STATISTICS

Statistics is the science of learning from data. It is concerned with the development of theory and with the application of that theory to the collection, analysis, and interpretation of quantitative information.

Because statistics is important in many scholarly disciplines, a degree in statistics provides the opportunity to enter not only the statistics profession but also many other fields which make extensive use of statistics. The areas of application include agriculture, the biological sciences, engineering, the physical sciences, the social sciences, education, business, and home economics, among others. Statistics also promises to be important in emerging endeavors such as pollution and environmental research, energy utilization, and health-care administration.

Those who pursue the study of statistics should be interested in scientific inquiry and should have a good mathematical background. In addition, it is desirable that they have a genuine interest in another discipline and learn some application of statistics in that discipline.

Careers in government, industry, and education, involving the disciplines previously mentioned, are open to the statistics graduate. In government and industry a statistician usually serves as a researcher or as a consultant to research scientists and decision-makers. In education, of course, the teaching function is added to those of research and consultation.

The Department of Statistics offers the BS and MS degrees to those interested in applications of statistics, and the PhD degree to those who wish to make original contributions to the theory of statistics.

Courses

STAT 1013 Statistical Literacy (A)
Prerequisites: Students must qualify for non-remediation of mathematics.
Description: This course focuses on statistical concepts and conclusions rather than on computations. Topics include descriptive measures, graphical representations, measures of center and variability, discussion of variability, sampling techniques, conditional probability interpretation and ramifications, confidence interval interpretation, practical vs. statistical significance, formulation and interpretation of hypothesis testing and p-values.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 2013 Elementary Statistics (A)
Prerequisites: MATH 1483 or higher, except MATH 1493, with a grade of "C" or better; or an acceptable placement score (see mathplacement.okstate.edu).
Description: An introductory course in the theory and methods of statistics. Descriptive measures, elementary probability, sampling, estimation, hypothesis testing, correlation and regression. Same course as STAT 2023 or STAT 2053.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought
Additional Fees: STAT 2013 Corequisite Lab fee of $90 applies.

STAT 2023 Elementary Statistics for Business and Economics (A)
Prerequisites: MATH 1483 or higher, except MATH 1493, with a grade of "C" or better; or an acceptable placement score (see mathplacement.okstate.edu).
Description: Basic statistics course for undergraduate business majors. Descriptive statistics, basic probability, discrete and continuous distributions, point and interval estimation, hypothesis testing, correlation and simple linear regression. Same course as STAT 2013 or STAT 2053.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 2053 Elementary Statistics for the Social Sciences (A)
Prerequisites: MATH 1483 or higher, except MATH 1493, with a grade of "C" or better; or an acceptable placement score (see mathplacement.okstate.edu).
Description: An introductory course in the theory and methods of statistics. Descriptive measures, elementary probability, sampling, estimation, hypothesis testing, correlation and regression. Same course as STAT 2013 or STAT 2023.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 2331 SAS Programming
Prerequisites: A different programming language or consent of instructor.
Description: SAS as a general purpose programming language, data representation, input/output, use of built-in procedures, report generation. Course previously offered as CS 2331.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 2890 Honors Experience in Statistics
Prerequisites: Honors Program participation and concurrent enrollment in a designated STAT course.
Description: A supplemental Honors experience in statistics to partner concurrently with designated statistics courses. This course adds a different intellectual dimension to the designated courses. Offered for fixed credit, 1 credit hour, maximum of 6 credit hours.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Honors Credit

STAT 3013 Intermediate Statistical Analysis
Prerequisites: STAT 2013, STAT 2023 or STAT 2053.
Description: Applications of elementary statistics, introductory experimental design, introduction to the analysis of variance, simple and multiple linear regression, nonparametric statistics, survey sampling and time series. Data analysis using Excel included.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 3023 Statistical Reasoning for Medical Applications (A)
Prerequisites: MATH 1483 or MATH 1513 or higher on an acceptable math placement score. See mathplacement.okstate.edu.
Description: This course focuses on developing the quantitative skills necessary for success in medical school and related activities. Topics include study design, descriptive measures, graphical representations, basic probability, statistical inference, correlation and regression, contingency tables.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 3033 Sports Analytics (A)
Prerequisites: Any of the following: MATH 1483, or MATH 1513, or an equivalent college algebra course, or math placement score of 50 or higher.
Description: This course focuses on developing the quantitative skills necessary to analyze both sports performance metrics and sports business data. Topics include introduction to data ecosystems, building relational databases. data visualization techniques, computation and evaluation of performance metrics, exploring statistical relationships, predictive modelling, analytics in sports marketing. and data-driven decision-making in sports management.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 4013 Statistical Methods I (A)
Prerequisites: MATH 1513 or higher, with a grade of "C" or better; or an acceptable placement score (see mathplacement.okstate.edu).
Description: Basic experimental statistics, basic probability distributions, methods of estimation, tests of significance, linear regression and correlation, analysis of variance for data that are in a one way, a two-way crossed, or in a two-fold nested classification. Same course as STAT 4053.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 4023 Statistical Methods II
Prerequisites: STAT 3013 or STAT 4013 or STAT 4033 or STAT 4053.
Description: Basic concepts of experimental design. Analysis of variance, covariance, split-plot design. Factorial arrangements of treatments, multiple regression in estimation and curvilinear regression, enumeration data. May not be used for degree credit with STAT 4063 or STAT 5563.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4033 Engineering Statistics
Prerequisites: MATH 2133 or MATH 2163.
Description: Probability, random variables, probability distributions, estimation, confidence intervals, hypothesis testing, linear regression. No degree credit for students with credit in STAT 4073.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4043 Applied Regression Analysis
Prerequisites: One of STAT 4013, STAT 4033, STAT 4053, STAT 5013 or equivalent.
Description: Matrix algebra, simple linear regression, residual analysis techniques, multiple regression, dummy variables, interactions, model building, introduction to logistic regression. This course explains fundamentals of linear regression and provides an introduction to logistic regression. May not be used for degree credit with STAT 5543.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4053 Statistical Methods I for the Social Sciences (A)
Prerequisites: MATH 1513 or higher, with a grade of "C" or better; or an acceptable placement score (see mathplacement.okstate.edu).
Description: Basic experimental statistics, basic probability distributions, methods of estimation, tests of significance, linear regression, calculation and analysis of variance for one and two-way classifications. Same course as STAT 4013.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics
General Education and other Course Attributes: Analytical & Quant Thought

STAT 4063 Statistical Methods II for the Social Sciences
Prerequisites: STAT 3013 or STAT 4013 or STAT 4033 or STAT 4053.
Description: Basic concepts of experimental design. Analysis of variance, covariance, split-plot design. Factorial arrangements of treatments, multiple and curvilinear regression, enumeration data. May not be used for degree credit with STAT 4023 and STAT 5563.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4073 Engineering Statistics with Design of Experiments
Prerequisites: MATH 2163.
Description: Random variables and basic probability distributions, estimation, confidence intervals, hypothesis testing, basic analysis of variance, factorial arrangement of treatments and fractional factorial experiments, elementary quality control. No degree credit for students with credit in STAT 4033.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4091 Sas Programming
Prerequisites: STAT 4013 or equivalent.
Description: SAS dataset construction, elementary statistical analysis, and use of statistics and graphics procedures available in SAS. No credit for students with credit in STAT 5091.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4123 Probability Theory
Prerequisites: MATH 2163 and either MATH 2233 or MATH 3013.
Description: Basic probability, including conditional, marginal, and joint distributions. Random variables, moments, independences and dependence, common distributions, and distributions of functions of random variables.Course explains probability calculations, the usefulness of probability, and fundamentals required for obtaining sampling distributions. Useful in preparing for the actuarial P exam. May not be used for degree credit with STAT 4203, STAT 5123 and STAT 5253.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4191 R Programming
Prerequisites: STAT 4013 or equivalent.
Description: R dataset construction, elementary statistical analysis, and use of statistics and graphics with R. May not be used for degree credit with STAT 4193, STAT 5191, STAT 5193.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4193 SAS and R Programming
Prerequisites: STAT 4013 or equivalent.
Description: SAS and R dataset construction, elementary statistical analysis, and use of statistics and graphics with SAS and R. May not be used for degree credit with STAT 4091, STAT 4191, STAT 5091, STAT 5191, STAT 5193.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4203 Mathematical Statistics I
Prerequisites: MATH 2163 with a grade of "C" or better.
Description: Probability, random variables such as Poisson, Geometric, Hypergeometric, Uniform, Normal, Gamma, Beta, Exponential and their distributions, independence and correlation, multivariate distributions, marginal and conditional probabilities, functions of random variables, order statistics and their distributions, moment generating functions, the Central Limit Theorem. May not be used for degree credit with STAT 4123 and STAT 5253.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4213 Mathematical Statistics II
Prerequisites: STAT 4203 or STAT 4123.
Description: Methods of estimating population parameters such as point and confidence interval estimation for a mean, proportion, and the difference between means and proportions, maximum likelihood methods, method of moments, hypothesis testing and its applications, sample size estimation, linear regression models, and categorical data analysis. May not be used for degree credit with STAT 5263.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4463 Statistical Machine Learning with R
Prerequisites: STAT 4043.
Description: Computationally intense statistical methods for prediction and classification with R. Topics are bias-variance tradeoff; prediction and classification error; cross validation; bootstrapping; linear and logistic regression; discriminant functions; k-nearest neighbors; local and spline-based regression; generalized additive models; model selection and regularization; support vector machines; decision trees; principle component analysis; cluster analysis. May not be used for degree credit with STAT 5063.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4910 Special Studies
Prerequisites: Consent of instructor.
Description: Special subjects in statistics. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Statistics

STAT 4980 Internship in Statistics
Prerequisites: Consent of instructor.
Description: Directed practicum or internship experience in a Statistics-related professional work setting. Students must have an approved internship that will provide statistical experience beyond that available in the classroom. Students produce written analyses of their work and learning under the guidance of the instructor and internship site supervisor. Offered for variable credit, 1-12 credit hours, maximum of 12 credit hours.
Credit hours: 1-12
Contact hours: Contact: 1-12 Other: 1-12
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Statistics

STAT 4981 Statistics Capstone I
Prerequisites: STAT 4023, STAT 4043, STAT 4091 or STAT 4193; and STAT 4203 or concurrent enrollment.
Description: Information and preparation for graduate school for statistics undergraduates, communication skills for collaborating with scientists, introduction to research in statistics.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4991 Statistics Capstone II
Prerequisites: STAT 4023 and STAT 4043 and STAT 4091 or STAT 4193; and STAT 4203 or concurrent enrollment.
Description: Career skills for statistics undergraduates entering the workforce, communication skills for collaborating with scientists.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Statistics

STAT 4993 Senior Honors Project
Prerequisites: Departmental invitation, senior standing, Honors Program participation.
Description: A guided reading and research program ending with an honors project under the direction of a faculty member, with a second faculty reader and an oral examination. Required for graduation with departmental honors in statistics.
Credit hours: 3
Contact hours: Contact: 3 Other: 3
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Statistics
General Education and other Course Attributes: Honors Credit

STAT 5000 Master's Research
Prerequisites: Consent of advisory committee.
Description: Methods of research and supervised thesis or report. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

STAT 5002 Applied Masters Creative Component
Prerequisites: Consent of advisory committee.
Description: Creative component for Applied Masters in Statistics.
Credit hours: 2
Contact hours: Contact: 2 Other: 2
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

STAT 5003 Statistics for Medical Residents
Prerequisites: Employed as a medical or veterinary resident or permission of instructor.
Description: Survey of statistical methodology relevant to health care professionals. Basic understanding of statistics presented in recent medical literature. Hypothesis testing, ANOVA techniques, regression, categorical techniques. Same course as BIOM 5003.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5013 Statistics for Experimenters I
Prerequisites: Graduate standing and MATH 1513.
Description: Introductory statistics course for graduate students. Descriptive statistics, basic probability, estimation, hypothesis testing, p-values, analysis of variance, multiple comparisons, correlation and linear regression, categorical data analysis.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5023 Statistics for Experimenters II
Prerequisites: Graduate standing and STAT 4023 or STAT 5013.
Description: Analysis of variance, contrasts and multiple comparisons, factorial experiments, variance components and their estimation, completely randomized, randomized block and Latin square designs, split plot experiments.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5033 Nonparametric Methods
Prerequisites: One of STAT 4023, STAT 4043, STAT 5023 or consent of instructor.
Description: A continuation of STAT 4013 and STAT 4023, concentration on nonparametric methods. Alternatives to normal-theory statistical methods; analysis of categorical and ordinal data, methods based on rank transforms, measures of association, goodness of fit tests, order statistics.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5043 Sample Survey Designs
Prerequisites: One of STAT 4013, STAT 4033, STAT 5013 or consent of instructor.
Description: Constructing and analyzing personal, telephone and mail surveys. Descriptive surveys including simple random, stratified random designs. Questionnaire design, frame construction, non-sampling errors, use of random number tables, sample size estimation and other topics related to practical conduct of surveys.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5053 Time Series Analysis
Prerequisites: STAT 4043.
Description: An applied approach to the analysis of time series in the time domain. Trends, autocorrelation, random walk, seasonality, stationarity, autoregressive integrated moving average (ARIMA) processes, Box-Jenkins method, forecasting.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5063 Statistical Machine Learning with R
Prerequisites: STAT 5543.
Description: Computationally intense statistical methods for prediction and classification with R. Topics are bias-variance tradeoff; prediction and classification error; cross validation; bootstrapping; linear and logistic regression; discriminant functions; k-nearest neighbors; local and spline-based regression; generalized additive models; model selection and regularization; support vector machines; decision trees; principle component analysis; cluster analysis. May not be used for degree credit with STAT 4463.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5073 Categorical Data Analysis
Prerequisites: STAT 5223, STAT 5023 or equivalent or concurrent enrollment.
Description: Analysis of data involving variables of a categorical nature. Independence/association test for contingency tables, exact tests for small counts, generalized linear models, logistic regression models for binary response variables, loglinear models for count data, analyses of ordinal variables, multicategory logit models for multiple category responses, and applications.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5083 Statistics for Biomedical Researchers
Prerequisites: STAT 5013.
Description: Analysis of variance, experimental designs pertaining to medical research, regression and data modeling, categorical techniques and the evaluation of diagnostic tests. No credit for students with credit in STAT 5023.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5091 Sas Programming
Prerequisites: STAT 5013 or equivalent.
Description: SAS dataset construction, elementary statistical analysis, and use of statistics and graphics procedures available in SAS. No credit for students with credit in STAT 4091.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5093 Statistical Computing
Prerequisites: STAT 5223.
Description: Random variable generation; numerical calculations of maximum likelihood estimators, computer intensive exact tests; randomized tests; bootstrap and cross validation methods, Monte Carlo integration and simulation; Markov Chain Monte Carlo methods for Bayesian estimation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5123 Probability Theory
Prerequisites: MATH 2163 and one other course in MATH that has either MATH 2144 or MATH 2153 as a prerequisite.
Description: Basic probability, including conditional, marginal, and joint distributions. Random variables, moments, independences and dependence, common distributions, and distributions of functions of random variables. Course explains probability calculations, the usefulness of probability, and the fundamentals required for obtaining sampling distributions. Useful in preparing for the actuarial P exam.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5133 Stochastic Processes
Prerequisites: STAT 5123 and MATH 2233, MATH 3013.
Description: Definition of a stochastic process, probability structure, mean and covariance function, the set of sample functions, stationary processes and their spectral analyses, renewal processes, counting processes, discrete and continuous Markov chains, birth and death processes, exponential model, queuing theory. Same course as IEM 5133 & MATH 5133.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5191 R Programming
Prerequisites: STAT 4013 or STAT 5013.
Description: R dataset construction, elementary statistical analysis, and use of statistics and graphics with R. May not be used for degree credit with STAT 4191, STAT 4193, STAT 5193.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5193 SAS and R Programming
Prerequisites: STAT 5013 or equivalent.
Description: SAS and R dataset construction, elementary statistical analysis, and use of statistics and graphics with SAS and R. May not be used for degree credit with STAT 4091, STAT 4191, STAT 4193, STAT 5191, STAT 5091.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5213 Bayesian Analysis
Prerequisites: STAT 5123 or STAT 5253 or STAT 4203 or consent of instructor.
Description: Bayes rule, fundamentals of Bayesian statistics, conjugate priors, posterior and predictive inference. Markov chain Monte Carlo, computation and software, hierarchical models, convergence diagnostics, Bayes factor, nonparametric Bayes.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5223 Statistical Inference
Prerequisites: STAT 5123 and MATH 3013.
Description: Convergence concepts, Central Limit Theorem, sampling distributions, point estimation, maximum likelihood methods, Bayesian estimation, Cramer-Rao lower bound, confidence intervals. Hypothesis testing including Neyman-Pearson tests, uniformly most powerful tests, and generalized likelihood ratio tests. Course derives and explains testing and estimation included in introductory statistics courses. Useful for understanding assumptions and theory in common statistical methods. Previously offered as STAT 4223.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5253 Mathematical Statistics I
Prerequisites: MATH 2163 with a grade of "C" or better.
Description: Probability, random variables such as Poisson, Geometric, Hypergeometric, Uniform, Normal, Gamma, Beta, Exponential and their distributions, independence and correlation, multivariate distributions, marginal and conditional probabilities, functions of random variables, order statistics and their distributions, moment generating functions, the Central Limit Theorem. No credit for students with credit in STAT 4203 or STAT 4123.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5263 Mathematical Statistics II
Prerequisites: STAT 5253 or STAT 4123.
Description: Methods of estimating population parameters such as point and confidence interval estimation for a mean, proportion, and the difference between means and proportions, maximum likelihood methods, method of moments, hypothesis testing and its applications, sample size estimation, linear regression models, and categorical data analysis. No credit for students with credit in STAT 4213.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5303 Experimental Designs
Prerequisites: STAT 5023 or STAT 4023 with consent of instructor.
Description: Students will identify treatment structures and design structures, conduct the analyses of data from experimental scenarios, and interpret the results. The understanding and preparation of statistical analysis statements for publication are also covered. Analysis topics include: ANOVA, multiple comparisons, factorial experiments, complete and incomplete block designs, linear mixed models analysis (including repeated measures analysis), split-plot experiments, 2n and 3n factorial experiments, fractional factorial experiments, crossover designs, ANCOVA and SAS programming.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5323 Theory of Linear Models I
Prerequisites: STAT 5223, MATH 3013, and one of STAT 4023 or STAT 5023.
Description: Matrix theory (generalized inverse, idempotent matrix, and non- negative matrix results), multivariate normal distribution, quadratic forms, chi-square distribution, general linear models, estimability, general hypothesis testing.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5333 Theory of Linear Models II
Prerequisites: STAT 5323.
Description: Maximum likelihood estimation; one- way and two-way ANOVA models, multiple comparisons, regression models, linear mixed models, variance component estimation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5513 Multivariate Analysis
Prerequisites: STAT 5323.
Description: Multivariate normal distribution, simple, partial and multiple correlation, multivariate sampling distributions. Wishart distribution, general T-distribution, estimation of parameters and tests of hypotheses on vector means and covariance matrix. Classification problems, discriminate analysis, and applications.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5543 Applied Regression Analysis
Prerequisites: One of STAT 4013, STAT 4033, STAT 4053, STAT 5013 or equivalent.
Description: Matrix algebra, simple linear regression, residual analysis techniques, multiple regression, dummy variables, interactions, model building, introduction to logistic regression. This course explains fundamentals of linear regression and provides an introduction to logistic regression. May not be used for degree credit with STAT 4043.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5563 Statistical Methods II for the Social Sciences
Prerequisites: STAT 3013 or STAT 4013 or STAT 4033 or STAT 4053.
Description: Basic concepts of experimental design. Analysis of variance, covariance, split-plot design. Factorial arrangements of treatments, multiple and curvilinear regression, enumeration data. May not be used for degree credit with STAT 4023 and STAT 4063.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 5910 Seminar in Statistics
Prerequisites: Consent of instructor.
Description: Investigation of special problems in the theory and/or application of statistics using current techniques. Special studies for M.S. level students. Offered for variable credit, 1-6 credits. maximum of 3 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

STAT 5980 Internship in Statistics
Prerequisites: Consent of instructor.
Description: Directed practicum or internship experience in a Statistics-related professional work setting. Students must have an approved internship that will provide statistical experience beyond that available in the classroom. Students produce written analyses of their work and learning under the guidance of the instructor and internship site supervisor. Offered for variable credit, 1-9 credit hours, maximum of 9 credit hours.
Credit hours: 1-9
Contact hours: Contact: 1-9 Other: 1-9
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

STAT 6000 Doctoral Dissertation
Prerequisites: Consent of advisory committee.
Description: Directed research culminating in the PhD thesis. Offered for variable credit, 1-10 credit hours, maximum of 30 credit hours.
Credit hours: 1-10
Contact hours: Contact: 1-10 Other: 1-10
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

STAT 6010 Statistics Literature
Prerequisites: Consent of instructor.
Description: Published journal articles from statistics or related areas are discussed. Previously offered as STAT 6001. Offered for fixed credit, 1 credit hour, maximum of 2 credit hours.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 6013 Genetic Statistics
Prerequisites: Elementary Statistics or with the permission of the instructor.
Description: Course provides a statistical basis for analyzing genetic sequence data. Review of basic concepts in statistics including graphical and numerical methods, sample size estimation for biological experiments, and hypothesis testing. Review of basic concepts in genetics including DNA, genes, alleles, polymorphisms, SNP's. Descriptive statistics for genetic sequences, use of statistical tools for sequence analysis and statistical inference with R.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 6113 Probability Theory
Prerequisites: STAT 5123 and MATH 5143.
Description: Measure theoretical presentation of probability, integration and expectation, product spaces and independence, conditioning, different kinds of convergence in probability theory, statistical spaces, characteristic functions and their applications. Previously offered as STAT 5113.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 6203 Large Sample Inference
Prerequisites: STAT 5223 and STAT 6113.
Description: Different types of convergence in probability theory, central limit theorem, consistency, large sample estimation and tests of hypotheses, concepts of asymptotic efficiency, nonparametric tests. Previously offered as STAT 5203.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 6223 Advanced Statistical Inference
Prerequisites: STAT 6113.
Description: Point estimation, maximum likelihood, Cramer-Rao inequality, confidence intervals, Neyman-Pearson theory of testing hypothesis and power of test. Previously offered as STAT 6213.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Statistics

STAT 6910 Special Problems
Prerequisites: Consent of instructor.
Description: Investigation of special problems in the theory and application of statistics using current techniques. Special studies for PhD level students. Offered for variable credit, 1-6 credit hours, maximum of 12 credit hours.
Credit hours: 1-12
Contact hours: Contact: 1-12 Other: 1-12
Levels: Graduate
Schedule types: Independent Study
Department/School: Statistics

Undergraduate Programs

- Statistics, BS (http://catalog.okstate.edu/arts-sciences/statistics/bs/)
- Statistics: Actuarial Science, BS (http://catalog.okstate.edu/arts-sciences/statistics/actuarial-bs/)
- Statistics: Business Essentials, BS (http://catalog.okstate.edu/arts-sciences/statistics/business-essentials-bs/)
- Statistics: Data Science, BS (http://catalog.okstate.edu/arts-sciences/statistics/data-science-bs/)

Graduate Programs
Admission Requirements

It is necessary to have an undergraduate degree, not necessarily in statistics or mathematics, to begin a program of study toward the master's degree in statistics. In some instances, it may be advantageous to have an undergraduate degree in another field. However, the student should have acquired a good mathematical background and some statistical background as an undergraduate. Also, each student is required to have completed CS 1113 Computer Science I (A) or to have demonstrated competence in a programming language such as C. This should be equivalent to the required courses in the bachelor's program:

Code	Title	Hours
MATH 2144	Calculus I (A)	4
MATH 2153	Calculus II (A)	3

MATH 2163	Calculus III	3
STAT 4013	Statistical Methods I (A)	3
MATH 3013	Linear Algebra (A) (not required for Applied MS)	3
MATH 4013	Calculus of Several Variables (not required for Applied MS)	3
CS 1113	Computer Science I (A)	3

Lecturer: Jana Alford, MS

Students admitted to the program with deficiencies will be required to remedy such deficiencies. MATH 3013 and MATH 4013 are not required for the Master of Science in Applied Statistics.

The Master of Science Degree

The Master of Science degree in statistics is designed to prepare students for work as a statistician or doctoral studies in statistics. It may be completed by following one of the three plans listed in the "Graduate College (http://catalog.okstate.edu/graduate-college/)" section of the Catalog. Normally, the all-course work plan will be initiated at the suggestion of the faculty. Each student will be required to attain an introductory knowledge of some field of application outside of statistics, mathematics, and computer science. This requirement may be satisfied by having taken a three-hour graduate course in an approved field of statistical application.

The Master of Science in Applied Statistics Degree

The Master of Science in Applied Statistics (MSAS) degree can be completed with online coursework. It is intended to be a terminal professional master's degree. It is not intended to be preparation for doctoral work in statistics. Neither comprehensive exams nor a thesis or formal report is required for completion of this degree. A two-hour creative component course is required at the end of the matriculation through the program. More information regarding this degree can be found on the OSU Statistics Department website.

The Doctor of Philosophy Degree

The PhD requires the completion of 90 hours beyond the BS degree. A maximum of 30 of these credit hours may be earned by research for the dissertation. Each student will be required to attain an introductory knowledge of some field of application which may be satisfied by taking a three-hour graduate course outside the fields of statistics, mathematics, and computing.

Minors

- Applied Statistics (APST), Minor (http://catalog.okstate.edu/arts-sciences/statistics/applied-statistics-minor/)
- Statistical Data Science (SDSC), Minor (http://catalog.okstate.edu/arts-sciences/statistics/statistical-data-science-minor/)
- Statistics (STAT), Minor (http://catalog.okstate.edu/arts-sciences/statistics/statistics-minor/)

Faculty

Melinda H. McCann, PhD—Professor and Head
Professors: Carla L. Goad, PhD; Joshua Habiger, PhD; Lan Zhu, PhD
Associate Professors: Ye Liang, PhD; Pratyaydipta Rudra, PhD
Assistant Professors: Sangyoon Yi, PhD; Zeyi Wang, PhD
Teaching Assistant Professor: Nishantha Samarakoon, PhD; Alyaa Zahran, PhD; Nicholas Kaukis, PhD