

# BUSINESS ANALYTICS & INTELLIGENCE (BUAI)

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## **BUAI 400. Linear Algebra. 1 Unit.**

The objective of this one-credit hour course is to provide a basic working knowledge of material in linear algebra that is relevant to the Master of Supply Chain Management and Master of Business Analytics & Intelligence programs. This background material includes geometric and algebraic properties of vectors and matrices together with operations that can be performed on them. The use of vectors and matrices in solving systems of linear equations is taught. Offered as BUAI 400 and SCMG 400. Prereq: For Master of Business Analytics & Intelligence students only.

## **BUAI 406A. Operations Management I. 1.5 Unit.**

Operations managers, ranging from supervisors to vice presidents, are concerned with the production of goods and services. More specifically, they are responsible for designing, running, controlling and improving the systems that accomplish production. This course is a broad-spectrum course with emphasis on techniques helpful to the practice of management at the analyst level. Its goal is to introduce you to the environments, to help you appreciate the problems that operations managers are confronted with, and provide you with the tools to address these problems. Operations Management spans all value-adding activities of an organization including product and process design, production, service delivery, distribution network and customer order management. As global competition in both goods and services increases, a firm's survival depends upon how well it structures its operations to respond quickly to changing consumer needs. Thus, it is essential for all business managers to acquire an understanding of operations management to maintain their competitive advantage. This course provides students with the basic tools needed to become an analyst in Supply Chain and Operations Management. This course provides an overview of Process analysis, Capacity management, Queuing system and analysis. Prereq: For Master of Business Analytics & Intelligence students only.

## **BUAI 406B. Operations Management II. 1.5 Unit.**

Operations managers, ranging from supervisors to vice presidents, are concerned with the production of goods and services. More specifically, they are responsible for designing, running, controlling and improving the systems that accomplish production. This course is a broad-spectrum course with emphasis on techniques helpful to the practice of management at the analyst level. Its goal is to introduce you to the environments, to help you appreciate the problems that operations managers are confronted with, and provide you with the tools to address these problems. Operations Management spans all value-adding activities of an organization including product and process design, production, service delivery, distribution network and customer order management. As global competition in both goods and services increases, a firm's survival depends upon how well it structures its operations to respond quickly to changing consumer needs. Thus, it is essential for all business managers to acquire an understanding of operations management to maintain their competitive advantage. This course provides an overview of Quality management, Material Requirements planning, Inventory management, and Supply Chain management. The emphasis of the course is on both real world applications and technical problem solving. Several manufacturing and non-manufacturing environments will be discussed explicitly, like health care, insurance, hotel-management, airlines and government related operations. Also we will explore the interface of operations management with other functional areas such as marketing, finance, accounting, etc. This coursework includes individual and group assignments, case analyses and experiential learning through simulations and educational games. Prereq: For Master of Business Analytics & Intelligence students only.

## **BUAI 407A. Managerial Marketing I. 1.5 Unit.**

This course is part one of the Core Marketing Management class, as taught in typical MBA programs, including our own. Marketing management is defined as the 'art and science of choosing target markets and getting, keeping, and growing customers through creating, delivering, and communicating superior customer value' (Kotler and Keller 2012, p. 3). This course addresses the management challenges of developing products and services that profitably deliver value including selecting target markets and designing the best combination of marketing variables to carry out a firm's strategy.

## **BUAI 407B. Managerial Marketing II. 1.5 Unit.**

This course is part one of the Core Marketing Management class, as taught in typical MBA programs, including our own. Marketing management is defined as the 'art and science of choosing target markets and getting, keeping, and growing customers through creating, delivering, and communicating superior customer value' (Kotler and Keller 2012, p. 3). This course addresses the management challenges of developing products and services that profitably deliver value including selecting target markets and designing the best combination of marketing variables to carry out a firm's strategy. Prereq or Coreq: BUAI 407A.

**BUAI 410. Accounting and Financial Management. 3 Units.**

This course focuses on learning the language of business, how basic accounting information is reported and analyzed, and how basic financial principles can be applied to understanding how value is created within an enterprise. This course is intended for individuals who have a limited background in accounting, finance and business. Most of the exercises will involve evaluating and building models in Excel. Teaching objectives are fairly straightforward: 1. Provide you with a basic understanding of the key principles of accounting and finance. We will quickly cover material that is typically covered in a three-course sequence (Introductory Accounting and Finance I and II). We will fly at a fairly high level, but we want to make sure you understand the basic concepts. 2. Apply these concepts to real (but straightforward) business situations, to gain a better understanding of how companies utilize accounting and financial information. 3. Time permitting, explore how these concepts can be applied to securities, mergers and acquisitions and leveraged buyout transactions, with a specific emphasis on how these concepts are likely to surface in your role in such transactions. Prereq: For Master of Business Analytics & Intelligence students only.

**BUAI 411. Operations Analytics: Deterministic. 3 Units.**

The first half of the course provides a practical coverage of linear programming, a special type of mathematical model. The art of formulating linear programs is taught through the use of systematic model-building techniques. The simplex algorithm for solving these models is developed from several points of view: geometric, conceptual, algebraic, and economic. The role and uses of duality theory are also presented. Students learn to obtain and interpret a solution from a computer package and how to use the associated output to answer "What-happens-if..." questions that arise in post-optimality analysis. Specific topics include: problem formulation, geometric and conceptual solution procedures, the simplex algorithm (phase 1 and phase 2), obtaining and interpreting computer output, duality theory, and sensitivity analysis. The second half of this course provide a practical approach to formulating and solving combinatorial optimization problems in the areas of networks, dynamic programming, project management (CPM), integer programming, and nonlinear programming. The art of formulating problems, understanding what is involved in solving them, and obtained and interpreting the solution from a computer package are shown. A comparison with formulating and solving linear programming problems is provided as a way to understand the advantages and disadvantages of some of these problems and solutions procedures. Recommended preparation: Knowledge of Excel, one semester each of undergraduate linear algebra and undergraduate calculus (derivatives); or consent of instructor. Prereq: For Master of Business Analytics & Intelligence students only.

**BUAI 432. Operations Analytics: Stochastic. 3 Units.**

This course covers modeling and analysis of discrete-event dynamical systems using computer simulations. Topics include an introduction to simulation as a modeling tool, with emphasis on understanding the structure of a simulation model and how to build such models, model validation, random number generation, simulation languages, statistical simulation output analysis, design of simulation experiments and selected current research topics. Prereq: BUAI 433 or MSBA 433. Prereq or Coreq: BUAI 406A and BUAI 406B.

**BUAI 433. Foundations of Probability and Statistics. 3 Units.**

Data of many kinds are typically available in practice, but the challenge is to use those data to make effective professional decisions. This software-intensive course begins with useful descriptions of data and the probability theory foundation on which statistics rests. It continues to statistics, including the central limit theorem, which explains why data often appear to be normally distributed, and the Palm-Khintchine theorem which explains why data often appear to have a Poisson distribution. The remainder of the course focuses on regression and forecasting, including detecting and overcoming some of the deadly sins of regression, and the surprising flexibility of regression models. Recommended preparation: One semester of undergraduate calculus or consent of instructor. Prereq: For Master of Business Analytics & Intelligence students only.

**BUAI 434. Data Mining & Visualization. 3 Units.**

Data Mining is the process of identifying new patterns and insights in data. As the volume of data collected and stored in databases grows, there is a growing need to provide data summarization (e.g., through visualization), identify important patterns and trends, and act upon the findings. Insight derived from data mining can provide tremendous economic value, often crucial to businesses looking for competitive advantages. This course is a survey of data visualization methods, supervised and unsupervised learning techniques, and modern tools for discovering knowledge for business decisions. Prereq or Coreq: BUAI/MSBA 433 or SCMG/MSOR 433 or OPRE 433.

**BUAI 435. Marketing Models and Digital Analytics. 3 Units.**

Models & analytics suitable for digital marketing data are the focus of this course. The objective to develop analytical skills for making intelligent decisions about marketing investments that create value and build competitive advantage. In short, to build capabilities for marketing ai-analytics for insights. The course content and assignments are designed to (a) enable student learning by using real- world problems and data, (b) emphasize the Problem-Data-Analytics interdependence for effective problem solving, and (c) engage with thoughtful practitioners of digital data analytics to inform current practices and opportunities. Prereq or Coreq: MBAC 506 or BUAI/MSBA 407A. Prereq: BUAI/MSBA 433 or SCMG/MSOR 433 or OPRE433.

**BUAI 444. Predictive Modeling. 3 Units.**

Predictive modeling is a set of procedures and tools for hypothesizing, testing and validating a model to explain and predict the probability or likelihood of a future event, or outcome. A wide range of procedures and tools are available for predictable modeling, and this course will cover a select set of topics with wide applicability. Through applications and case studies involving real-life data, the course will emphasize managerial problem solving. To build models is to capture managerial problem formulation, and to test/validate them is to confront managerial hypotheses with empirical observations. Problem solving is a creative act rooted in validated evidence of managerial hypotheses testing. Prereq or Coreq: BUAI/MSBA 433 or SCMG/MSOR 433 or OPRE 433.

**BUAI 445. Advanced Marketing Analytics. 3 Units.**

In order to improve decision making in various decision areas of marketing like segmentation, positioning, advertising, promotions, new product development and pricing, use of quantitative data and analysis has become very popular. It is increasingly common for marketing managers to be challenged by top managers, to show the value of marketing expenditures to an organization's financial well-being. This course will introduce a variety of data based decision-aids in the marketing area that will often focus on those metrics. In addition, the course will also introduce SAS to you. SAS is a very popular tool that analysts in business and economics field have been using for decades now, and has the potential to open some doors for you when it comes to internships and jobs. In order to improve decision making in various decision areas of marketing like segmentation, positioning, advertising, promotions, new product development and pricing, use of quantitative data and analysis has become very popular. It is increasingly common for marketing managers to be challenged by top managers, to show the value of marketing expenditures to an organization's financial well-being. This course will introduce a variety of data based decision-aids in the marketing area that will often focus on those metrics. In addition, the course will also introduce SAS to you. SAS is a very popular tool that analysts in business and economics field have been using for decades now, and has the potential to open some doors for you when it comes to internships and jobs. The course will also use Python in parallel to re-emphasize what you have already learnt in previous classes. Prereq or Coreq: BUAI/MSBA 407A or MBAC 506. Prereq: (BUAI/MSBA 433 or OPRE 433 or SCMG/MSOR 433) and (BUAI 492 or MSOR 492 or BTEC 420).

**BUAI 446. Machine Learning and Artificial Intelligence in Business Analytics. 3 Units.**

Advances in computational analytics including Machine, Deep and Statistical Learning (ML) provide powerful methods for developing mathematical "learning" models that can autonomously parse, learn from, and make predictions from data to improve performance with "experience". In deep learning, large neural networks are leveraged to achieve artificial intelligence (AI), enabling machines to mimic human behavior. This course covers principles, algorithms, and applications of machine learning from a business analytics perspective. Specifically, the course will provide a practical understanding of modern machine learning techniques including regression and classification methods, resampling methods and model selection, regularization, perceptron and artificial neural networks, tree-based methods, support vector machines and kernel methods, and grouping methods. Prereq or Coreq: BUAI/MSBA 434 or BUAI/MSBA 444. Prereq: Master of Business Analytics & Intelligence students only and (BUAI/MSBA 492 or SCMG/MSOR 492 or BTEC 420).

**BUAI 485B. Team Development. 1.5 Unit.**

This course is unique in the sense that its primary focus is on the student working in teams. In this course the student will assess their team interaction based on team assignments simulated and action learning type projects, presenting to the class as a team, engaging in various experiential activities, participating one team coaching session, working with a team, and expanding their knowledge of team leadership and membership skills and abilities. They are also expected to engage with projects external to the university (similar to an action learning project).

**BUAI 492. Foundations of Python Programming. 1.5 Unit.**

Python is an object-oriented programming language that can interact with the world wide web as well as Excel and other programming languages like VBA. As such, Python has gained popularity and is becoming an industry standard in many areas, including supply chain management. In addition to assignment, if/then, and for/while statements, in this course you will learn about object-oriented programming and how to implement those ideas with appropriate data structures. You will also learn how to use libraries that others have created, such as Numpy for numerical calculations (like working with vectors, matrices, and solving systems of linear equations). In addition to individual homeworks, you will solve an assigned project in groups and make a final presentation to the class with PowerPoint. Being able to communicate your model and results is part of learning to work effectively with others in an organization, which is a goal of the supply chain program. All of this is designed to enable you to build and solve models that help organizations make good decisions. Offered as BUAI 492 and SCMG 492. Prereq: For Master of Business Analytics & Intelligence students only.

**BUAI 499. Capstone Project in Business Analytics. 0 Unit.**

This course is focused on engaging Master of Business Analytics students in a capstone experience. Students will be provided with analytics problems with data from local companies and will be asked to leverage the broad range of skills, tools and approaches introduced throughout the program to analyze the data. They will also present a final report to the sponsoring organization. Prereq: For Master of Business Analytics & Intelligence students only.