

## Business Analytics Certificate Courses

### **STAT 4610 Business Statistics (4 Credit-Hours)**

This course introduces students to the basic analytical tools in statistics and business analytics, 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 and communicating the results of the analysis. The Microsoft Excel Data Analysis and Solver Toolkits will be used to conduct statistical analyses, allowing students to become more proficient overall in using Microsoft Excel and to place their emphasis on applications to core business disciplines, statistical reasoning, and proper interpretation of results.

#### 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.
3. Construct analytic models, to include multiple regression and optimization or simulation models, and apply them in the functional areas of business such as finance, accounting, marketing, and operations.
4. Use the results of statistical analysis and analytic modeling to support business decisions, and communicate those results effectively to business leaders.
5. Demonstrate proficiency in performing data management, statistical analysis, and analytic modeling in a spreadsheet environment.

### **INFO 4120 Python Programming (4 Credit-Hours)**

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.

#### Learning Outcomes:

1. Understand and use the basic components of coding (sequential, conditional, and looping structures) using the Python language.
2. Be able to perform basic and advanced data management tasks using Python including reading and writing data, cleaning, and reshaping datasets.
3. Use Python to perform exploratory and statistical analysis of data, to include the techniques taught in STAT4610.
4. Use Python to create analytic models to analyze data and to produce results and insights that can be used in the business decision-making process.



### **INFO 4140 Business Databases (4 Credit-Hours)**

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:

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

### **INFO 4300 Predictive Analytics (4 Credit-Hours)**

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. Understand the various time series analysis techniques available to the business modeler, and conduct time series analysis to improve business decision-making.

### **6-Course Certificate Elective Options:**

#### **INFO 4240 Data Warehousing (4 Credit-Hours)**

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. Plan, design, and model the data warehouse.
2. Build the data warehouse.
3. Extract, load and transform data into the data warehouse.
4. Perform multidimensional analysis on the data warehouse.
5. Build reports within the data warehouse environment.

#### **INFO 4340 Data Mining and Visualization (4 Credit-Hours)**

In this course, students create business intelligence tools such as balanced scorecards, data visualization and dashboards to inform business decisions. The course will focus on the identification of metrics, measures, and key performance indicators for a variety of business operations, and will introduce numerous analytic methodologies to support the decisions made with regard to these metrics. The focus will be on the advantages and disadvantages of various modeling methodologies and implementations moving towards performance improvement and business understanding. 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. Explain, apply and interpret multivariate analysis of variance, principal component analysis, factor analysis, multi-level logistic regression, generalized linear modeling, hierarchical linear modeling, path analysis, and structural equation modeling.

### **INFO 4390 Analytic Modeling in R (4 Credit-Hours)**

The use of R as a programming language for business analytics and data sciences is becoming increasingly popular across the business environment. This course teaches the use of R for the entire spectrum of business analytics applications, to include data management and organization, data cleaning, statistical analysis, analytic modeling, and presentation of results. Applications will include those addressed in STAT 4610 and INFO 4300, in addition to introducing further analytic modeling techniques that are of use to business analysts and data scientists.

Learning Outcomes:

1. Understand and use the R language to capture and organize data for use in statistical and analytic models.
2. Use R to perform exploratory and statistical analysis of data, to include the techniques taught in STAT 4610, INFO 4300, and INFO 4340.
3. Use R to create analytic models to analyze data and to produce results and insights that can be used in the business decision-making process.

### **INFO 4590 Optimization (4 Credit-Hours)**

This course introduces students to the basic optimization modeling techniques and tools as practiced by business analysts to help their enterprises make better-informed decisions. Applications will include mix, selection, assignment, distribution, transportation, financial management, planning, scheduling, and management implementations in a variety of business settings. The course will focus on problem definitions, problem configuration, spreadsheet solutions, LP Software (LINGO) solutions, and interpreting and implementing results.

Learning Outcomes:

1. Understand the role that optimization plays in business analytics, and identify when optimization modeling is an appropriate technique to inform the decision-making process.
2. Model optimization problems that involve linear programming, integer programming, binary integer programming, mixed-integer programming, and nonlinear programming.
3. Use spreadsheet modeling to configure and solve optimization problems.
4. Configure optimization problems for implementation in a commercial solver package.
5. Use a commercial solver (LINGO, GAMS, CPLEX, or R) to solve optimization problems.