Course Guide for Business Analytics Emphasis

Business analytics and data are transforming modern firms. Every aspect of the firms is shifting toward data-driven decision making using business analytics. The transformation necessitates a need for "analytics-and-data-savvy" managers who 1) understand the business analytics methodologies, 2) ask the right business questions, and most importantly, 3) use the available data science and business analytics tools to answer these questions and make better decisions.

The Business Analytics Emphasis offered by the Data Sciences and Operations (DSO) Department is the unique program that provides students with analytical and data science skills that allow them to make data-driven business decisions in various industries, ranging from healthcare, entertainment, energy, retail, technology, interactive gaming, media, sports, hospitality, automotive, consumer goods, transportation, logistics, manufacturing, and financial services. Our graduates are hired in different business functions, such as marketing, finance, human resources, accounting, logistics, and production.

The Business Analytics Emphasis requires completion of at least twelve (12) units of DSO upper division coursework, which include 400-level DSO courses, including DSO 499. The following guide shows how each DSO elective course equips students with skill sets in three core areas necessary for becoming analytics-and-data-savvy managers: *methodologies, tools, and applications*. Note that a course can provide students with skills in multiple areas. For example, a course on optimization teaches students optimization methodologies, shows how Excel and Python can be used to implement optimization models, and demonstrates a wealth of business applications using optimization models. A complete list of all courses is given at the end of the document.

1) *Methodologies:* The following courses provide students with knowledge of different business analytics methodologies.
    a. AI and Machine Learning: DSO 428, DSO 431, and DSO 464
    b. Data Analysis and Statistics: DSO 458 and DSO 499 (Statistical Computing and Data Visualization in R and Tableau)
    c. Optimization: DSO 499 (Optimization with Analytics for Better Decision Making)
    d. Simulation and Decision Analysis: DSO 427
    e. Times Series and Forecasting: DSO 424

2) *Tools and software:* The following courses provide students with training in different tools and software that are available for data science and business analytics. Some courses use multiple software and tools, and they are listed multiple times.
    a. R: DSO 424, DSO 458, DSO 464, and DSO 499 (Statistical Computing and Data Visualization in R and Tableau)
    b. Python: DSO 459, DSO 462, and DSO 464
    c. Excel: DSO 401, DSO 424, DSO 427, DSO 455, DSO 462, DSO 482, and DSO 499 (Optimization with Analytics for Better Decision Making)
    d. Tableau/Power BI: DSO 428, DSO 483, and DSO 499 (Statistical Computing and Data Visualization in R and Tableau)
    e. SQL and databases: DSO 427, DSO 428, DSO 431, DSO 435, DSO 459, and DSO 462

3) *Applications:* The following courses train students on the broad range of business applications that can be addressed using business analytics. These courses provide students with extensive real-world examples of analytics applications, and the students will learn how to "ask the right business questions". These courses include DSO 401, DSO 424, DSO 427, DSO 458, DSO 459, DSO 464, DSO 482, DSO 483, and DSO 499 (Optimization with Analytics for Better Decision Making).

Recommended Coursework based on Fields of Interest

The Business Analytics Emphasis can help all Marshall undergraduates to improve their career prospects, regardless of their fields of interest or intended industries after graduation. Every firm in every industry is embracing data-driven decision making using quantitative business analytics. It is more important than ever for all students to develop expertise in data analysis and analytical techniques. Below is a list of recommended coursework based on fields of interest.

For students interested in marketing: To help with advertising decisions and targeting, marketing professionals routinely use quantitative analytical tools such as analysis of big data and optimization. Courses that provide you with skills in these areas include DSO 428 (Essentials and Digital Frontiers of Big Data), DSO 458 (Essentials of Business Data Analysis Using R), and DSO 499 (Optimization with Analytics for Better Decision Making). You may also be interested in DSO 424 on business forecasting.

For students interested in risk management: Many DSO courses provide students with training on how to evaluate and manage risks in business processes, including DSO 427 (Designing Spreadsheets-based Business Models) and DSO 455 (Project Management). Finding an effective risk mitigation strategy can often be formulated as an optimization problem, and the knowledge and tools from DSO 499 (Optimization with Analytics for Better Decision Making) can be applied to this problem.

For students interested in finance: The finance industry routinely employs sophisticated techniques to analyze big data. The DSO department offer many courses on data analysis. Interested students should consider DSO 424 (Business Forecasting), DSO 458 (Essentials of Business Data Analysis Using R), and DSO 464 (Deep Learning for AI and Business applications). Having a working knowledge of python programming and data architecture can also be helpful because you routinely work with large datasets. Courses such as DSO 459 (Business Analytics with Python) and DSO 435 (Enterprise Data Architecture) will give you knowledge in these areas.

For students interested in logistics and supply chain: Logistics and supply chain management are crucial business operations for retailers and e-commerce companies. These businesses routinely use optimization methodologies to find the most effective inventory, routing, and fulfillment decisions. The DSO department offers courses that provide students with state-of-the-art knowledge in the areas, including DSO 482 (Supply Chain Management), DSO 483 (Operations Consulting), and DSO 499 (Optimization with Analytics for Better Decision Making).

For students interested in entrepreneurship: Entrepreneurs should understand the foundation of digital business and how the tools from business analytics can be applied to launch a new venture. Courses that may be applicable include DSO 431 (Foundations of Digital Business Innovation), DSO 443 (Current Trends in Digital Business Models), and DSO 462 (Managing a Small Business on the Internet).

What if my interest is not listed or the recommended coursework does not fit with my plan? The DSO department offers many courses, and it is likely that there are courses that meet your needs. Please contact Professor Feng Chen (fchen@marshall.usc.edu), the Emphasis Faculty Advisor, to discuss how the DSO courses can help with your career goals and aspirations.

DSO Upper Division Courses

Course	Course Name	Course Description
DSO 401	Business Information Systems -- Spreadsheet Applications	Applied understanding of how spreadsheets are used to analyze business information. Create real world software applications for use in accounting, finance, marketing, and operations.
DSO 424	Business Forecasting	A variety of forecasting techniques used by a variety of businesses. Emphasis on learning to apply these techniques to real data.
DSO 427	Designing Spreadsheets-based Business Models	Application of decision analysis, simulation, and optimization techniques to managerial problems. Learn how to create and present useful spreadsheet models to analyze practical business problems.
DSO 428	Essentials and Digital Frontiers of Big Data	An overview of key concepts of big data and related digital technologies and their applications to different business problems. Hands-on experience at introductory level.
DSO 431	Foundations of Digital Business Innovation	Implementing transformative digital technologies. Strategies to complete with ERP, blockchain, cloud, cryptocurrency, fintech, insurtech, API economy, digital platforms/ecosystems, open data, AI and ML.
DSO 435	Enterprise Data Architecture	Management of enterprise data architecture including data structures, conceptual data modeling, logical data modeling, structured query language (SQL), and physical optimization of high performance data architecture.
DSO 443	Current Trends in Digital Business Models	How rapidly developing digital technologies change the organization, structure and operations of media industries. Provides the perspective of new players in the media industries.
DSO 455	Project Management	Topics related to project management in a variety of industries such as real estate projects, new product launch, plant location, etc.
DSO 458	Essentials of Business Data Analysis Using R	The course uses business cases to introduce practical ways of solving problems. You will learn how to use R/RStudio to download real-world data, manipulate data sets from various sources, manage the information, produce high quality charts. You will learn the basics of computing, as well as problem-solving and algorithmic thinking. You will complete projects and create programs that are practical to business applications outside the class, you will work on real-world cases.
DSO 459	Business Analytics with Python	This course teaches hands-on skills, using Python, to implement strategies and approaches for defining, performing, and presenting business analytics in major business areas. This course prepares students to learn about and execute the business analytics project in a business setting starting with formulating business hypotheses, exploring data numerically and visually, building models using the provided Python code, interpreting the results and finally communicating actionable business recommendations.
DSO 462	Managing a Small Business on the Internet	Foundational knowledge for managing a small business on the internet including strategies, tools, and resources integrated with hands-on skills for developing a small business website.
DSO 464	Deep Learning for AI and Business applications	Gather, categorize, analyze, interpret, evaluate relevant qualitative/quantitative information. Extract patterns from unstructured Big Data. Find crucial heterogeneity for business decisions with real-time data.
DSO 482	Supply Chain Management	Issues in supply chain management. Supply chain performance and dynamics. Tools for planning, control and coordination. Supply chain design and strategy.
DSO 483	Operations Consulting	Study of concepts and techniques for improving operations, formulation and implementation of operations strategy, and development of frameworks for process design, selection and performance evaluation.
DSO 499	Statistical Computing and Data Visualization in R and Tableau	Students will learn how to make sense of data numerically and visually. The course starts with statistical computing, and students will gain experience with a programming language called R and Rstudio. In addition, students will learn Tableau and be able to integrate R with Tableau to maximize these tools' capabilities for business. They will learn the practice of data cleaning, reshaping of data, basic tabulations, and aggregations in order to be able to produce high quality visualizations.
DSO 499	Optimization with Analytics for Better Decision Making	The course will teach students how to make better business decisions through the use of optimization models. The students will learn about the enormous and impactful applications of optimization across multiple industries, including aviation, hospitality, retails, supply chain, manufacturing, and agricultural industries. This course will teach students the tools and techniques to formulate an optimization model, solve the model, and interpret the resulting solutions. The course will provide students with a unique analytics edge in an increasingly competitive global business environment