

DECISION SCIENCES (DS)

The Decision Sciences (DS) Department within the Peter T. Paul College of Business and Economics consists of faculty from three disciplines: business statistics, operations research/management, and management information systems. The Decision Sciences faculty focuses on developing analytical methods to aid business decision making. The expertise in the Department can be segmented into three main building blocks of business analytics:

- Descriptive analytics deals with storing/accessing data via databases, pre-processing data, and visually representing/summarizing historical patterns to gain managerial insights.
- Predictive analytics deals with modeling/quantifying uncertainty and building models that assist in producing forecasts/predictions for future phenomena.
- Prescriptive analytics deals with optimal business decisions when firms are faced with limited resources.

The Department also coordinates the B.S. Business Administration options in Information Systems & Business Analytics and Entrepreneurial Studies, as well as the MBA Information Systems & Business Analytics specialization and the graduate certificate in Business Analytics. The Peter T. Paul College is accredited by the Association to Advance Collegiate Schools of Business (AACSB).

<https://paulcollege.unh.edu/decision-sciences-department>

Programs

- [Business Analytics \(M.S.\)](#)
- [Business Analytics \(Graduate Certificate\)](#)

Courses

Decision Sciences (DS)

DS 800 - Paul Assessment of MSBA Core Knowledge

Credits: 0

One of the learning objectives in the MSBA Program is that all students will graduate with an understanding of the core knowledge assembled from various core courses in the program. We assess the learning as part of our Assurance of Learning Program. This zero credit course provides an administrative mechanism for accomplishing this goal.

Grade Mode: Graduate Credit/Fail grading

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.

Prerequisite(s): DS 802 with a minimum grade of B-

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.

Prerequisite(s): DS 803 with a minimum grade of B-

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.

Prerequisite(s): DS 805 with a minimum grade of B-**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.

Prerequisite(s): DS 806 with a minimum grade of B-**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.

Prerequisite(s): DS 803 with a minimum grade of B-**Grade Mode:** Letter Grading**DS 810 - Big Data and AI: Strategy and 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 knowledge and skills to manage and model vast quantities of data for business analytics. The course covers deep neural networks and large-scale data processing using ecosystems of computing tools such as TensorFlow and Apache Spark. Students learn how to store, analyze, and derive insights from large-scale datasets and develop an understanding of the implications of deep learning for business. As a part of the capstone experience, students complete a team project that focuses on using big data and artificial intelligence for business insights, and present and discuss their work.

Prerequisite(s): DS 801 with a minimum grade of B- and DS 804 with a minimum grade of B- and DS 805 with a minimum grade of B-**Grade Mode:** Letter Grading**DS 815 - Programming for Business Analytics****Credits:** 3

This course introduces students to business programming. The course covers the Python programming language and students learn to collect, wrangle and manipulate data. Students also gain hands-on experience generating and presenting meaningful visualizations of quantitative and qualitative data to aid peer/managerial decision-making.

Grade Mode: Letter Grading**DS 816 - Tools for Business Analytics****Credits:** 3

The goal of this course is to expose students to popular software tools used in all stages of data analytics in business, to create actionable insights. The course will cover and introduce tools for the three key areas of data analytics: a) Data Preparation & Blending b) Data Analysis & Visualization c) Model Building for Predictive Analytics. Students learn about the overall capabilities of these tools and will practice applying them to diverse types of sample data.

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

Faculty

[Decision Sciences Faculty](#)