

# BU.510 (QUANTITATIVE METHODS)

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## **BU.510.601. Statistical Analysis. 2 Credits.**

Students learn statistical techniques for further study in business, economics, and finance. The course covers sampling distributions, probability, confidence intervals, hypothesis testing, regression and correlation, basic modeling, analysis of variance, and chi-square testing. The course emphasizes statistics to solve management problems. Case studies, spreadsheets, and Excel Add-in Data Analysis ToolPak computer software are used.

## **BU.510.650. Data Analytics. 2 Credits.**

This course prepares students to gather, describe, and analyze data, using advanced statistical tools to support operations, risk management, and responses to disruptions. Analysis is done targeting economic and financial decisions in complex systems that involve multiple partners. Topics include probability, statistics, hypothesis testing, regression, clustering, decision trees, and forecasting.

**Prerequisite(s):** BU.510.601 OR BU.914.610

## **BU.520.601. Business Analytics. 2 Credits.**

Business analytics makes extensive use of data and modeling to drive decision making in organizations. To become a leader in a data driven world, it is therefore critical to acquire hands-on experience of both data-related (statistical) and modelling skills. This class focuses on the latter: it introduces students to analytical frameworks used for decision making to make sense of the data. The methodologies covered include Linear and Integer Linear Programming, Decision Analysis, Foundations of utility and risk, and Monte Carlo Simulation. For each topic/methodology students are first exposed to the basic mechanics of the framework, and then apply the methodology to several business problems using software.

**Prerequisite(s):** BU.510.601;BU.913.610

## **BU.520.620. Advanced Business Analytics. 2 Credits.**

This course trains decision makers to function in the face of multi-dimensional uncertainty, through the development and use of optimization models. Mathematical abstractions are created which deal with issues including resource allocation, scheduling, pricing, and other responses to the realization of a variety of "known unknowns". Topics include linear programming, dynamic programming, multi-criteria optimization, and non-linear optimization.

**Prerequisite(s):** BU.520.601 OR BU.913.610

## **BU.520.650. Data Visualization. 2 Credits.**

This course prepares students to make informed decisions based on data using descriptive analytical techniques. Students will view examples from real-world business cases where data visualization helps the decision makers to visualize, discover, and decode the hidden information from within the data, and to exploit such information for making educated decisions. Topics include cognition and visual perception; design principles; fundamental charts; interactive visualizations; storytelling and dashboards; advanced visualizations methods for: temporal, spatial, networks, trees, textual, and high dimensional data; and advanced data visualization tools.

**Prerequisite(s):** BU.510.650

## **BU.610.625. Simulation and Strategic Options. 2 Credits.**

In this course we draw from Economics, Monte Carlo Simulation, and Decision Theory to build a framework for the assessment and control of quantifiable risks. In the process we introduce the logic of real options and analysis of contingent claims. From this base we cover several classic problems including retirement planning, insurance valuation, market entry, and product introductions. The unifying theme is the application of rigorous approaches to thinking through 'optionality' in the real world as a means to manage risks.

**Prerequisite(s):** (BU.231.620 OR BU.910.611) AND (BU.520.601 OR BU.913.610)