DATA SCIENCE (DSC)

DSC 223 Intro Math of Data Science (3 credits)
This course provides an introduction to basic mathematical topics needed to understand modern areas of applied and theoretical mathematics including the rapidly growing field of data science. It includes elementary set theory and counting techniques, discrete probability, descriptive statistics, simple linear regression, basic inferential statistics, and an introduction to linear algebra. This course will also cover some basic proof techniques in elementary set theory, combinatorics, discrete probability and linear algebra.
Prerequisites: MAT 155 and MAT 161
Attributes: Math Beauty, Undergraduate

DSC 325 Essentials of Data Science (3 credits)
This course covers the basic topics in data science. It includes descriptive and inferential statistics, introduction to simple and multiple regression, data visualization, and data cleaning or scrubbing. It also includes an introduction to machine learning topics such as decision trees, k-nearest neighbors, neural networks and clustering. The R software or the Python programming language will be used to visualize and analyze datasets.
Prerequisites: MAT 223 or DSC 223
Attributes: Math Beauty, Undergraduate

DSC 326 Advanced Data Science (3 credits)
This course covers some advanced topics in data science, including recent tools for performing predictive analytics, data visualization, data wrangling, statistical inference, deep machine learning, and software engineering. Various software packages, including TensorFlow, will be used to build predictive models. Whenever appropriate, the mathematical background of predictive models will be covered. Also, one of the main goals is to introduce students to the most important aspects of data science by reinforcing writing efficient code, testing, and debugging while working with large software systems. The course includes several programming projects in Python and/or R.
Prerequisites: DSC 325 or CSC 346
Attributes: Math Beauty, Undergraduate

DSC 425 Machine Learning/Data Science (3 credits)
This course provides an introduction to the fields of Machine Learning, Data Science and Predictive Analytics. It includes linear regression, logistic regression, nearest neighbor methods, decision trees, neural networks, clustering, principal components analysis, and resampling methods such as cross-validation and bootstrapping. If time permits, it will also include support vector machines, deep learning methods, and machine learning methods for numerical optimization such as genetic and evolutionary algorithms and swarm intelligence algorithms. The R software will be used to apply statistical and machine learning methods to real data sets. Whenever appropriate, the mathematical background of machine learning methods will be covered. Students will be required to work on a final data analysis project and present their findings in class. This course and MAT 424 (Regression and Time Series) together cover the topics in the SOA (Society of Actuaries) exam in SRM (Statistics for Risk Modeling) and provide an intro to the PA (Predictive Analytics) exam. Also, this course and MAT 424 cover several topics in the CAS (Casualty Actuarial Society) exams in MAS (Modern Actuarial Statistics) I and II.
Prerequisites: MAT 223 or DSC 223
Attributes: Math Beauty, Undergraduate