning. Resampling methods, model selection, regularization, generalized additive models, trees, support vector machines, clustering, nonlinear dimension reduction.

Credit Hours: 3
Prerequisites: STAT 8320

STAT 8370: Statistical Consulting
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.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 and STAT 8320 or instructor's consent

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STAT 8410: Statistical Theory of Bioinformatics
Study of statistical theory and methods underpinning bioinformatics. Topics include statistical theory used in biotechnologies such as gene sequencing, gene alignments, microarrays, phylogentic trees, evolutionary models, proteomics and imaging.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760

STAT 8640: Bayesian Analysis I
Bayes' theorem, subjective probability, non-informative priors, conjugate prior, asymptotic properties, model selection, computation, hierarchical models, hypothesis testing, inference, predication, applications.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 and MATH 4140 or MATH 7140 or instructor's consent

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STAT 8710: Intermediate Mathematical Statistics I
Sample spaces, probability and conditional probability, independence, random variables, expectation, distribution theory, sampling distributions, laws of large numbers and asymptotic theory, order statistics.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 or instructor's consent

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STAT 8720: Intermediate Mathematical Statistics II
Further development of estimation theory, including sufficiency, minimum variance principles and Bayesian estimation. Tests of hypotheses, including uniformly most powerful and likelihood ratio tests.

Credit Hours: 3
Prerequisites: STAT 8710 or instructor's consent

STAT 9085: Problems in Statistics for Majors - PhD
Approved reading and study, independent investigations, and reports on approved topics.

Credit Hour: 1-99
Prerequisites: instructor's consent

STAT 9090: Doctoral Dissertation Research in Statistics
Graded on a S/U basis only.

Credit Hour: 1-99

STAT 9100: Recent Developments in Statistics
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.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 and instructor's consent

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STAT 9250: Statistical Computation and Simulation
Random number generation, acceptance/rejection methods; Monte Carlo; Laplace approximation; the EM algorithm; importance sampling; Markov chain Monte Carlo; Metropolis-Hasting algorithm; Gibbs sampling, marginal likelihood.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 or instructor's consent

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STAT 9310: Theory of Linear Models
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.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 and MATH 4140 or MATH 7140, and instructor's consent

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STAT 9340: Data Analysis IV
This course will explore advanced statistical learning methods for analyzing complex data, including statistical optimization, multi-level models, random processes, neural computing, Bayesian methods, and alternative learning strategies. The course will require significant involvement from the students in terms of highly computationally-oriented homework and project participation.

Credit Hours: 3
Prerequisites: STAT 8330

STAT 9370: Multivariate Analysis
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.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 and MATH 4140 or MATH 7140 or instructor's consent

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STAT 9410: Survival Analysis
Statistical failure models, Kaplan-Meier estimator, Log-rank test, Cox's regression model, Multivariate failure time date analysis, Counting process approaches.

Credit Hours: 3
Prerequisites: STAT 4760 or STAT 7760 or instructor's consent

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STAT 9530: Data Mining and Machine Learning Methods
Approaches to estimating unspecified relationships and findings unexpected patterns in high dimensional data. Computationally intensive methods including splines, classifications, tree-based and bagging methods, support vector machines.

Credit Hours: 3
Prerequisites: STAT 4110 or STAT 7110, STAT 4760 or STAT 7760 and STAT 8320 or instructor's consent

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STAT 9640: Bayesian Analysis II
Likelihood principle, decision theory, asymptotic properties, advanced topics in Bayesian analysis at the instructor's discretion.

Credit Hours: 3
Prerequisites: STAT 8640 and STAT 9710 or instructor's consent

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STAT 9710: Advanced Mathematical Statistics I
Advanced study of mathematical statistics appropriate for PhD students in statistics. Elements of probability theory, principles of data reduction, point and interval estimation, methods of finding estimators and their properties, hypothesis testing, methods of finding test functions and their properties. Decision theoretic, classical and Bayesian perspectives.

Credit Hours: 3
Prerequisites: STAT 8720 or instructor's consent

STAT 9720: Advanced Mathematical Statistics II
Continuation of STAT 9710. Topics include distribution theory and convergence, laws of large numbers, central limit theorems, efficiency, large sample theory, and elements of advanced probability.

Credit Hours: 3
Prerequisites: STAT 9710 or instructor's consent

STAT 9810: Advanced Probability
(same as MATH 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.

Credit Hours: 3
Prerequisites: STAT 4750 STAT 7750 or MATH 4700 or MATH 7700 or instructor's consent

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STAT 9820: Stochastic Processes
(same as MATH 8680). Markov processes, martingales, orthogonal sequences, processes with independent and orthogonal increments, stationarity, linear prediction.

Credit Hours: 3
Prerequisites: STAT 9810 or instructor's consent