# STA - STATISTICS

**STA 1020 Elementary Statistics Cr. 3**
**Satisfies General Education Requirement:** Quantitative Experience Comp
Descriptive statistics, correlation and regression, notions in probability, binomial and normal distributions, testing hypothesis. Offered Every Term.

**STA 2210 Probability and Statistics Cr. 4**
**Satisfies General Education Requirement:** Quantitative Experience Comp
Basic probability theory (definition of probability, conditional probability, independence, random variables, expectation and variance, normal distribution, law of large numbers, central limit theorem), descriptive statistics (histograms, scatter plots, box plots, mean, variance, quantiles, empirical rule, z-scores), statistical inference (confidence intervals for mean, t-tests, chi-square tests, linear regression, analysis of variance) and data analysis. Offered Every Term.
**Prerequisites:** MAT 1800 with a minimum grade of C-, MAT 2010-2350 with a minimum grade of C-, MAT Permit to Reg ACT/SAT with a test score minimum of 4, or Math Permit to Reg - (L1-L4) with a test score minimum of 4

**STA 5030 Statistical Computing and Data Analysis Cr. 3**
Computational aspect of statistics and data analysis for advanced undergraduate and beginning graduate students. Topics include descriptive statistics, probability distributions, hypothesis testing, ANOVA, linear regression and logistic regression. Data analysis by use of statistical packages such as R, SAS, Python, SPSS or Minitab. Satisfies Society of Actuaries Validation by Educational Experience (VEE) in Applied Statistics for regression component with a B- or better. Offered Fall.
**Prerequisites:** (MAT 2250 with a minimum grade of C- or MAT 2150 with a minimum grade of C-) and (MAT 2210 with a minimum grade of C-, STA 2210 with a minimum grade of C-, MAT 5700 with a minimum grade of C-, BE 2100 with a minimum grade of C-, ECO 5100 with a minimum grade of C-, or PH 3200 with a minimum grade of C-)

**STA 5800 Introduction to Mathematical Statistics Cr. 4**
A one-semester course for senior undergraduate and master's degree students. Introduction to basic mathematical theory of statistics. Topics include survey sampling, estimation theory, data analysis and sample statistics, testing hypothesis, two sample cases, analysis of variance, regression analysis, Bayesian inference. Satisfies Society of Actuaries Validation by Educational Experience (VEE) in Applied Statistics for regression component with a B- or better. Offered Winter.
**Prerequisites:** MAT 5700 with a minimum grade of C- and (MAT 2150 with a minimum grade of C-, MAT 2250 with a minimum grade of C-, or MAT 2350 with a minimum grade of C-)

**STA 5820 Introduction to Data Science Cr. 3**
An applied statistical learning course designed for upper level undergraduate students and graduate students in mathematics and other quantitative fields. Topics include: bias-variance trade-off, regression, classification, cross-validation, bootstrap, model selection, regularization, splines, generalized additive models, tree-based methods, support vector machines, principal component analysis and clustering. Computer implementation will be discussed for each of the methods, and students will run their own data analysis projects. Offered Winter.
**Prerequisite:** STA 5030 with a minimum grade of C or STA 5800 with a minimum grade of C or MAT 5800 with a minimum grade of C

**STA 5830 Applied Time Series Cr. 3**
Time series models, moving average models, autoregressive models, non-stationary models, and more general models; point estimators, confidence intervals, and forecast in the time domain. Statistical analysis in the frequency domain; spectral density and periodogram. Satisfies Society of Actuaries Validation by Educational Experience (VEE) in Applied Statistics for regression component with a B- or better. Offered Intermittently.
**Prerequisites:** (MAT 2250 with a minimum grade of C- or MAT 2150 with a minimum grade of C-) and (MAT 2210 with a minimum grade of C-, STA 2210 with a minimum grade of C-, BE 2100 with a minimum grade of C-, ECO 5100 with a minimum grade of C-, or PH 3200 with a minimum grade of C-)

**STA 6830 Design of Experiments Cr. 3**
Randomized blocks; Latin and Graeco-Latin squares; factorial designs; confounding; split plot; fractional replication; balanced incomplete blocks. Offered Intermittently.
**Prerequisites:** (MAT 2250 with a minimum grade of C- or MAT 2150 with a minimum grade of C-) and (MAT 2210 with a minimum grade of C-, STA 2210 with a minimum grade of C-, BE 2100 with a minimum grade of C-, ECO 5100 with a minimum grade of C-, or PH 3200 with a minimum grade of C-)

**STA 6840 Applied Regression Analysis Cr. 3**
Multiple linear regression; generalized linear models; random effect models; repeated measurements; mixed effect models; non-parametric additive models. Computer implementation using statistical software R; student project on real data analysis. Offered Fall.
**Prerequisites:** STA 5030 with a minimum grade of C- or STA 5800 with a minimum grade of C-

**STA 7800 Data Science and Analytics Practicum Cr. 6**
Apply theoretical knowledge and skills acquired throughout the Data Science and Business Analytics MS program to a challenging project involving real-world business problems/opportunities and data analytics in a reliable, scalable, distributed computing environment for optimal outcomes. Offered Yearly.
**Restriction(s):** Enrollment is limited to students with a major in Advanced Analytics, Data Computing, Data-Driven Business or Statistics; enrollment is limited to Graduate level students.
**Equivalent:** DSA 7500, DSB 7500, DSE 7500

**STA 7810 Advanced Statistics Theory I Cr. 3**
First of two basic courses for Ph.D. students in the Mathematics Department who are interested in statistics. Topics include sample distribution theory, point and interval estimations, optimal estimates, theory of hypothesis testing, and most powerful tests. Offered Every Other Fall.
**Prerequisite:** MAT 5610 with a minimum grade of C and MAT 5700 with a minimum grade of C
**Restriction(s):** Enrollment is limited to Graduate level students.