

BUSINESS ANALYTICS (BANA)

BANA 5939 - Internship (1-3 Credits)

Repeatable. Max Hours: 9 Credits.

Grading Basis: Satisfactory/Unsatisfactory

Repeatable. Max Credits: 9.

BANA 6610 - Statistics for Business Analytics (3 Credits)

Provides a conceptual overview of statistical thinking and its applications to business problems. Topics include descriptive statistics, data exploration, probability, inferential methods, regression analysis, classification, regression with high dimensional data, etc. Students gain hands-on experience with data analytic problems via projects using real business settings and data. Restriction: Restricted to MS BANA majors within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to BANA-MS students within the Business School.

BANA 6620 - Computing for Business Analytics (3 Credits)

Introduces database and modeling software used by business analytics professionals. Includes querying relational databases, state-of-the-art statistical freeware, and modeling software. Students learn to obtain, organize, and store data needed for analytics projects, undertake data cleansing for big data tasks, and conduct statistical data visualization. Restriction: Restricted to BANA-MS students within the Business School. Max Hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to BANA-MS students within the Business School.

BANA 6630 - Time-Series Forecasting (3 Credits)

Time series analysis is critical to industries such as finance, marketing, retail, and accounting. This course introduces time-series models with emphasis on their practical applications in business. The goal is to show how dynamic financial and economic data can be modeled and analyzed using proper statistical techniques. The topics include methods for trend and seasonal analysis and adjustment, modeling and forecasting with autoregressive moving average (ARMA) processes, and model identification and diagnostics for time series. Other subjects include volatility and state space models. This course provides hands-on experience by pairing lectures on methodology with lab sessions using R to perform real-world data analyses. If you do not meet the prerequisites you may contact the instructor for permission to register. Prereq: BANA 6610. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Note: Can only receive credit for either BANA 6630/DSCI 6230. Max Hours: 3 Credits.

Grading Basis: Letter Grade

Prereqs: BANA 6610. Restrictions: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6640 - Decision Analysis (3 Credits)

Introduces a quantitative approach to business decision making under conditions of risk and uncertainty. Emphasis will include introductions to decision analysis theory, risk analysis, utility theory, multi-criteria decision making, Bayesian decision analysis and hierarchical structured models. Psychological issues and qualitative approaches in the decision-making process will be discussed. Student computer-assisted projects are included. Prereq: BANA 6610 or permission from instructor. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereqs: BANA 6610. Restrictions: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6650 - Project Management (3 Credits)

Introduces the topic of Project Management (PM) in a business environment. Emphases will include the knowledge, skills, tools, and techniques as presented in the Project Management Body of Knowledge (PMBOK), a variety of managerial aspects commonly encountered in PM, and current extensions of PM. Projects in diverse contexts are examined. Cross-listed with URPL 6249. Restriction: Restricted to Graduate level students. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Graduate level students.

Typically Offered: Fall.

BANA 6660 - Predictive Analytics (3 Credits)

Addresses statistical and machine-learning approaches to prediction using the very large data sets increasingly common in business applications such as internet-based business, fraud detection, credit scoring and market segmentation. Methods covered in the course include data partitioning, logistic regression, clustering, decision trees, dimension reduction, and neural networks, among others. Emphasis is placed on proper choice of method and understanding of the strengths and limitations of competing methods. Students are expected to analyze and report on a variety of data sets drawn from business application areas. If you do not meet the prerequisites listed, you may contact the instructor for permission. Prereq: BANA 6610. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereqs: BANA 6610. Restrictions: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6670 - Prescriptive Analytics with Optimization (3 Credits)

Optimization is a key part of Business Analytics dealing with decision problems that lend themselves to modelling and analysis designed to determined optimal decisions. In this course, we'll study methodologies for determining the best course of action in situations with a large number of alternatives, each with their own financial or other characteristics, including restrictions on our actions that must be satisfied as we search for best solutions. While the focus of the course is on modeling and solving a wide variety of optimization problems, we'll also cover the basic mathematical underpinnings of linear programming, the most widely used form of optimization in industry and government and the foundation of many extensions into other classes of optimization. State of the art Software for solving optimization problems will be used throughout the course. Students will work in teams on a project involving optimization and some important problem. Restriction: Restricted to BANA-MS students within the Business School. Max Hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to BANA-MS students within the Business School.

BANA 6680 - Optimization for Machine Learning (3 Credits)

This course will give an introduction on numerical optimization algorithms in the context of machine learning applications. We shall discuss how optimization problems arise in machine learning and what makes them challenging. Topics include traditional nonlinear optimization, linear optimization and discrete optimization with an emphasis on effective computational techniques. We shall also talk about next generation large-scale machine learning algorithms such as stochastic gradient (SG) method. Applications to a variety of areas such as text mining and neural networks are also stressed through class projects. Problems will be solved using appropriate software tools. Prereq: BANA 6620 and BANA 6670. Restriction: Restricted to graduate business majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: BANA 6620 and BANA 6670. Restriction: Restricted to graduate business majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6690 - Network Modeling (3 Credits)

This course introduces network modeling. Utilizing data and metadata, programming, algorithms, statistical analysis, and visualization; networks are studied. The focus is on Business Applications to provide managerial insights and recommendations and will include transportation, social, transactional, electrical and communication networks. Prereq: BANA 6620. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA or NBD within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: BANA 6620. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA or NBD within the Business School.

BANA 6710 - Causal Analysis (3 Credits)

This course shows how to apply causal modeling to develop robust, causally effective business policies and interventions; and quantify their impacts using realistically imperfect data under uncertain and changing conditions. Students create causal models of customer behaviors and responses to business initiatives; quantify lifts caused by campaigns; and design customer and employee policies and interventions with robust benefits despite real-world uncertainties and data limitations. Prior exposure to probability, statistics, optimization and R programming language is helpful but not essential. Term offered: fall, spring. Max hours: 3 Credits.

Grading Basis: Letter Grade

Typically Offered: Fall, Spring.

BANA 6720 - Simulation Modeling (3 Credits)

Students learn to model and analyze complex dynamic systems using state-of-the art software. Illustrative application areas include production systems, service systems, distribution systems and health care systems. Topics include creating reliable simulation models, analyzing the input and output from the model, and managing simulation projects. A substantial part of the course will be devoted to student projects where students define, model and analyze a significant system of their choosing. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6730 - Supply Chain Analytics (3 Credits)

Introduces the design, analysis, management, and control of supply chains. Because of continuing advances in globalization, sustainability, and information technology, course emphasis will include integration of processes and systems, relationship management of upstream and downstream players, and strategies that incorporate current and future trends. Cross-listed with INTB 6730. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6740 - VBA for Business Analytics (3 Credits)

This course teaches the essentials of Visual Basic for Applications (VBA), the programming language for Microsoft Office. Focus in using VBA as a tool to automate common tasks and to create business analytic applications. Goal is to hide the details of the analytical and modeling techniques by creating user interfaces for inputs and then presenting managerially relevant results. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6750 - Large-Scale Optimization Methods for Big Data (3 Credits)

Optimization methodologies comprise one of the major components of modern business analytics. In the era of big data where problem scale is enormous, the ability to model and solve large-scale problems is increasingly important. In the first part of this course we will learn how to model and solve large scale applications by using the AMPL modeling language and solvers such as CPLEX and Gurobi. The second half of the course will be devoted to working on projects. Prereq: BUSN 6630 with a grade of "C" or better. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: BUSN 6630 with a grade of "C" or better Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6760 - Data Visualization (3 Credits)

The course equips the Business Analyst with foundational concepts and techniques required for telling a compelling story with large complex data sets. The importance of visualizing information for many analysts is often overlooked or downgraded as a natural product of the analytics or model but if the visualization is ineffective the decision making processes and knowledge discovery will be compromised. This is a project-based course that begins with reviewing concepts of human perception and cognition and perceptual accuracy and preferences. In the weeks we have together we will explore the basics of graphic design and making a “good” graph, explore why some data visualizations present information effectively and others do not, and we will also consider visualization as a component of systems for the Data Scientist and Business Analyst and presents examples of EDA (exploratory data analysis), visualizing time, networks, and maps. We end by reviewing methods and tools for static and interactive graphics. Tableau or other cutting-edge software will be utilized. Restrictions: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6770 - Evaluative Analytics (3 Credits)

Introduces principles of design of experiments (DOE), multivariate trials, randomized control trials (RCTs), A/B testing, and multi-armed bandit (MAB) optimization to evaluate and improve business processes, CRM and HR policies, and marketing campaign design and performance. Students learn to design evaluation studies and analyze data to critically evaluate and improve business process design and targeting, timing, content, context, and channel decisions to increase employee and customer satisfaction and long-term value (LTV). Note: Prior exposure to probability, statistics, and R is helpful but not essential. Max hours: 3 Credits.

Grading Basis: Letter Grade

Typically Offered: Spring.

BANA 6780 - AI for Business (3 Credits)

BANA 6780 introduces current artificial intelligence (AI) and machine learning (ML) technology, together with business use cases and AI/ML technology strategy for managers. Students learn how a variety of companies, from Netflix to electric utilities, apply modern AI/ML techniques to predict and manage customer demand, preferences, experiences, and behaviors; improve business processes and KPIs; automate and optimize routine business decisions; and develop more successful business strategies. Take-home software labs and demos enable students to experiment with recommendation engines, Bayesian probabilistic inference systems, pattern recognition and predictive analytics, natural language processing (NLP), anomaly detection, causal inference, and optimization and coordination of plans and decisions over time and within teams and organizations of AI agents. Students apply these AI/ML techniques to business strategy and use cases and present their analyses in a written report. Prereq: This course is intended to be self-contained. Previous experience with AI/ML or applied probability and statistics and R are helpful but not essential. Restriction: Restricted to graduate majors. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to students with graduate standing.

Typically Offered: Spring.

BANA 6800 - Special Topics (3-12 Credits)

A number of different current topics in business analytics are discussed in this course. Consult the current schedule for semester offerings.

Prereq: Permission of instructor. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Repeatable. Max hours: 12 Credits.

Grading Basis: Letter Grade

Repeatable. Max Credits: 12.

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6840 - Independent Study (1-6 Credits)

Instructor approval is required. Allowed only under special and unusual circumstances. Regularly scheduled courses cannot be taken as independent study. Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Repeatable. Max Hours: 6 Credits.

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.

BANA 6910 - Business Analytics Practicum (3 Credits)

Students apply business analytics methodologies to a real-life business problem in cooperation with a local organization. Under the supervision of faculty, students engage in problem definition, analysis and solution. Results are presented in oral and written form to the sponsoring organization. Because the practicum is a capstone course, it is not appropriate for students just beginning the program. Prereq: Will vary depending upon the particular topic (consult the schedule of classes). Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to graduate majors and NDGR majors with a sub-plan of NBA within the Business School.