

# BUSINESS ANALYTICS AND DATA SCIENCE

"You can have data without information, but you cannot have information without data." - Daniel Keys Moran

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:

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

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## Admission requirements

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.

The Business Analytics and Data Science graduate certificate prepares students for positions as data scientists, and provides working IT professionals with must-have skills in the expanding "Big Data" field.

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# COURSE DESCRIPTIONS

Most courses are offered both on campus and via distance education

## REQUIRED COURSES

### **IST 5420: Business Analytics & Data Science**

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, and Programming knowledge.*

### **IST 6450: Information Visualization**

Topics/activities include: the visualization development framework, traditional presentations of data, human perception and aesthetics, color space 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*

### **Notes:**

- 1) There is overlap between the course offerings for this graduate certificate and other big data graduate certificates. No course can be used to satisfy the requirement for more than one certificate.
- 2) Curriculum is subject to change. Please contact the department for up-to-date information on courses. Other courses approved by the department may be substituted for any of the above listed courses on a case-by-case basis. The administrative coordinators must approve the substitution prior to enrolling in the course.
- 3) Please check JoeSS for up-to-date course prerequisites.

## CORE COURSES (CHOOSE ONE)

### **ERP 5410: Use of Business Intelligence**

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.

### **IST 5001 Data Methods in Python**

Python methodologies for manipulating, processing, cleaning, grouping, slicing, reshaping and summarizing information in data-intensive applications; managing files, scraping web pages, mining social media; describing, modeling, analyzing, and visualizing data. Tools include Pandas, NumPy, SciPy, and Matplotlib libraries.

### **CSc 6304: Cloud Computing and Big Data Management**

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.

### **CSc 5204: Regression Analysis**

Simple linear regression, multiple regression, regression diagnostics, multicollinearity, measures of influence and leverage,

model selection techniques, polynomial models, regression with autocorrelated errors, introduction to non-linear regression.

### **CSc 5402: Data Mining and Machine Learning**

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.

### **ClE 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.

### **Stat 5814: Applied Time Series Analysis**

Introduction to time series modeling of empirical data observed over time. Topics include stationary processes, autocovariance functions, moving average, autoregressive, ARIMA, and GARCH models, spectral analysis, confidence intervals, forecasting, and

## ELECTIVE COURSES (CHOOSE ONE)

**IST 6443: Information Retrieval and Analysis**

**IST 6444: Essentials of Data Warehouses**

**IST 6445 Database marketing**

**IST 6448: Building the Data Warehouse**

**IST 6887: Research Methods in Business and IS&T**

**ERP 5210 Performance Dashboard, Scoreboard and Data Visualization**

**ERP 6220 Enterprise Performance Dashboard Prototyping**

**ERP 6610 Advanced Customer Relationship Management in ERP Environment**

**BUS 6425 Supply Chain and Project Management**