Data Analytics

Contact Information
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- Masters Degree
- Graduate's Certificate

The M.S. in Data Analytics aims at providing an interdisciplinary approach to data analytics that covers both the foundational mathematical knowledge of data science and the computational methods and tools for preprocessing, interpreting, analyzing, representing, and visualizing data sets. The degree is offered in both on-campus and online* formats. Applications are accepted each spring and fall semester. The Data Analytics program may, at its own discretion, accept new students in the summer semester, and consider accepting students under conditional admission, thereby allowing students to take classes at UIS to complete the program's entrance requirements. Upon the completion of all entrance requirements, the student will be fully admitted.

Students must have completed a course in data structures and algorithms to be considered for admission to the master's degree program.

We also offer the Data Analytics Graduate Certificate designed for students who would like to acquire the basic knowledge and skills required for data science professionals to boost their marketability. The certificate provides fundamental knowledge in pre-processing, cleaning, exploring and visualizing data and machine learning and predictive analysis as well as storage, management and analysis of big data.

The Master's Degree

Advising
On acceptance, students are assigned their academic advisor. Before registering for the first time, the student should discuss an appropriate course of study with the academic advisor.

Grading Policy
Students must earn a grade of B- or better in all courses that apply toward the degree, and a cumulative 3.0 grade point average is required to graduate. In addition, graduate students who do not maintain a 3.0 grade point average will be placed on academic probation according to campus policy. Graduate students enrolled in 400-level courses should expect more stringent grading standards and/ or additional assignments. Courses taken on a CR/NC basis will not count toward the degree.

Transfer Courses
Students are allowed to transfer a maximum of eight graduate semester hours with a grade of B or better. They will be evaluated on a case-by-case basis and approved by a Student Petition. Transfer students will be required to take a minimum of 28 credit hours of Data Analytics core and elective course work at UIS.

Students must complete 28 required credit hours and 8 elective credit hours to earn the Data Analytics degree while maintaining a minimum GPA of 3.0 on a scale of 4.0 as listed below.

Requirements

Prerequisites
CSC 225  Computer Programming Concepts I  3
CSC 275  Computer Programming Concepts II  3
CSC 302  Discrete Structures  4
CSC 385  Data Structures and Algorithms  4
DAT 332  Matrix Analysis and Numerical Optimization  4
or MAT 332  Linear Algebra
MAT 113  Business Calculus  4
or MAT 115  Calculus I
MAT 121  Applied Statistics  3

Total Hours  25

Required Courses
CSC 472  Introduction to Database Systems  4
DAT 502  Introduction to Statistical Computation  4
DAT 530  Advanced Statistical Methods  4
CSC 532  Introduction to Machine Learning  4
CSC 534  Big Data Analytics  4
CSC 535  Deep Learning  4
DAT 554  Data Analytics Capstone  4

Electives (Choose two)  8
DAT 444  Operations Research Methods
or MAT 444  Operations Research Methods
CSC 533  Data Mining
CSC 561  NoSQL Databases
CSC 562  Data Visualization
CSC 570  Advanced Topics in Computer Systems
CSC 572  Advanced Database Concepts

Total Hours  36

1 The capstone project will draw upon the knowledge and skills learned throughout the entire curriculum and will ask students to apply the appropriate methods and tools for data analysis in a real-world organizational setting. The capstone course provides the opportunity to exercise different techniques for data storage, preprocessing, integration and analysis covered throughout the M.S. in Data Analytics curriculum in order to address business challenges. The students must provide a well-written report and an oral presentation to effectively communicate their findings.

Graduate Certificate
- Graduate Certificate in Data Analytics

Online Degree
- Data Analytics
- Graduate Certificate in Data Analytics
Courses

DAT 332. Matrix Analysis and Numerical Optimization. 4 Hours.
This course is an introduction to matrices and numerical optimization with applications in engineering and science. Topics include Algebra of matrices and systems of linear algebraic equations, rank, inverse, eigenvalues, eigenvectors, vector spaces, subspaces, basis, independence, orthogonal projection, determinant, linear programming and other numerical methods. Course Information: Prerequisites: MAT 115 or MAT 113 or equivalent.

DAT 444. Operations Research Methods. 4 Hours.
Quantitative methods necessary for analysis, modeling, and decision making. Topics include linear programming, transportation model, network models, decision theory, games theory, PERT-CPM, inventory models, and queuing theory. Additional topics may be chosen from integer linear programming, system simulation, and nonlinear programming. Course Information: Same as MAT 444 and PAD 431. Prerequisite: MAT 332 with grade of C or better.

DAT 502. Introduction to Statistical Computation. 4 Hours.
Explore the use of various statistical software packages, such as SAS, SPSS, and R. Topics will be selected from construction of data set, descriptive analysis, regression analysis, analysis of design experiment, multivariate analysis, categorical data analysis, discriminant analysis, cluster analysis, and presentation of data in graphic forms. Course Information: Prerequisites: CSC 225 or equivalent and MAT 121 or equivalent.

DAT 530. Advanced Statistical Methods. 4 Hours.
Topics include multiple linear regression, statistical inferences for regression model, diagnostics and remedies for multicollinearity, outlier and influential cases, model selection, logistic regression, multivariate analysis, categorical data analysis, discriminant analysis, cluster analysis. Course Information: Prerequisites: MAT 121 or equivalent.

DAT 532. Introduction to Machine Learning. 4 Hours.
Machine learning explores the design and the study of algorithms that can learn from data or experience, improve their performance, and make predictions. The course provides an overview of many concepts, techniques, and algorithms in machine learning, including supervised learning, unsupervised learning, reinforcement learning, and neural networks. Course Information: Prerequisites: CSC 385.

DAT 533. Data Mining. 4 Hours.
This course teaches advanced techniques for discovering hidden patterns in the rapidly growing data generated by businesses, science, web, and other sources. Focus is on the key tasks of data mining, including data preparation, classification, clustering, association rule mining, and evaluation. Course Information: Course is restricted to MS CSC majors and MS DAT majors only. Prerequisites: CSC 385.

DAT 534. Big Data Analytics. 4 Hours.
This course teaches concepts and techniques in managing and analyzing large data sets. Focus is on big data management, storage solutions, query processing, analytics, and big data applications. Topics include: introduction to Hadoop and YARN, MapReduce, Apache Spark, Big Data Warehousing with Hive and Spark SQL, large scale recommender systems and large scale Clustering and Classification. Course Information: Prerequisites: CSC 385, CSC 472, CSC 532 (co-requisite).

DAT 554. Data Analytics Capstone. 4 Hours.
This is a practicum course that allows students to apply the appropriate methods and tools for data analysis in a real-world organizational setting. The capstone course provides the opportunity to exercise different techniques for data storage, preprocessing, integration and analysis covered throughout the Master of Data Analytics curriculum in order to address challenges from different areas. Course Information: Co-requisites: CSC 534 and CSC 535.

DAT 555. Data Analytics Capstone Continuing Enrollment. 0 Hours.
This course is required for DAT students who took but have not completed Capstone course DAT 554. Students must register for DAT 555 for zero credit hour (one billable hour) in all subsequent semesters until DAT 554 is completed. Course Information: Restricted to DAT majors.

DAT 570. Advanced Topics in Data Analytics. 4 Hours.
Topics and prerequisites vary. Students may refer to the course schedule for topics and prerequisites. Restricted to Graduate Students, Data Analytics majors or Computer Science majors.