

# Data (DATA)

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## Data Science

### **DATA 1501. Introduction to Data Science. 3 Hours.**

An introduction to the field of Data Science. Students will develop skills in appropriate technology and basic statistical methods by completing hands-on projects focused on real-world data and addressing the social consequences of data analysis and application.

### **DATA 2000. Information Systems and Data Transformation in Business. 3 Hours.**

An introduction to how information and information systems support business operations and decision-making, and to the use of data in business.

### **DATA 2600. Foundations of Data Science. 3 Hours.**

A first course in the methods of data science, including fundamentals of time series analysis, machine learning, and neural networks. Students will be introduced to programming, spreadsheets, and other technologies useful in data science.

### **DATA 3100. Introduction to Data Analytics. 3 Hours.**

Prerequisite: BUSA 2100. Introduction to a variety of modeling and analytic methods using data to describe, diagnose, predict, and prescribe real world decisions and processes. Topics include finding data, cleaning data, visualizing data, analyzing data, and making statistical inferences.

### **DATA 3200. Data Visualizations and Analytics. 3 Hours.**

Prerequisite: DATA 3100. An introduction to data visualization techniques to communicate information and identify business problems. Students will manipulate data, create visual objects to describe data, create hierarchies, linked and dynamic graphs to gain a deeper understanding of existing relationships in the data.

### **DATA 3200H. Data Visualizations and Analytics Honors. 3 Hours.**

An introduction to data visualization techniques to communicate information and identify business problems. Students will manipulate data, create visual objects to describe data, create hierarchies, linked and dynamic graphs to gain a deeper understanding of existing relationships in the data. This honors section is restricted to the honors business major and requires coverage of advanced topics.

### **DATA 3355. Data Mining. 3 Hours.**

An introduction to concepts behind data mining, machine learning, text mining and web mining. Topics include data mining techniques such as classification, regression, association rules, cluster analysis, and recommendation systems used for processes of managing, analyzing, exploring and visualizing Big Data.

### **DATA 3500. Data Organization and Management. 3 Hours.**

An introduction to methods, techniques, and programs to organize and manage data, including data representations in computer systems, arrays, lists, trees, objects, classes, database concepts, data modeling, entity-relationship model, entity-relationship diagram, relational data model, and structured query language.

### **DATA 3502. Data Architecture. 3 Hours.**

An examination of rules, models, policies, and standards that govern the type of data collected and managed within an organization. The course emphasizes the tasks of data architects/data managers, i.e., reviewing and analyzing organizational data infrastructure and future databases and the implementation of solutions to store and manage data for organizations and their uses.

### **DATA 3505. Data Management. 3 Hours.**

A survey of general principles and concepts in data management and practices with the tools and knowledge for data architects/data managers to manage data effectively. The course emphasizes strategies for working with data, organizing research data, and sharing your data securely, and effectively.

### **DATA 3508. Data-Driven Decision Making. 3 Hours.**

An introduction to the critical role of data architects and managers in leveraging a diverse array of tools and methodologies to harness the power of data. Through a hands-on approach, learners will explore the fundamentals of data collection, delve into sophisticated techniques for data analysis, and master the art of drawing actionable insights. This course equips students with the knowledge and skills to employ data-driven strategies that drive organizational success emphasizing practical applications in real-world scenarios.

### **DATA 3600. Data Mining in Business. 3 Hours.**

The application of data mining techniques and tools for business analytics to improve managerial decision making, in a variety of business domains using data-driven approaches.

### **DATA 3700. Statistical Computing. 3 Hours.**

Prerequisites: MATH 3600 or permission of instructor. Also offered as MATH 3700. A study of the basic tools for statistical computing. Topics include generating random variations; Monte Carlo integration; Monte Carlo methods for estimation and hypothesis tests; Bootstrap confidence interval; numerical methods for root-finding, integration, optimization; regression; and other modern topics.

### **DATA 3701. Time Series Forecasting Techniques. 3 Hours.**

Prerequisites: DATA 3803. Advanced time series forecasting techniques, including ARIMA, SARIMA, GARCH, and neural network models. Students will explore model selection, hybrid approaches, and real-time forecasting, applying techniques to multivariate and univariate time series in practical projects.

**DATA 3801. Programming for Data Science I. 3 Hours.**

Prerequisites: DATA 2600 and CS 1301. A first course in programming for data science, with emphasis on using a high-level language such as Python to solve applied problems. Topics include dataset management, association mining, strings and regular expressions, and basic visualization tools.

**DATA 4000. Business Analytics Capstone. 3 Hours.**

Prerequisites: CS 1010, ECON 4000, and DATA 3600 with a grade of "C" or better. A capstone in which students will integrate and apply data analytics knowledge and tools to real business problems.

**DATA 4610. Statistical Machine Learning I. 3 Hours.**

Prerequisite: DATA 3700. Basics of statistical learning, bias-variance trade-off, review of topics related to multilinear models, resampling methods, model comparison, subset selection, shrinkage methods, generalized linear models, max-scaled and pseudo coefficient of determination, Pearson residuals, likelihood ratio tests.

**DATA 4901. Operations Research. 3 Hours.**

Prerequisites: MATH 2150 or MATH 4150 with a grade of "C:" or higher, or by permission of instructor. Also offered as MATH 4901. Mathematical aspects and applications of Operations Research. Topics are selected from linear programming (mainly), integer programming, and dynamic programming.

**DATA 4905. Topics in Data Science. 3 Hours.**

Prerequisites: MATH 3700 or 4901 or permission of instructor. Also offered as MATH 4905. Capstone project class for the Certificate in Basic Data Science program. Students will apply the knowledge and skills of R data analysis to complete course projects that will test essential skills in data visualization, probability, statistical inference, modeling, data organization, regression, Monte Carlo simulation and machine learning. Students will create data products that can be used to showcase their skills to potential employers. All projects will come from real world problems. May be repeated up to twice for credit.

**DATA 4980. Data Analytics Internship. 3 Hours.**

Graded "Satisfactory" or "Unsatisfactory". The application of data analytics skills in an employment situation. A written reflection and an employer evaluation is required. May be taken more than once with Department Head approval.

**DATA 4990. Special Topics in Data Science. 3 Hours.**

Selected topics in the field of data science. May be taken more than once if topics are different.