

APPLIED DATA SCIENCE

Courses

ADS 500A | PROBABILITY AND STATISTICS FOR DATA SCIENCE

Units: 3 Repeatability: No

This course is an introduction to probability and statistical concepts and their applications in solving real-world problems. This prerequisite course provides a solid background in the application of probability and statistics that will form the basis for advanced data science methods. Statistical concepts, probability theory, random and multivariate variables, data and sampling distributions, descriptive statistics, and hypothesis testing will be covered. The use of computer-based applications for the performance of basic statistics will be utilized. Covered topics include the numerical and graphical description of data, elements of probability, sampling distributions, probability distribution functions, estimation of population parameters, and hypothesis tests. This course will combine the learnings from texts, case studies, and standard organizational processes with practical problem-solving skills to present, structure, and plan the problem as it would be presented in large enterprises, and execute the steps in a structured analytics process.

ADS 500B | DATA SCIENCE PROGRAMMING

Units: 3 Repeatability: No

This course is on fundamental and advanced concepts of programming and problem-solving for data science. Python and R languages are used to solve problems on real-world datasets. Topics include basics of Python and R, data acquisition, cleansing and transformation, problem understanding and data preparation, standardization, and exploratory data analysis. In addition, this course is on advanced concepts of programming and modeling for data science. Topics include data partitioning, validation, model building with Decision trees, Naïve Bayes classification, Neural networks, clustering and regression, model evaluation, dimensionality reduction, association rules, and generalized linear models.

ADS 501 | FOUNDATIONS OF DATA SCIENCE AND DATA ETHICS

Units: 3 Repeatability: No

Prerequisites: ADS 500A with a minimum grade of C- and ADS 500B with a minimum grade of C-

This course covers an introduction into the methods, concepts, and ethical considerations found and practiced in the field of professional data science. Topics include: defining and structuring the problem, managing the integration of data science in business, the CRISP-DM and Agile processes, “ensuring the science” in data science using the scientific method, managing ethical concerns, and model bias by analyzing case studies, and performing exploratory data analysis with visualizations using BI tools. This course will combine the learnings from case studies, texts, and standard organizational processes with practical problem-solving skills to present, structure, and plan the problem as it would be presented in large enterprises, and execute the steps in the data science workflow.

ADS 502 | APPLIED DATA MINING

Units: 3 Repeatability: No

Prerequisites: ADS 500A with a minimum grade of C- and ADS 500B with a minimum grade of C-

The course covers data exploration and data mining principles, techniques, and applications with a variety of integrated theoretical and practical examples in classification, association analysis, cluster analysis, and anomaly detection. This course also includes a wide variety of applied examples associated with each topic in data mining.

ADS 503 | APPLIED PREDICTIVE MODELING

Units: 3 Repeatability: No

Prerequisites: ADS 500A with a minimum grade of C- and ADS 500B with a minimum grade of C-

This course provides a working knowledge of applied predictive modeling. Students will obtain a broad understanding of model training and development procedures, applications to real-world problems in the industry, and the differences between predictive model types and uses. Course topics include linear and non-linear regression modeling methods, linear and non-linear classification modeling methods, model selection, variable importance, variable selection and model applications.

ADS 504 | MACHINE LEARNING AND DEEP LEARNING FOR DATA SCIENCE

Units: 3 Repeatability: No

Prerequisites: ADS 500A with a minimum grade of C- and ADS 500B with a minimum grade of C-

Study of supervised and unsupervised algorithms for machine learning. Emphasis on formulating, choosing, applying, implementing, evaluating machine learning models to capture key patterns exhibited in cross-sectional data, time-series data, and longitudinal data. Considerations of model complexity, results interpretations, and implementation in real-world applications.

ADS 505 | APPLIED DATA SCIENCE FOR BUSINESS

Units: 3 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C- and ADS 502 with a minimum grade of C-

This course covers the role Data Science plays in enabling business strategy and competitive advantage. Topics include alignment of data science solutions to business strategy and the fundamental concepts of solving problems in the industry with Data Science. Other topics include data-analytic thinking, problem identification to data and analytics solutioning, segmenting with k-Nearest Neighbor (k-NN), Naive Bayes Classifier, Dimensionality Reduction, Classification, and Regression Trees.

ADS 506 | APPLIED TIME SERIES ANALYSIS

Units: 3 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C- and ADS 502 with a minimum grade of C-

Many data sets naturally have a time series component: records collected over time, including financial data, biological data signals, such as brain waves or blood glucose levels, weather, and seasonal information. Practicing data scientists need to identify when they encounter time series data and apply suitable techniques. This course will cover the major topics in time series analysis and forecasting (prediction). Students will be familiar with the major types of time series models commonly used in industrial practice and apply them on real datasets, culminating in a complete analysis of a nontrivial real-world dataset from end-to-end.

ADS 507 | PRACTICAL DATA ENGINEERING

Units: 3 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C-

This course will cover database table structures, column data types, and the T-SQL language components that go into querying against a database. Reading data from a table, row filtering, and column based functions will be discussed. We will also write queries that combine data from multiple tables, use conditional logic, and create aggregated result sets (sum, average, min, max). Database administration features of SQL will be discussed. Finally we will discuss how to create objects in SQL Server such as tables, views and stored procedures, and how to manipulate data in existing objects using insert, update, and delete statements.

ADS 508 | DATA SCIENCE WITH CLOUD COMPUTING

Units: 3 Repeatability: No

Prerequisites: ADS 502 with a minimum grade of C-

This course is on fundamental concepts of cloud computing as it impacts the field of data science. Course topics include cloud economics, distributed storage, MapReduce, Hadoop ecosystem, Apache Spark, Machine Learning with MLLib, natural language processing with Spark, and data governance considerations in the cloud.

ADS 509 | APPLIED TEXT MINING

Units: 2 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C-

This course focuses on the major applications and techniques used in textual data mining and analyzing using Python and R. Topics include text preprocessing, vectorization and word document frequencies, linguistic feature engineering, topic modeling, text and document classification, sentiment analysis, introduction to advanced deep learning models.

ADS 550 | NEW STUDENT ORIENTATION

Units: 0 Repeatability: No

This orientation course introduces students to the University of San Diego and provides important information about the program. Throughout the orientation, students will learn to successfully navigate through the Blackboard learning environment and locate helpful resources. Students will practice completing tasks in Blackboard as preparation for success in their online graduate courses. This orientation course will be available to students as a reference tool throughout the entirety of your program.

ADS 594 | SPECIAL TOPICS IN DATA SCIENCE

Units: 3 Repeatability: Yes (Repeatable if topic differs)

Prerequisites: ADS 501 with a minimum grade of C- and ADS 501 with a minimum grade of C-

This is a special topics course discussing areas of interest in data science. This course may be repeated for credit with a different topic.

ADS 599A | CAPSTONE PROJECT

Units: 1 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C- and ADS 502 with a minimum grade of C- and ADS 504 with a minimum grade of C- and ADS 505 with a minimum grade of C- and ADS 507 with a minimum grade of C-

The Master's level capstone includes a comprehensive, in-depth data science project implementation in two individual courses to provide students with an opportunity to collect, process, and apply various data science techniques and tools to address analytic real-world interdisciplinary problems. The team-based, collaborative project will be conducted to practice cases similar to analytic projects in industry, government, nonprofit organizations, and academic research. Teams will submit a consolidated report and provide technical presentations to the project advisors on the entire project process.

ADS 599B | CAPSTONE PROJECT

Units: 3 Repeatability: No

Prerequisites: ADS 501 with a minimum grade of C- and ADS 502 with a minimum grade of C- and ADS 504 with a minimum grade of C- and ADS 505 with a minimum grade of C- and ADS 507 with a minimum grade of C-

The Master's level capstone includes a comprehensive, in-depth data science project implementation in two individual courses to provide students with an opportunity to collect, process, and apply various data science techniques and tools to address analytic real-world interdisciplinary problems. The team-based, collaborative project will be conducted to practice cases similar to analytic projects in industry, government, nonprofit organizations, and academic research. Teams will submit a consolidated report and provide technical presentations to the project advisors on the entire project process.