Washington University in St. Louis

Data Analytics & Applications

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Courses

Visit online course listings to view semester offerings for U71 DATA.

U71 DATA 5001 Foundations of Programming for Data Analytics & Applications
Programming is an increasingly important skill, whether you aspire to a career in software development or in other fields. This course introduces core programming concepts and problem-solving using Python. Students will learn the principles of software development, style, and testing. Topics include an operational model of Python execution, procedures and functions, iteration, recursion, lists, strings, algorithms, exceptions, object-oriented programming, and GUIs (graphical user interfaces). As the course progresses, students will learn to work with packages, data structures, object-oriented programming, and tools for data science and cybersecurity.
Credit 3 units. UColl: OLI

U71 DATA 5002 Foundations of Mathematics for Data Analytics & Applications
This course introduces the fundamental concepts, theorems, and tools used in data science and machine learning, including probability, optimization and calculus, linear algebra, discrete mathematics, and statistics. Applications of the theory to data science and machine learning will be developed with mathematical concepts being applied in Python. Prerequisites: None
Credit 3 units. UColl: OLI

U71 DATA 5013 Data Visualization and Story Telling
This course begins with a review of human perception and cognition, drawing upon psychological studies of perceptual accuracy and preferences. The course reviews principles of computational graphic design, what makes for a good graph, and why some data visualizations effectively present information and others do not. It considers visualization as a component of systems for data analytics and applications and presents examples of exploratory data analysis, visualizing time, networks, and maps. Students learn methods for static and interactive graphing and become familiar with tools for building web-browser-based presentations. Prerequisites: None
Credit 3 units. UColl: OLI

U71 DATA 5025 Enterprise Data Management
Organizations have begun generating, collecting, and accumulating more data at a faster pace than ever before. The advent of "Big Data" has proven to be both opportunity and challenge for contemporary organizations who are awash-even drowning-in data but starved for knowledge. Unfortunately, organizations have not developed comprehensive enterprise data management (EDM) practices that treat data as a strategic imperative. EDM is a comprehensive approach to defining, governing, securing, and maintaining the quality of all data involved in the business processes of an organization. EDM enables data-driven applications and decision-making by establishing policies and ownership of key data types and sources. The ultimate goals are to create a strategic context for the technology underpinnings of data life cycle management and ensure good stewardship of an organization's data. This course will cover the critical components of building an enterprise data management practice including, but not limited to, data strategy, data governance, data security, data architecture, data quality, data ownership, and metadata management. This course includes case studies, lectures, and group activities to enhance the textbook material.
Credit 3 units. UColl: OLI

U71 DATA 5030 Analytics Applications
This course focuses on the strategic, operational, tactical, and practical use of data analytics to inform decisions within an organization across a range of industry and government sectors as well as within organizational functions. Students will be introduced to specific analytics techniques that are used currently by practitioners in areas of diagnostic, descriptive, predictive, and prescriptive analytics. Students will learn the critical phases of analytics including data preparation, model development, evaluation, validation, selection, and deployment. In so doing, students will learn to apply data analytics in order to optimize organizational processes, improve performance, and inform decision-making.
Credit 3 units. UColl: OLI

U71 DATA 5300 Introduction to Relational Databases and SQL Programming
The purpose of this course is to introduce the essential concepts behind relational databases, and help students acquire and apply foundational knowledge of the SQL language and Relational Database Management Systems (RDBMS). Students will study relational data models and discover how they are created and what benefits they bring, plus how to apply them to their own data. Additionally, students are exposed to other types of datastores like NoSQL and graph databases, and how to work with them. The emphasis in this course is on practical and hands-on learning. Through a series of labs, students will practice building and running SQL queries. Prerequisites: None
Credit 3 units. UColl: OLI

U71 DATA 5740 Foundations of Data Analytics
Organizations are rapidly transforming the way they ingest, integrate, store, and serve data and perform analytics. In this course, students will learn the steps involved with designing and implementing data analytics and applications projects. Topics addressed include ingesting and parsing data from various sources, dealing with messy and missing data, transforming and engineering features, building and evaluating models, and visualizing results. Using Python, as well as other tools, students will complete assignments learning the process of building a data model as well as a variety of analytics techniques and under what situations they are best employed. Through lectures and practical exercises, students will become familiar with the computational mathematics that underpin analytics; the elements of statistical modeling and machine learning; model interpretation and assessment; and structured and unstructured data analysis. Prerequisites: None
Credit 3 units. UColl: OLI