BSAN - Business Analytics

Courses numbered 100 to 299 = *lower-division*; 300 to 499 = *upper-division;* 500 to 799 = *undergraduate/graduate*.

BSAN 150. Special Topics   (1-3).
An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 150A, 150B). 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 150A. Generative AI for Real-World Problem Solving: An Interdisciplinary Approach to Design   (3).
Cross-listed as ENGR 150A. In this course, students from various disciplines come together to explore the practical applications of generative AI to develop solutions for messy real-world problems. Course emphasis focuses on understanding how to use applications and pinpoint potential use-cases, while providing a high-level overview of the theoretical underpinnings. Students learn to critically analyze and anticipate the impact of generative AI tools on the future of education and the workforce, as well as delve into the ethical, intellectual and legal dilemmas with societal implications. Interdisciplinary student teams work on a term project to foster a deeper understanding of generative AI platforms, encouraging innovative thinking to develop solutions to real problems. To ensure that students are able to identify and approach new problems using generative tools, the course provides a high-level overview of machine learning through practical programming exercises designed for students without a programming background. *Course includes diversity content*.

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 status.

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).
Provides students with the opportunity to get practical experience in the field of business analytics and apply what they learned in the classroom. This course must be approved by the program director and under the supervision of a graduate faculty. May not be used for credit without prior approval of the program director. Repeatable for a total of 3 credit hours.

BSAN 790. Seminar in Special Topics   (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.