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”. 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.

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.

When are the classes offered?

**Required core courses:**

- IST 5420 (301) Business Analytics & Data Science   Offered Spring Semester
- IST 6450 Information Visualization     Offered Fall Semester

Choose one of the following as an elective course:

- ERP 5410 (345) Use of Business Intelligence   Offered Fall Semester
- CSc 6304 (401) Cloud Computing and Big Data Management   Offered Fall Semester
- CSc 5402 (301) Data Mining & Maching Learning   Offered Fall Semester
- CpE 6330 (439) Clustering Algorithms   Offered Spring Semester
- Stat 5814 (314) Applied Time Series Analysis   Offered Spring Semester

Choose one of the following as elective course:

- 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   Offered Spring Semester
- 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 6425 (425) Supply Chain and Project Management   Offered Spring Semester

Admission:

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. The certificate program consists of four courses. 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. The core courses will be offered at least once per year. 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)
bitt@mst.edu
Required Core Course:

IST 5420: Business Analytics & Data Science (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. Calculus, Statistics, and Programming knowledge.

IST 6450: Information Visualization (Campus/Distance)
Topics/activities include: the visualization development framework, traditional presentations of data, human perception and aesthetics, colorspace theory, visualization algorithms and software, case studies of modern topology, research into visualization algorithms and implementations in R. Students will produce significant programs and visualizations. Prerequisites: Statistics, Calculus, and Programming Knowledge

Core Courses (Choose one):

ERP 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: IST 3423 or equivalent; ERP 2110 or preceded or accompanied by ERP 5110.

CSc 6304: 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: A 'C' or better grade in both CSc 5800 and either CSc 5300 or CSc 5001- Introduction to Data Mining.

CSc 5402: Data Mining and Machine Learning (Campus/Distance)
Classical and modern data mining and machine learning algorithms; data preprocessing/warehousing, mining association rules, classification/prediction methods, clustering techniques, Bayesian networks; unsupervised/supervised/reinforcement learning, learning decision trees, artificial neural networks, support vector machines, and ensemble learning. Prerequisites: A "C" or better in both CSc 2300 and one of STAT 3111,3113,3115,3117.

CpE 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 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 one):

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

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY
Department of Business and Information Technology Phone: 573-341-7216 Email: bit@mst.edu Web: bit.mst.edu
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.

ERP 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 preceded or accompanied by ERP 5110.

ERP 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 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 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