

**Daniels College of Business**  
University of Denver  
**2016-2017 Graduate Business Certificate Courses in BIA**

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**Program Learning Outcomes:**

1. Describe how business intelligence is used in corporate decision making.
2. Utilize software tools to design and query a business intelligence system.
3. Identify key issues around capturing, using, managing and securing the information resource in an enterprise.
4. Understand the tradeoffs a business must consider in selecting the target level of data quality, completeness and integration.
5. Compare and contrast various ways to display and interpret voluminous amounts of business intelligence data.
6. Analyze enterprise decision processes, identify key participants and assess their relationships to effective execution.
7. Recognize and implement the appropriate analytic modeling techniques that allow businesses to make informed decisions.

**INFO 4100 Introduction to Business Intelligence (4 Credit-Hours) Fall and Spring Quarter**

This course provides an overview of business intelligence: how business data is generated, collected, and processed to support decision making. It will address both how to assess and use data that is readily available as well as how to start with corporate strategy and determine what data is needed, how to generate and process it.

**Learning Outcomes:**

1. Describe the core elements of the corporate decision process.
2. Compare and contrast a data warehouse with an operational relational database management system.
3. Construct and evaluate data models for a data warehouse with data marts.
4. Summarize the tools and approaches used in data mining.
5. Describe how business intelligence is used in corporate decision making.
6. Utilize software tools to design and query a business intelligence system.

**INFO 4120 - Python for Business Analytics**

Python is a popular general purpose programming language which is well suited to a wide range of problems. With the right set of add-ons, it is comparable to domain-specific languages such as R and MATLAB. Python is a scripting language. The following topics will be covered: Importing data, Reading and writing files, Cleaning and Managing Data, Merging and joining DataFrame objects, Plotting and Visualization, Statistical Analysis, Fitting data to probability distributions and Linear models. Packages: Pandas, NumPy, matplotlib, statsmodels, Scikit-learn, and IPython. Principal Content Elements: 1. Introduction to Programming Logic and Design Using Python 2. Data Management 3. Statistical Analysis 4. Advanced Data Management and Statistical Analysis  
Prerequisite/Corequisite: STAT 4610.

**INFO 4140 Business Databases (4 Credit-Hours) Fall and Spring Quarter**

This is an introductory database course which will cover enterprise database design, modeling and implementation. Students with existing proficiency in databases can substitute another BIA graduate course.

**Learning outcomes:**

1. Understand, create, normalize, and use relational database models.
2. Use SQL to define, load, query, and modify databases.
3. Use SQL Server 2012 to create SQL code to build, populate and query databases.

**STAT 4610 Business Statistics (4 Credit-Hours) Fall & Spring Quarters**

This course introduces students to the basic analytical tools in statistics and operations management, and provides the theoretical concepts and skills that are building blocks for future courses. The approach is to present students with a “corporate” view of how statistical tools are used to analyze data and facilitate business decision-making. Students will familiarize themselves with all of the statistical techniques and models presented in the course and will demonstrate knowledge in applying the appropriate techniques and models to various data sets and interpreting the results of the analysis.

**Learning outcomes:**

1. Learn and understand the basic tenets of probability distributions, and be familiar with the distributions most often used in business modeling.
2. Conduct and interpret various statistical hypothesis testing techniques on single and multiple populations of interest.
3. Conduct and interpret various regression analyses on single and multiple independent variables;
4. Use the results of statistical analysis to support business decisions.
5. Construct statistical models and apply them in the functional areas of business such as finance, accounting, marketing, and operations.
6. Use proficiently statistical software such as Minitab or JMP as an aid to business decision-making.

### **INFO 4240 Data Warehousing (4 Credit-Hours) Winter and Summer Quarter**

This course introduces students to the main components of a data warehouse for business intelligence applications. Students will learn how a data warehouse fits into the overall strategy of a complex enterprise, how to develop data models useful for business intelligence, and how to combine data from disparate sources into a single database that comprises the core of a data warehouse. Students will also explore how to define and specify useful management reports from warehouse data. Prerequisites: INFO 4100, INFO 4140.

Learning outcomes:

1. Gather requirements and model a data warehouse with data marts to meet the requirements.
2. Design a data warehouse and data marts given a model.
3. Describe several current data architectures, the strengths and weaknesses of each.
4. Create a strategy to extract, transform (cleanse, integrate, and qualify) and load data from operational databases into the data warehouse.
5. List the tradeoffs a business must consider in selecting the target level of data quality, completeness and integration.
6. Utilize common tools which support the components of the data warehouse.

### **INFO 4280 Project Management (4 Credit-Hours) Winter and Summer Quarter**

In this course students examine the science, practice the art, and discuss the folklore of project management to enable them to contribute to and manage projects as well as to judge when to apply this discipline. The course also covers the use of MS Project Professional as a management tool and Crystal Ball as a Monte Carlo simulator for project exercises.

Prerequisite: INFO 4100

Learning outcomes:

1. Apply project management—consistently making the tradeoffs required to derive optimal outcomes based on copious hands-on experience.
2. Justify flexibility in at least one of the three project constraints: scope, timeframe and resources, in order to deliver worthwhile results.
3. Plan projects to optimize project results while taking into account the fact that projects seldom are executed according to plan.
4. Find creative ways to bring projects back on schedule, explaining why simply throwing more resources at the problem tends to push the project further behind schedule.
5. Demonstrate the advantages of the critical chain approach to managing projects while addressing its biggest challenge of getting stakeholder buy-in.
6. Assess the value of formally executing the close step of any project in capturing information valuable for future projects.
7. Compare and contrast the use of probability distributions versus point estimates for all critical project variables.
8. Delineate the costs and benefits of using formal project management software tools such as Microsoft Project Professional.

### **INFO 4300 Predictive Analytics (4 Credit-Hours) Fall and Spring Quarter**

This course is designed to prepare students for managerial data analysis and data mining, predictive modeling, model assessment and implementation using large data sets. The course addresses the how, when, why, and where of data mining. The emphasis is on understanding the application of a wide range of modern techniques to specific decision-making situations, rather than on mastering the theoretical underpinnings of the techniques. The course covers methods that are aimed at prediction, forecasting, classification, clustering, and association. Students will gain hands-on experience in using computer software to mine business data sets.

Prerequisite: STAT 4610.

Learning outcomes:

1. Identify and perform the steps in the data mining process.
2. Explain, apply and interpret forecasting models, component analysis, and classification methods.
3. Explain, apply, and interpret regression models, generalized linear models, logistic regression models, and hierarchical linear models.
4. Explain, apply and interpret discriminant analysis, cluster analysis, principal component analysis, and neural network models.

### **INFO 4340 Data Mining & Visualization (4 Credit-Hours) Fall and Spring Quarter**

In this course, students create business intelligence tools such as balanced scorecards, data visualization and dashboards to inform business decisions. Students will also learn optimization modeling and time series analysis techniques. The course will focus on the identification of metrics, measures, indicators and key performance indicators for a variety of business operations. The focus will be on the advantages and disadvantages of various modeling methodologies and implementations moving towards performance improvement. Prerequisite: STAT 4610.

Learning outcomes:

1. List the components of a balanced scorecard and their relationship to each other.
2. Compare and contrast various ways to display and interpret voluminous amounts of business intelligence data.
3. Assess the potential of key performance indicators for different types of enterprises.
4. Articulate the value of key business metrics for the success of an enterprise.
5. Use VBA to construct interactive scorecards, dashboards, and data visualization.
6. Understand when optimization modeling is appropriate in a business setting, and implement an optimization model to improve business decision-making.
7. Understand the various time series analysis techniques available to the business modeler, and conduct time series analysis to improve business decision-making.

### **INFO 4360 Complex Data Analytics (4 Credit-Hours) Fall & Spring Quarter**

This course explores the concepts of the considerations and management of big data projects. It also explores technical aspects of performing text analytics and natural language processing, network analysis, geographic data analysis. We will focus on social data for many of the examples and also explore how disparate data sources can be combined to provide insight for business decisions.

### **INFO 4380 Decision Processes (4 Credit-Hours) Summer and Winter Quarter**

This course addresses the process of decision making in the enterprise: who makes what decisions based on what information and for what purpose. Business Intelligence is premised on the HP motto: "In God we trust. All others bring data." But what is the cost of collecting and analyzing the data and presenting the results, and what decisions justify that cost? Is the transformation from data to decision always rational, and what are the common pitfalls for human decision makers? We examine the results of recent experiments from behavior economics and their relevance to making business decisions. Prerequisite: INFO 4100.

Learning outcomes:

1. Analyze enterprise decision processes, identify key participants and assess their relationships to effective execution.
2. Evaluate the tradeoffs between the costs and benefits of data driven decisions and contrast these with direct experimentation.
3. List and describe hidden traps in rational decision making such as anchoring, confirmation bias, etc.
4. Explain the paradox of choice: why more is less, and its impact on business decisions.

### **INFO 4520 Health Informatics (4 Credit-Hours) Quarter offered TBD**

Annual health care spending in the United States exceeds 16% of GDP (\$2 Trillion) and is expected to continue to increase. The effective use of information technology is perceived as an important tool in increasing the access to and quality of health care delivery in a cost effective manner. This course examines the role of health informatics in the health care delivery and management process. The objectives of this course are to familiarize students with the critical issues and challenges faced by those in the health care environment, what technologies are or will soon be available to potentially address these issues and challenges, potential barriers professionals employed in the health care field may face deploying and managing these technologies, and possible strategies to assist these professionals in addressing and overcoming these barriers. This course focuses on four major areas related

to health informatics: the role of electronic health records, clinical decision support systems, analytics, and other ehealth initiatives such as mobile technologies and telehealth.

Learning outcomes:

1. Understand the issues related to the deployment and utilization electronic health records.
2. Articulate the strengths and weaknesses associated with clinical decision support systems.
3. Understand and apply basic analytic techniques to healthcare data.
4. Develop sample eHealth and mobile technology strategies for an organization.

**INFO 4590 Optimization (4 credit hours) Winter quarter**

This course introduces students to the basic optimization modeling techniques and tools as practiced by business analysts, operations research analysts, data analysts, data scientists, decision scientists, decision support scientists, business intelligence analysts, quants, actuaries, financial analysts, marketing analysts, and anyone else interested in using analytics to improve the bottom line. The course will focus on problem definitions, problem configuration, spreadsheet solution, LP Software (LINGO) solutions, and interpreting and implementing results.