

## BSAN - Business Analytics

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Courses numbered 500 to 799 = *undergraduate/graduate*. (Individual courses may be limited to undergraduate students only.) Courses numbered 800 to 999 = *graduate*.

### **BSAN 675. Analytics Decision Modeling with Spreadsheets (3).**

Cross-listed as FIN 675. Introduces key principles of business analytics modeling: descriptive, predictive and prescriptive. Models covered in each area may differ from semester to semester. Students learn how to make decisions not based on intuition or “gut feel,” but on models and data. Course adopts a practical approach to the modeling of a wide variety of business problems in various functional areas. Models are built in Excel and add-ins to Excel, allowing students to gain advanced Excel skills, which will benefit them in their careers. Prerequisite(s): DS 350 and FIN 340 each with a grade of C or better; BADM 162, ECON 231, and ECON 232 or equivalents.

### **BSAN 710. Python Programming for Business (3).**

Cross-listed as ECON 710. Provides students with an understanding of the fundamentals of Python programming to prepare them for the growing demand for these skills in modern business. This course uses Python Notebooks to introduce students to important Python packages essential for data analysis, such as Numpy, Pandas, Matplotlib, Scikit-learn, etc. Students learn how to program in Python; perform scientific computations; prepare, manipulate, transform and clean data; create descriptive statistics; visualize different types of data; and use the data to create analytical models. Upon successful completion of this course, students should be skillful with python programming for analytics with a solid foundation for further study in data science and a competitive edge in the contemporary workplace. Prerequisite(s): ECON 231 and either an ECON 300-level class or MIS 310; or graduate standing.

### **BSAN 734. Introduction to Data Mining and Machine Learning (3).**

Introduction to databases, data warehouses, data mining processes and techniques (e.g., predictive machine-learning models and clustering), simple text mining techniques (e.g., sentiment analysis and topic modeling) and data mining approaches for big data (e.g., MapReduce and the Hadoop ecosystem). The course focuses on the application of these techniques more than theoretical considerations. The techniques and material are presented and demonstrated using Jupyter notebooks in the Python programming language. Prerequisite(s): BSAN 710 or equivalent, or instructor's consent.

### **BSAN 735. Advanced Machine Learning and Deep Learning (3).**

Covers advanced machine learning, natural language processing and deep learning techniques that are relevant to business applications involving high dimensional data sets, unstructured data or other complex data sets. Supervised learning, unsupervised learning, transfer learning and feature representation are all introduced in the context of real-world problems. Methods covered include deep neural networks, transformer language models, multimodal models, recurrent neural networks, convolutional neural networks, clustering, dimensionality reduction, decision trees, support vector machines and ensembles. Students use premade Jupyter and Colab notebooks (with packages such as pandas, scikitlearn, Keras, Hugging Face, and Tensorflow) to apply these techniques on topics ranging from marketing to finance to social media analytics. The assignments and project focus on applying the techniques via the provided notebooks rather than coding the models from scratch. Prerequisite(s): BSAN 734 or CS 746 or instructor's consent.

### **BSAN 750. Data Visualization (3).**

Cross-listed as MIS 750. Introduces data visualization principles and prepares managers for developing and implementing digital

performance dashboards to monitor business processes and make informed decisions. Covers a broad category of data visualization strategies for descriptive data analysis, visual data analysis and design choices. Emphasizes the importance of using big data and insightful visualizations to improve the business decision-making process. Hands-on projects with the use of modern data visualization software are included.

### **BSAN 760. ERP: Enterprise Resource Planning (3).**

Cross-listed as DS 760. Provides students with an understanding of what Enterprise Resource Planning (ERP) systems are (also known as Enterprise Systems). ERPs are designed to assist an organization with integrating and managing its business processes by moving away from numerous disintegrated and costly legacy systems towards one main IT system for the organization. ERPs are a critical component of an organization's IT strategy because they integrate many functions in business including operations, supply chain, sales, distribution and accounting. The course provides a technical overview of ERP systems and their managerial impact on organizations. SAP is introduced to illustrate the concepts, fundamentals, framework, information technology context, technological infrastructure and integration of business enterprise-wide applications. Latest technological trends in the ERP market are discussed. Additional accompanying software is introduced, as time permits.

### **BSAN 775. Introduction to Business Analytics (3).**

Offers an overview of business analytics and its relationship with data analytics and data science. The course covers different analytics models at the descriptive (includes visualization), predictive and prescriptive levels, and briefly goes over ethical issues surrounding the use of such models for real-world problems. The emphasis is on business problems in various disciplines (operations, supply chain, finance, marketing, human resources, etc.). Students are exposed to various software packages available for business intelligence and analytics (e.g., Tableau, SPSS, WEKA). Topics covered in the course assist students, regardless of their background, in understanding a problem, framing the problem, selecting the proper analytical model, selecting software packages to use, running models, analyzing the results, and communicating these in a professional and effective manner. The course also includes case analyses, a term project, and discussions of emerging topics and trends in analytics.

### **BSAN 781. Cooperative Education (1-3).**

Academic program that expands a student's learning experiences through paid employment in a supervised educational work setting related to the student's major field of study or career focus. May not be used for credit without prior approval of the program director. Repeatable for a total of 3 credit hours.

### **BSAN 790. Selected Topics in Business Analytics (1-3).**

An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 790A, 790B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course.

### **BSAN 790A. Causal Inference and Analytics with Machine Learning (3).**

Offers an in-depth exploration of causal inference, an advanced topic in analytics, as it applies to the field of machine learning. Using Python, the course is designed for students looking to deepen their understanding of how causal relationships are identified and utilized. The curriculum covers a broad range of topics, starting with the history of causality and advancing through complex concepts such as graphical models, advanced estimators, and the latest developments in deep learning and natural language processing (NLP) with transformers. Additional topics include hyperparameter tuning with DoWhy and

EcoML, propensity scores, experimental design, regression and interventions. While comprehensive, this course provides a starting point to explore and apply causality analysis across multiple business disciplines (e.g., supply chain, economics, marketing and management). It includes lectures, case studies and a group project to understand current trends and future directions of causal inference.

**BSAN 790B. Introduction to Applied Statistics (3).**

Provides a comprehensive introduction to statistical methods for business, focusing on data collection, organization and analysis. Topics include descriptive statistics, probability, hypothesis testing, chi-square and nonparametric tests, as well as regression analysis (simple and multiple) and model building. Students develop practical skills in applying these techniques to business scenarios, using statistical software to analyze and interpret data, supporting decision-making and problem-solving in real-world business environments.

**BSAN 810. Business Acumen for Technical Professionals (3).**

This class is designed for students with little to no business knowledge, who are interested in pursuing a graduate degree or profession in an analytics field. It is intended to provide these students with an introduction to key business topics that include business culture, communication, finance and accounting, marketing, operations management and supply chain, effective teams, and strategic thinking. The class delivery focuses on critical thinking, teamwork, business writing and presentation skills. Prerequisite(s): not open for MBA students or undergraduate business majors from an accredited U.S. university.

**BSAN 875. Prescriptive Analytics with Python (3).**

Provides a comprehensive introduction to prescriptive analytics techniques with a focus on optimization and simulation using Python. Students learn to develop and implement various optimization models including linear programming, network models and integer programming. The course also covers simulation modeling techniques, including discrete-event simulation and Monte Carlo methods, with applications to queuing systems and business decision-making under uncertainty. Through hands-on programming exercises and real-world business cases, students gain practical experience using Python libraries for optimization and simulation. The course emphasizes problem-solving skills and the application of prescriptive analytics to support strategic business decisions. Prerequisite(s): BSAN 710 and BSAN 775 or equivalent, or instructor's consent.

**BSAN 885. Business Analytics with Advanced AI Techniques (3).**

This advanced course integrates traditional analytics methods with cutting-edge artificial intelligence technologies to solve business problems. Students learn to create sophisticated analytics systems that incorporate large language models (LLMs), embedding techniques, and automated pipelines for complex business applications. The course covers advanced topics including API integration, LLM analytics pipeline development, cloud computing for data processing, document data extraction, and analytics for text, image and audio data. Through hands-on projects, students develop expertise in configuring analytics environments, implementing cloud-based solutions, and creating automated systems for document analysis and business intelligence. Special emphasis is placed on practical implementation of AI technologies in business contexts, including working with LLMs and embedding models for market analysis and document processing. Capstone course. Prerequisite(s): BSAN 710, BSAN 775 and BSAN 734 all with a grade C or above. Pre- or corequisite(s): BSAN 735 or BSAN 875 or instructor's consent.