ANALYTICS (DATA)

DATA 1101 Business Analytics   **3 Credits**
This course introduces basic skills necessary for business analytics such as data analysis and preparation, probability and statistical modeling, data-driven decision making, and persuasion/storytelling with data. Spreadsheets are used as the platform for conducting analyses, performing statistical calculations, and presenting results. Previously DATA 2101.

DATA 1101L Excel Certification Lab   **0 Credits**
This is a required lab component of DATA 1101 with a focus on Microsoft Excel. The lab is designed to improve students' spreadsheet skills, which is vital in today's job market. The lab also prepares students to pass a certification exam that is offered in a secure, proctored format during the course. A passing grade in this lab corresponds to successful completion of the certification exam.

DATA 2000 AI   **3 Credits**
Prerequisite: DATA 1101.
This course focuses on the practical application of no-code artificial intelligence (AI) tools to solve complex business problems. These tools require no programming, instead emphasizing skills such as prompt engineering and the strategic use of large language models like ChatGPT. Through hands-on weekly projects and a comprehensive final project, students will learn to navigate and apply desktop and cloud-based generative AI tools in application areas including text, images, audio, video, code, and tabular data, preparing them to innovate and lead in the new age of AI.

DATA 2140 Project Management   **3 Credits**
Prerequisite: ECON 3278 or MATH 1017 or MATH 2217.
This course introduces students to project management and its role in business operations, with applications in such functional areas as accounting, finance, information systems, management, and marketing. Topics include the linkage between projects and organizational strategy, project planning and scheduling, project development and implementation, applying best practices and tools, evaluation methodologies and control techniques, and critical success factors. Special attention is given to showing how concepts and models presented in lectures and readings apply to real-world projects. Previously ISOM 2140.

DATA 2980 Internship   **1 Credit**
Prerequisite: Sophomore standing.
Students may take up to two semesters of a department-approved internship. Students must be matriculated in the Dolan School of Business and have a GPA of 2.5 or higher. Previously BUAN 2980.

DATA 3210 Business Analytics Methods   **3 Credits**
Prerequisites: DATA 1101.
This course focuses on quantitative modeling and analyzing business problems using spreadsheet software such as Excel, and data visualization software such as Tableau. Topics include descriptive analytics, visualizing and exploring data, predictive modeling, regression analysis, time series analysis, portfolio decisions, risk management, and simulation. Business models relevant to finance, accounting, marketing, and operations management are set up and solved, with managerial interpretations and "what if" analyses to provide further insight into real business problems and solutions. Previously BUAN 3210.

DATA 3235 Python Apps for Business Analytics   **3 Credits**
Prerequisite: DATA 1101.
This course introduces students to business analytics using Python. Students should gain a fundamental understanding of how analytics can be done using Python. Business problems will be used for assignments and projects. Technical topics include reading/writing to files, data types, variables, simple control logic, loops, strings, lists, dictionaries, functions, and structure. Previously BUAN 3235.

DATA 3260 Database Systems   **3 Credits**
Prerequisite: DATA 1101.
This course covers fundamental database concepts, such as tables and queries, using Microsoft Access. Students then gain hands-on knowledge with the industry-standard database language, Structured Query Language (SQL). A semester-wide project helps students bring together learned concepts. Students also learn how to use a popular data analytics software, Alteryx.

DATA 3335 Sports Analytics   **3 Credits**
Prerequisite: DATA 1101.
Virtually every sport has been improved in recent years with the introduction and widespread acceptance of analytical methods. Analytics help leagues, teams, referees, coaches, athletes, agents, and fans appreciate their favorite sports on a higher level. In this course, students will gain a broad perspective on the methods, findings, impact, and controversies within sports analytics across a variety of sports and e-sports, learn how to analytically evaluate and compare differing perspectives, and practice communicating findings to a non-analytical audience in an impactful and actionable way.

DATA 3980 Internship   **3 Credits**
Prerequisite: Junior standing.
Students may take up to two semesters of a department-approved internship. Students must be matriculated in the Dolan School of Business and have a GPA of 2.5 or higher. Previously ISOM 3980, BUAN 3980.

DATA 4000 Python Programming with AI   **3 Credits**
Prerequisite: DATA 2000.
This course aims to introduce students to Python programming, leveraging generative AI to enhance learning and practical application. The course will cover fundamental programming concepts, data structures, and logical thinking, while also focusing on the use of AI models to assist in coding and evaluating AI-generated responses. Ultimately, this course aims to prepare students for their future careers by equipping them with valuable technical skills and AI literacy.

DATA 4310 Business Intelligence   **3 Credits**
Prerequisites: DATA 3210, DATA 3260.
Business Intelligence (BI) is an umbrella concept covering the processes and methods of collecting, storing, and analyzing data generated from business operations or activities to make informed business decisions. Disparate industries, such as retail, healthcare, and education, have adopted BI for various decision support purposes. Since data in today's business environments is vast in volume and grows at a fast pace, utilizing computerized technologies helps managers make fact-based decisions to support business operations. This course provides an introduction to the use of business intelligence and data visualization in organizations, with emphasis on how data is gathered, stored, analyzed, and used. Topics covered include business intelligence, data warehousing, data visualization, and business reporting. Previously BUAN 4310.

DATA 4315 Data Mining and Applications   **3 Credits**
Prerequisites: DATA 3210, DATA 3260.
This course provides students with a practical understanding of data mining, applications, techniques, and tools, with a specific focus on business analytics. The pillars of the data mining process (data collection/extraction and mining) are demonstrated with real world examples. Applications of these techniques and tools to different areas are covered. A semester-wide team project provides students with hands-on experience to bring together data mining concepts learned. Previously BUAN 4315.

DATA 4990 Independent Study   **3 Credits**
Students pursue topics of special interest through independent study, research, and/or completion of a business analytics project under the supervision of a full-time faculty member. The Department Chair and Dean must approve the work. The student and the faculty project advisor must submit an application to the Registrar before registering for the course. If any work is expected to occur at any time other than the semester registered, students must obtain the approval of the faculty project advisor and the Department Chair prior to commencing of any work. Normally, students should have completed at least two advanced business analytics courses before taking the independent study. Previously ISOM 4990.

DATA 4999 Business Analytics Capstone   **3 Credits**
Prerequisite: Senior standing.
This course is the capstone for the business analytics major. Students collaborate on different types of analytical projects of varying scope and complexity. Each student acquires and applies specialized technical and managerial expertise as required for completing the projects. The capstone projects will be real-world, client-oriented, and faculty-guided applications. Supplementary instruction in analytical project design, development, and evaluation is provided on an as-needed basis within the context of the project work. Previously BUAN 4999.

DATA 5400 Applied Business Statistics   **3 Credits**
Using spreadsheet software, this hands-on course teaches a variety of quantitative methods for analyzing data to help make decisions. Topics include: data presentation and communication, probability distributions, sampling, hypothesis testing and regression, and time series analysis. This course uses numerous case studies and examples from finance, marketing, operations, accounting, and other areas of business to illustrate the realistic use of statistical methods. Previously BUAN 5400.

DATA 5405 Python Fundamentals   **3 Credits**
This course is an introduction to Python, with an emphasis on general programming concepts (structure, logic, data, etc.) that apply to just about any general purpose programming language. Starting with a review of fundamental programming concepts, the course uses short lessons, quizzes, and coding challenges to cover the basics of how Python is used in a professional Business Analytics setting. The course concludes with a final project designed to demonstrate proficiency. Previously BUAN 5405.

DATA 5410 Analytics Programming for Business   **1.5 Credits**
This course focuses on quantitative modeling and analyzing business problems using spreadsheet software, such as Excel and its add-ins. Topics include descriptive analytics, visualizing and exploring data, predictive modeling, regression analysis, time series analysis, portfolio decisions, risk management, and simulation. Business models relevant to finance, accounting, marketing, and operations management are set up and solved, with managerial interpretations and "what if" analyses to provide further insight into real business problems and solutions. Open to MS Management students only. Previously BUAN 5410.

DATA 6100 Fundamentals of Analytics   **3 Credits**
This is an introductory level graduate course focusing on spreadsheet modeling to analyze and solve business problems. Topics include descriptive analytics, data visualization, predictive modeling, time series analysis, and data mining. Contemporary analytical models utilized in finance, marketing, accounting, and management are set up and solved through case studies. Previously ISOM 6500.

DATA 6500 Leading with Analytics   **3 Credits**
This course provides a broad overview to the analytics profession, with a focus on data driven leadership and hands-on analytical skills. Starting with a foundation of analytical framing and statistical analysis, the course moves on to more advanced topics like data visualization and summarization, descriptive and inferential statistics, spreadsheet modeling for prediction, linear regression, risk analysis using Monte-Carlo simulation, linear and nonlinear optimization, and decision analysis. The course culminates with a group research project using curated big data datasets, as well as individual exercises in problem framing intending to be a component of an analytics capstone experience. Previously BUAN 6500.

DATA 6505 Data Munging in Python   **3 Credits**
Prerequisite: DATA 5405 or placement exam.
In this course, we introduce Python as a language and tool for collecting, preprocessing, and visualizing data for business analytics. Since Python is one of the most popular programming languages in machine learning, its fundamental programming logic and knowledge is essential for students to apply in analytics and to succeed in the job market. Specifically, this course focuses on the data munging phase, which includes collecting, preprocessing, and visualizing data, with respect to applications in business modeling, optimization, and statistical analysis. In addition, important techniques such as web scraping and Application Programming Interface (API) usage are introduced. The course culminates with a final project in exploratory data analysis, as well as individual exercises in data munging intending to be a component of an analytics capstone experience. Previously BUAN 6505.

DATA 6510 Data Warehousing and Visualization   **3 Credits**
This course introduces datasets, databases, data warehouses, data management, and data visualization techniques. Starting from the relational data model and basic database fundamentals, the course offers a hands-on introduction to Structured Query Language (SQL) for defining, manipulating, accessing, and managing data, accompanied by the basics of data modeling and normalization needed to ensure data integrity, including entity relationship modeling and diagrams. Additionally, the course simultaneously offers hands-on learning with visualization and interactive dashboards in Tableau. The course concludes with a comprehensive data warehousing and visualization project that gives each student the opportunity to integrate and apply the new knowledge and skills learned from this class. Previously BUAN 6510.

DATA 6520 Analytics Consulting and Strategy   3 Credits
Prerequisite: DATA 6500.
With the rise of analytics for cutting-edge business innovation, the industry needs business leaders who can solve an organization's most important problems by asking and answering questions using data. These business consultants need to bridge both the data analytics and business fields. This class tries to provide a "real world" consulting experience through a project-centric experiential approach, in addition to case studies of analytics consulting and business problem solving using descriptive, predictive and prescriptive analytics. When possible, class projects will be client-driven using community partners. Students work in teams using analytics to answer the client's current and important business questions using data. The students will approach these as business analytics consultants by using effective project management to gathering requirements, using continuous client engagement to deepen understanding of the problem, suggesting ways in which to explore the question and its possible solutions through data, running different data models to approach the solution, working with clients to come up with effective analytics strategies, making business presentations based on findings, incorporating the inevitable changes that come with real world projects, and recommending strategic solutions based on their findings.

DATA 6530 Statistics and Forecasting   3 Credits
Prerequisite: DATA 5400 or placement exam.
This course introduces analytical techniques used for decision-making under uncertainty. Topics include time series and other forecasting techniques, such as Monte Carlo simulation, to assess the risk associated with managerial decisions. Specifically, we will cover data collection methods, time dependent models and analysis, advanced solver, time series techniques, exponential smoothing, moving averages, and Box-Jenkins (ARIMA) models. Application examples include financial models - stock prices, risk management - bond ratings, behavior models - customer attrition, customer likes/dislikes, buying patterns - propensity to buy, politics - identify swing voters, and sales. Previously BUAN 6530.

DATA 6540 Business Intelligence and Data Storytelling   3 Credits
Prerequisite: DATA 6510.
Modernly, business intelligence has become far more interactive. This course provides an advanced application and overview of the new techniques for building interactive dashboards and tools now prevalent in this profession. Additionally, with data overload happening on every level, the importance of good data storytelling has soared. Using programming languages and environments such as Tableau and R, this course introduces students to the business intelligence profession and teaches the skills necessary to develop and deploy cloud-based interactive apps to assist in data and analytical storytelling, including insights into user interface design (UI) and user experience design (UX). The course concludes with a comprehensive project. Previously BUAN 6540.

DATA 6545 Data Science and MLOps   3 Credits
Prerequisite: DATA 6505.
This course provides an advanced understanding of the practices of machine learning techniques and operations (MLOps), with a special focus on business applications. To assure practical relevance, the emphasis of this course is on the applications of techniques and tools realizing machine learning in terms of business analytics. The course is organized following the Cross-Industry Standard Process for Data Mining (CRISP-DM) and all learned techniques are applied in a couple of semester-wide projects. Python is introduced and illustrated through a series of tutorials and case studies, and Automatic Machine Learning (AutoML) is introduced as well. Students are expected to actively participate in the course deliverables through independent assignments, lab work, and group projects. The course culminates with a final project in predictive analytics, as well as individual exercises in modeling and interpretation intending to be a component of an analytics capstone experience. Previously BUAN 6545.

DATA 6550 Big Data Management and Data Ops   3 Credits
Prerequisites: DATA 6505 and DATA 6510.
This course introduces the fundamentals of Big Data management and its implementation in the public cloud. Topics include classic theories of data architecture, dimensional database design, data pipelines, and data governance, supplemented with the latest developments in the emerging field of DataOps. The theory is grounded with hands-on experience building databases and data pipelines with the Modern Data Stack.

DATA 6560 Sports Analytics   3 Credits
Sports analytics is transforming the way teams, leagues, players, coaches, referees, and fans perceive and appreciate their favorite pastimes and games, including major team sports such as baseball, basketball, football, soccer, cricket, and rugby, more individualized sports like tennis and golf, and brand-new innovations such as e-sports. In this course, students will gain experience in framing analytical questions in sports, discover and evaluate cutting-edge research and findings in sports analytics, develop hands-on skills in using and implementing sports analytics solutions, and learn how to communicate findings to a non-analytical audience in an impactful and actionable way. This course culminates in a scholarly sports analytics research paper.

DATA 6570 Artificial Intelligence Applications   3 Credits
Artificial intelligence is becoming far more prevalent in the business and analytics worlds, yet many analytics professionals are excluded from participating in this new wave because they lack the strong coding foundations that are typically needed to implement this new technology from scratch. However, recent advances in AI/ML have coincided with desktop and cloud tools that can be deployed far more easily to generate new models without complicated coding requirements. This course will teach students how to discover, use, and daisy-chain such tools to solve real-world business problems in ways that would otherwise be impossible.

DATA 6575 Deep Learning and Artificial Intelligence   3 Credits
Prerequisite: DATA 6545.
This course introduces students to the latest development of machine learning, namely deep learning, as well as its applications to a variety of domains. Fundamental knowledge, such as the architectures of the deep neural networks, extraction of high-level features representing unstructured data, backpropagation, and stochastic gradient descent. Additionally, students get hands-on experience building deep neural network models with Python. Topics covered in this class include model building and optimization, image classification, natural language processing, generative models, and so forth. These topics cover the foundations and the latest developments in the field of deep learning.

DATA 6900 Contemporary Topics Seminar   **3 Credits**
This course draws from current literature and practice on information systems and/or operations management. The topics change from semester to semester, depending on student and faculty interest and may include: project management, e-business, management of science with spreadsheets, e-procurement, executive information systems, and other socioeconomic factors in the use of information technology. Previously ISOM 6900.

DATA 6990 Independent Study   **3 Credits**
This course provides an opportunity for students to complete a project or perform research under the direction of an Information Systems and Operations Management (ISOM) faculty member who has expertise in the topic being investigated. Students are expected to complete a significant project or research paper as the primary requirement of this course. Enrollment by permission of the ISOM Department Chair only. Previously ISOM 6990.

DATA 6999 Capstone: Business Analytics Applications   **3 Credits**
Prerequisites: 18 or more credits of DATA courses at the 5000-level or higher.
This capstone course for the MS Business Analytics program is to be taken in the last term before graduation. The purpose is to apply and integrate knowledge and skills learned in the program (statistics, modeling, data management, data mining, etc.) to a live data analytics project. The course is project-based, with students collaborating on their work under the guidance of faculty members. Application areas and format of the projects may vary, depending on faculty, dataset, and budget availability. However, the work should be rich enough to demonstrate mastery of business modeling and technology, with each student making a unique, demonstrable contribution to completion of the work. Previously BUAN 6999.