

# Graduate Certificate in Business Analytics & Data Science

## What is it?

The Graduate Certificate in Business Analytics and Data Science is one of three graduates certificates offered by cooperating departments at Missouri S&T to fulfill the needs in the area described as "Big Data".

Big Data is an emerging phenomenon. Computing systems today are generating 15 petabytes of new information every day- eight more times than the combined information in all the libraries in the U.S.; about 80% of the data generated every day is textual and unstructured data.

Data analytics facilitates realization of objectives by identifying trends, creating predictive models for forecasting, and optimizing business processes for enhanced performance. Three main categories of analytics are:

- Descriptive- the use of data to find out what happened in the past
- Predictive- the use of data to find out what could happen in the future
- Prescriptive- the use of data to prescribe the best course of action for the future.

## When are the classes offered?

### *Required core courses:*

IST 5420 (301) Introduction to Big Data Analytics

### *Choose one of the following as an elective course:*

ERP 5410 (345) Use of Business Intelligence	Offered Fall Semester
CSc 6001 (401) Cloud Computing and Big Data Management	
CSc 5001 (301) Introduction to Data Mining	
CpE 6330 (439) Clustering Algorithms	Offered Spring Semester
Stat 5814 (314) Applied Time Series Analysis	

### *Choose two of the following as elective courses:*

IST 6443 (443) Information Retrieval and Analysis	Offered Fall Semester
IST 6444 (444) Essentials of Data Warehouses	Offered Spring Semester
IST 6445 (445) Database Marketing	Offered Spring Semester
IST 6448 (448) Building the Data Warehouse	
ERP 5210 (348) Performance Dashboard, Scorecard and Data Visualization	Offered Spring Semester
ERP 6610 (442) Adv. Customer Relationship Mgmt in ERP Environment	Offered Fall Semester
ERP 6220 (448) Enterprise Performance Dashboard Prototyping	Offered Fall Semester
BUS 5360 (360) Business Operations	Offered Fall Semester
BUS 6425 (425) Supply Chain and Project Management	Offered Spring Semester

## How do I apply?

The graduate certificate program is open to all individuals holding a BS, MS or PhD degree in areas such as business, social sciences, technology, engineering, or related disciplines. In order to receive a Graduate Certificate, the student must have an average graduate cumulative grade point of 3.0 or better on a 4.0 scale in the certificate courses taken. Students admitted only to the certificate program will have non-degree graduate status but will earn graduate credit for the courses they complete. If the four-course sequence approved by the graduate advisor is completed with a grade of B or better in each of the courses taken, the student will, upon application, be admitted to the Master of Business Administration or to the Master of Science in Information Science and Technology. The certificate courses taken by students admitted to the program will count towards the MBA program or the M.S. in Information Science and Technology degree program. Once admitted to the Certificate program, a student will be given three years to complete the program as long as a B or better average is maintained in the courses taken.

## Who do I contact for more information?

Department of Business and Information Technology  
573-341-7216 (phone)  
573-341-4812 (fax)  
bit@mst.edu

## **Required Core Course:**

IST 301/3001: Introduction to Big Data Analytics (Campus/Distance)

This course addresses the foundations of using predictive statistics on big data sets to impact decision-making. Focus is applied examples using realistic data. Models implemented include regression (parametric/nonparametric), classification, decision trees, and clustering with analytical estimation accomplished using popular software. Prerequisites: Calculus, Statistics Knowledge.

## **Core Courses (Choose one):**

ERP 345/5410: Use of Business Intelligence (Campus/Distance)

This course introduces data-oriented techniques for business intelligence. Topics include Business Intelligence Architecture, Business Analytics, and Enterprise Reporting. SAP Business Information Warehouse, Business Objects, or similar tools will be used to access and present data, generate reports, and perform analysis. Prerequisite: ERP 2110 or preceded or accompanied by ERP 5110.

CSc 401/6001: Cloud Computing and Big Data Management (Campus/Distance)

Cloud computing architecture, data management and indexing in cloud computing, security and privacy issues in cloud computing, scheduling, and cost analysis, sensor and mobile cloud, Ajax/mapreduce and EC3 cloud.

Prerequisites: Instructor's permission and knowledge of operating systems, databases, distributed computing and programming language.

CSc 301/5001: Introduction to Data Mining (Campus/Distance)

This course provides an introduction to classical data mining methods which can be used to predict unknown or futures values or variables, or to find human-interpretable patterns that describe data. Topics will include classification, clustering, association rule discovery, sequential pattern discovery, regression, and deviation/anomaly detection. Prerequisites: CSc 2300 and one of STAT 3113/3115/3117 or 5643.

CpE 439/6330: Clustering Algorithms

An introduction to cluster analysis and clustering algorithms rooted in computational intelligence, computer science and statistics. Clustering in sequential data, massive data and high dimensional data. Students will be evaluated by individual or group research projects and research presentations. Prerequisite: At least one graduate course in statistics, data mining, algorithms, computational intelligence, or neural networks, consistent with student's degree program. (Co-listed with Elec Eng 6340, Sys Eng 6214, Comp Sci 6405 and Stat 6239)

Stat 314/5814: Applied Time Series Analysis

Introduction to time series modeling of empirical data observed over time. Topics include stationary processes, auto covariance functions, moving average, auto regressive, ARIMA, and GARCH models, spectral analysis, confidence intervals, forecasting, and forecast error. Prerequisites: One of Stat 3113/3115/3117/5643 and one of Math 3103/3108 or 5108.

## **Elective Courses (choose two):**

IST 443/6443: Information Retrieval and Analysis (Campus/Distance)

Covers the applications and theoretical foundations of organizing and analyzing information of textual resources. Topics include information storage and retrieval systems, web search engines, text mining, collaborative filtering, recommender systems. Students will also learn the techniques with the use of interactive tools such as SAS. Prerequisite: ERP 5410 or statistics knowledge.

IST 444/6444: Essentials of Data Warehouses (Campus/Distance)

This course presents the topic of data warehouses and the value to the organization. It takes the student from the database platform to structuring a data warehouse environment. Focus is placed on simplicity and addressing the user community needs. Prerequisite: IST 3423 or equivalent relational database experience

IST 445/6445: Database Marketing (Campus/Distance)

Intro to methods and concepts used in database marketing: 1) predictive modeling techniques (e.g., regression, decision trees, cluster analysis) and 2) standard processes for mapping business objectives to data mining goals to produce a deployable marketing model. Metrics like lifetime value of a customer and ROI will be covered. Several application areas covered. Prerequisite: Statistics understanding, programming understanding, familiarity with spreadsheets.

IST 448/6448: Building the Data Warehouse (Campus/Distance)

Data modeling and processes needed to populate a data warehouse; trade-offs among several models and tools; technical issues that are faced, such as security, schemas, Web access, other reporting techniques. Prerequisite: IS&T 6444.

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**ERP 348/5210: Performance Dashboard, Scorecard and Data Visualization (Campus/Distance)**

This course will study different strategic performance management systems including dashboards, management cockpit, scorecards, and strategy maps in an organization. SAP's Strategic Enterprise Management (SEM), Business Objects Xcelsius, or similar tools will be used to enhance student education with real world applications. Prerequisite: ERP 2110 or ERP 5110 (may be taken concurrently)

**ERP 442/6610: Advanced Customer Relationship Management in ERP Environment (Campus/Distance)**

This customer-centric course emphasizes identification (targeting), acquisition, retention, and development (expansion) of (profitable) customers. It also covers effective and efficient management of customers with utilization of information technology. The SAP CRM module and SAS Enterprise Miner are used to enhance student education with real world applications and prepare graduates for future career requirements. Prerequisite: ERP 2110 or preceded or accompanied by ERP 5110.

**ERP 448/6220: Enterprise Performance Dashboard Prototyping (Campus/Distance)**

This course will study implementation and design practices for enterprise performance management and monitoring systems with a focus on dashboards, balanced scorecard, and value based management. SAP's Strategic Enterprise Management (SEM), Business Object Xcelsius, or similar tools will be used for project implementation. Prerequisite: ERP 5110; ERP/IST 6444.

**BUS 360/5360: Business Operations (Campus Only)**

This course examines the concepts, processes, and institutions that are fundamental to an understanding of business operations within organizations. Emphasis is on the management and organization of manufacturing and service operations and the application of quantitative methods to the solution of strategic, tactical and operational problems. Prerequisites: Math 1208 or Math 1212 or Math 1214; any Statistics course; Bus 1210 or Eng Mgt 2211.

**BUS 425/6425: Supply Chain and Project Management (Campus/Distance)**

This course covers supply chain management and its critical role in developing and maintaining effective and efficient processes in the organization, including operations and project management processes and principles. MBA core. Prerequisite: Graduate standing