

DECISION SCIENCES (DS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

DS 801 - Business Intelligence

Credits: 3

This course is designed to introduce students to the skills needed to succeed in today's big data environment through the application of data management techniques, business-oriented hands-on cases and exercises. Students will acquire concepts and application of data management techniques, business-oriented hands-on cases and exercises. Students will acquire concepts and techniques in the theory, design, and implementation of relational databases and Data Warehousing (DW) systems, queries in Structured Query Language (SQL), next generation query language (NoSQL).

Grade Mode: Letter Grading

DS 802 - Probability and Simulation

Credits: 3

The course is designed to provide an introductory understanding of the fundamentals of uncertainty quantification in business decision making. The course will serve as a building block for subsequent course work in inferential statistics, predictive analytics, and time series analysis. The topics include the axioms of probability theory, random variables, probability distributions, random variable generation using simulation methods, and system simulation for relevant business applications (e.g. inventory management, supply chain management, and staffing in call centers). An introduction to the programming language R will be part of the learning experience.

Grade Mode: Letter Grading

DS 803 - Fundamentals of Statistical Analysis

Credits: 3

The course is designed to introduce the fundamentals of statistics needed for solving business analytics problems. The course will mainly cover the broadly defined subjects of random sampling, likelihoods, estimation using maximum likelihood, Bayesian inference using priors, computational statistics methods, interval estimation, hypothesis testing for continuous data, Gaussian linear models, and model diagnostics. The course will conclude with a brief introduction to nonparametric analysis. Prereq: DS 802.

Grade Mode: Letter Grading

DS 804 - Exploration and Communication of Data

Credits: 3

The goal of this course is to expose students to techniques and technologies that will enable them to collect, harvest and transform unstructured and structured data into useful business insights. The first half of the course deals with data management and provides an introduction to data types and sources, data acquisition and harvesting tools and techniques and effective strategies and methods for data aggregation and analysis. In the second half of the course, students learn about the theoretical underpinnings of data visualization and use a variety of software tools to visualize business data in order to generate insightful information that facilitates effective business decision making.

Grade Mode: Letter Grading

DS 805 - Statistical Learning

Credits: 3

This course introduces students to statistical tools for modeling and identifying patterns in complex data sets. The goal of statistical learning is to develop predictions informed by data. Topics to be covered include Gaussian linear models, cross-validation techniques, penalized regression methods such as ridge and LASSO, nonlinear models, logistic regression, tree-based models including random forests, bagging, and boosting, and support vector machines. Application areas include Marketing (e.g., effectiveness of advertising and customer satisfaction), Financial Economics (valuation), and Operations Management (resource allocation). The course delivery will be a mix of lectures, readings/podcasts with discussion, and hands-on data analyses. Prereq: DS 803.

Grade Mode: Letter Grading

DS 806 - Optimization Methods I

Credits: 3

This course introduces students to fundamental quantitative methods for modeling, analyzing, and determining the best course of action in complex decision-making situations. Topics to be covered include decision trees and tables, price of uncertainty, utility theory, linear programming, LP sensitivity analysis, and network flow optimization. Application areas include Marketing and Operations management (e.g., advertising, production and inventory planning, project or personnel scheduling, shipping and distribution, routing, ride matching, etc.)

Grade Mode: Letter Grading

DS 807 - Modeling Unstructured Data

Credits: 3

This course introduces students to statistical and machine learning tools for modeling unstructured data; including emails, documents, text messages, and social media data. Topics to be covered include text mining, clustering, mixture models, deep learning, and topic models. The course integrates numerous applications to demonstrate practical approaches to analyzing large unstructured collections of data. Application areas include Marketing (Yelp and Trip Advisor reviews), Human Resources (health care plan analysis), Social Media (Twitter, YouTube, and Instagram). The course delivery will be a mix of lectures, readings/podcasts with discussion, and hands-on data analysis. Prereq: DS 805.

Grade Mode: Letter Grading

DS 808 - Optimization Methods II

Credits: 3

This course introduces students to more advanced concepts and modeling techniques in mathematical programming. Topics to be covered include integer programming, nonlinear programming, multi-objective optimization, goal programming, and Monte Carlo simulation. Application areas include Marketing (e.g., pricing and revenue optimization), Finance (capital budgeting and portfolio optimization), and Operations management (e.g., production and inventory planning, shipping and distribution, routing, location selection, etc.). The course delivery will be a mix of lectures, hands-on problem solving, and case discussions. Prereq: DS 806.

Grade Mode: Letter Grading

DS 809 - Time Series Analysis

Credits: 3

The course is designed to introduce analytical techniques needed in the estimation and analysis of temporal (time series) data in various business disciplines. The course focuses on theoretical and application aspects of stationary/non-stationary univariate as well as multivariate time series models. Emphasis will be given to topics such as time series regression, random walks, ARIMA/SARIMA processes, ARCH/GARCH for modeling conditional volatility, Vector ARMA models, and transfer functions. Modern software implementation is fully integrated into the course. Some examples of the business application areas include demand forecasting, financial asset return modeling, stochastic volatility modeling of financial indexes and securities, mortgage default risk assessment, online webpage click-rate modeling, market share modeling. Prereq: DS 803.

Grade Mode: Letter Grading

DS 810 - Enterprise Level Analytics

Credits: 3

This course is designed to be a capstone experience with emphasis on the integration of materials covered in prior courses. In addition, the course provides students with the necessary knowledge and skills to manage vast quantities of business data. By the end of the course students will understand how big data systems are developed and used to support the operations and decision-making functions within a business organization. The course begins with a framework for understanding big data systems are developed and used. It continues with an emphasis on "experiential learning" where students build big data systems using contemporary technologies such as Hadoop, MapReduce, Spark etc. Finally, students learn how to analyze large-scale data sets and reveal valuable business insights. As part of the capstone experience, students develop these systems in groups, make several presentations and discuss cases during the semester. Prereq: DS 801, DS 804, and DS 807.

Grade Mode: Letter Grading

DS 898 - Topics in Business Analytics

Credits: 3

Special Topics; may be repeated. Pre- and co-requisite courses vary. Please consult time and room schedule for the specific 898 topics section you are interested in for details.

Repeat Rule: May be repeated for a maximum of 12 credits.

Grade Mode: Letter Grading