BUSINESS ANALYTICS

Faculty

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Organizations of all types increasingly rely on data and analytics to inform their decision-making processes. To this end, both for-profit and not-for-profit organizations must have the ability to transform data into information. Business analytics is the scientific process of transforming data or quantitative models into actionable insight to improve decision-making. Business analytics rests on three broad functional pillars: descriptive, predictive and prescriptive analytics.

- Descriptive analytics prepares, displays and analyzes historical data; it identifies data patterns to report trends.
- Predictive analytics forecasts future probabilities and trends, and determines relationships in data that may not be readily apparent with descriptive analysis.
- Prescriptive analytics evaluates and determines new ways to operate based upon meeting certain objectives while balancing operational constraints.

This modeling and analysis cannot be done in isolation. Across the curriculum, we will address and investigate the ethical implications of both the intended and unintended use of our analysis. The business analytics major allows students with an interest in quantitative analysis (broadly defined) to further explore their interests in an organizational context, to appreciate the inherent broad social and ethical issues within the field, and to become effective managers in any data-driven organization. The major provides our graduates the necessary analytical and communication skills built upon a broad management education to address challenges in the 21st century.

Business analytics majors are also eligible to pursue a BA in Data Science (https://coursecatalog.bucknell.edu/archive/2025-2026/collegeofartsandsciencescurricula/areasofstudy/datascience/) as a co-major. Complementing the depth a student receives from their business analytics major, the BA in data science provides breadth across the interdisciplinary field of data science. The co-major is not intended as – nor may it be declared as – a stand-alone course of study.

In the spring of their sophomore year, all BSBA students will, in consultation with their advisers, select a major in one of the Freeman College of Management departments and will complete the specific major requirements in addition to the Freeman College core curriculum requirements (https://coursecatalog.bucknell.edu/archive/2025-2026/collegeofmanagementcurricula/curriculaoverview/Corerequirements/).

Business Analytics Requirements

Beyond completion of the Freeman College core requirements (https://coursecatalog.bucknell.edu/archive/2025-2026/collegeofmanagementcurricula/curriculaoverview/Corerequirements/), all business analytics majors must take the following courses:

Business Analytics Core Requirements

MATH 201	Calculus I	1
or MATH 192	Topics in Calculus	
MATH 216	Statistics I	1
ANOP 203	Introduction to Programming for Business Analytics	1
or CSCI 203	Introduction to Computer Science	

Business Analytics Major Requirements

ANOP 270	Data Visualization for Business Analytics	1
or HUMN 270	Data Visualization for the Digital Humanities	
ANOP 330	Predictive Analytics: Machine Learning Fundamentals for Business	1
ANOP 350	Predictive Analytics: Forecasting & Simulation	1
ANOP 370	Prescriptive Analytics: Decision Modeling & Optimization	1
or MATH 358	Topics in Operations Research	
ANOP 400	Business Analytics Practicum	1

Culminating Experience

All BSBA majors must satisfy the Culminating Experience component of the Freeman College of Management General Education Curriculum by taking a course designated as such ***on campus*** no earlier than the second semester of the junior year. Business analytics majors will fulfill this by taking ANOP 400 Business Analytics Practicum.

Analytics & Operations Management Suggested Plan of Study

Below is a general guide for when to take the courses that count toward the Freeman College Core and your major requirements. Suggested term(s) of study are denoted in parenthesis. These are just a general guide. Other sequences are possible. Consult the Bucknell course schedule for course availability in each semester. Refer to your catalog year for specific information about your major and related prerequisites.

Abbreviation Key:		
FY = First Year		
SO = Sophomore Year		
JR = Junior Year		
SR = Senior Year		
FREEMAN CORE COURSES = 8.5 credits		
ANOP 102	Spreadsheet Modeling & Data Analysis (FY either semester)	1
ECON 101	Economic Principles/Problems (FY either semester)	1
MGMT 100	Exploring Management (FY first semester)	.5
MGMT 101	Introduction to Organization and Management (FY second semester or SO first semester) # w	1
ACFM 104	Foundations of Accounting I (SO either semester)	1
ACFM 203	Corporate Finance (SO or JR either semester) p	1
ANOP 202	Operations Management (SO either semester) p	1
MIDE 201	Marketing (SO or JR either semester)	1
MORS 302	Responsible Management p	1
or MGMT 303	Technological Dystopia	
(either may be taken JR second semester, SR either semester)		
BUSINESS ANALYTICS CORE REQUIREMENTS = 8 credits		
MATH 201	Calculus I	1
or MATH 192	Topics in Calculus	
(either may be taken FY either semester)		
MATH 216	Statistics I (SO first semester)	1
ANOP 203	Introduction to Programming for Business Analytics	1
or CSCI 203	Introduction to Computer Science	
(either may be taken FY second semester or SO first semester)		
ANOP 270	Data Visualization for Business Analytics p	1
or HUMN 270	Data Visualization for the Digital Humanities	
(either may be taken FY second semester or SO either semester)		
ANOP 330	Predictive Analytics: Machine Learning Fundamentals for Business (SO second semester or JR either semester) p	1
ANOP 350	Predictive Analytics: Forecasting & Simulation (JR either semester or SR first semester) p	1
ANOP 370	Prescriptive Analytics: Decision Modeling & Optimization p	1
or MATH 358	Topics in Operations Research	
(either may be taken Junior first semester or SR first semester)		
ANOP 400	Business Analytics Practicum (JR second semester, SR either semester) CE p	1

\# Lab science should be taken before the end of the sophomore year. **Strongly recommend lab science not be taken in the semester in which you are enrolled in MGMT 101.**

w Satisfies W2 requirement.

p Consult the catalog for the prerequisite required for this course.

CE Qualifies for the culminating experience if taken spring of junior year or either semester of senior year.

Data Science Co-major

Students pursuing a BSBA in business analytics are eligible to pursue a BA in Data Science (https://coursecatalog.bucknell.edu/archive/2025-2026/collegeofartsandsciencescurricula/areasofstudy/datascience/) as a co-major. Complementing the depth a student receives from their business analytics major, the BA in data science provides breadth across the interdisciplinary field of data science. The co-major is not intended as – nor can it be declared as – a stand-alone course of study.

Business Analytics Minor

The business analytics minor provides students with the opportunity to complement their major field of study with a foundation in descriptive, predictive and prescriptive analytics.

The business analytics minor consists of three required courses and two electives for a total of five courses, as follows[1]:

Required courses:		
ANOP 102	Spreadsheet Modeling & Data Analysis	1
ANOP 270	Data Visualization for Business Analytics	1
ANOP 330	Predictive Analytics: Machine Learning Fundamentals for Business	1
Two courses from the following list:		2
ANOP 203	Introduction to Programming for Business Analytics	
ANOP 242	Database Management and Applied Data Analysis	
ANOP 302	Financial Decision Modeling using Spreadsheets	
ANOP 311	Supply Chain Analytics	
ANOP 350	Predictive Analytics: Forecasting & Simulation	
ANOP 370	Prescriptive Analytics: Decision Modeling & Optimization	

[1] Other ANOP courses (excluding ANOP 202 (https://coursecatalog.bucknell.edu/archive/2025-2026/search/?P=ANOP%20202) and ANOP 301 (https://coursecatalog.bucknell.edu/archive/2025-2026/search/?P=ANOP%20301)) may be considered with approval by the ANOP department chair.

Drawing upon their professional and liberal education, Freeman College of Management students will be able to collaboratively create positive societal impacts through:

Analysis

- Students will demonstrate the ability to understand organizations and analyze them rigorously.

Integrity

- Students will possess the judgment, vision and integrity necessary to serve society and their professions.

Morality

- Students will identify creative and morally responsible solutions to organizational and societal issues.

Beyond the learning goals of the Freeman College Core Curriculum, Business Analytics majors will:

1. Understand and critically apply the concepts and methods of the discipline to support predictions and decisions in real-world situations.
2. Foster the ability to bridge the gap between technical teams and stakeholders by working effectively as a member or leader of an interdisciplinary team and communicate the outcomes to the relevant decision makers.
3. Learn how to evaluate and quantify uncertainty and risk, incorporating their inherent influence on both the decision process and the outcomes.
4. Commit to ethical decision-making and the long-run welfare of both organizations and the communities they serve.
5. Develop an appreciation and dedication for personal continuous improvement, leading to a long-lasting and relevant knowledge base and skill set.

Courses

ANOP 102. Spreadsheet Modeling & Data Analysis. 1 Credit.
Offered Both Fall and Spring; Lecture hours:3,Other:1
This course serves as the introduction to quantitative modeling and basic statistical analysis in a spreadsheet-based environment, especially as they apply to managerial decision making.

ANOP 202. Operations Management. 1 Credit.
Offered Both Fall and Spring; Lecture hours:3
This course introduces students to the ways in which to model, analyze, and improve processes for producing services and goods. Prerequisite: ANOP 102. ENGR 226 or MATH 216 or MATH 227 or PSYC 215 accepted with permission of the instructor.

ANOP 203. Introduction to Programming for Business Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Overview of programming tools and methods for analytics. Students solve computational and modeling problems using Python. This foundation of programming logic will help students understand advanced analytic tools in the upper-level Business Analytics courses. Not open to students who have taken CSCI 203.

ANOP 204. Sports Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
This course focuses on analytical techniques and their application to the sports industry. Course topics include player evaluation, team ratings, scheduling and coaching strategies. A basic knowledge of Excel spreadsheets, probability, statistics and sports (specifically, baseball, basketball and football) is assumed. Prerequisite: ANOP 102 or MATH 216 or PSYC 215.

ANOP 242. Database Management and Applied Data Analysis. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Databases are essential for organizations to collect, store and use data in an effective way. This course introduces students to how databases are designed and operated. The students will learn the principles of database design, the relational model and the SQL language. Prerequisite: ANOP 102 or permission of the instructor.

ANOP 270. Data Visualization for Business Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
An introduction to the principles of data visualization and data preparation. Instruction in software to prepare and present data through the creation of tables, charts and dashboards to aid in communication of insights. Prerequisite: ANOP 102 or ENGR 215 or ENGR 226 or MATH 216 or MATH 227 or PSYC 215.

ANOP 301. Global Supply Chain Management. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
In this course students will learn the concepts and tools to model, analyze and improve global supply chain operations under a variety of contexts. Prerequisites: ANOP 102. ENGR 226 or MATH 216 or MATH 227 or PSYC 215 accepted with permission of the instructor.

ANOP 302. Financial Decision Modeling using Spreadsheets. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Decision making of individuals and groups in organizations. Topics include linear and nonlinear optimization with applications in finance and accounting, fundamentals of portfolio and risk management, and the application of Monte Carlo methods to the pricing of derivatives. Prerequisites: ACFM 203 or ACFM 210 and ANOP 102, or equivalents.

ANOP 310. Independent Study in Analytics and Operations Management. .25-1 Credits.
Offered Either Fall or Spring; Lecture hours:Varies,Other:3; Repeatable
Independent Study in Analytics and Operations Management. Prerequisite: permission of the instructor.

ANOP 311. Supply Chain Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
In this course students will learn basic concepts in quantitative supply chain modeling and simulation. Students learn methods that are used extensively in business organizations to solve large, structured problems. Prerequisite: ANOP 102. ENGR 226 or MATH 216 or MATH 227 or PSYC 215 accepted with permission of instructor.

ANOP 315. Special Topics in Analytics and Operations Management. .25-1 Credits.
Offered Fall, Spring or Summer; Lecture hours:Varies
Special Topics in Analytics and Operations Management. Prerequisite: permission of the instructor.

ANOP 330. Predictive Analytics: Machine Learning Fundamentals for Business. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
A survey of the concepts, methods, and applications of machine learning toward problems in business. Topics include classification, prediction, and clustering methods. Students will require a laptop in class. Prerequisites: (ANOP 102 or ENGR 215 or ENGR 226 or MATH 216 or MATH 227 or PSYC 215) and (ANOP 203 or CSCI 203).

ANOP 350. Predictive Analytics: Forecasting & Simulation. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Study of statistical modelling and simulation techniques for data and model-based forecasting (Time Series, Smoothing Methods, Regression, ARIMA, Simulation, etc.) using a variety of software tools. Prerequisites: (ANOP 102 or ENGR 226 or MATH 216 or MATH 227 or PSYC 215) and (ANOP 203 or CSCI 203).

ANOP 370. Prescriptive Analytics: Decision Modeling & Optimization. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
An introduction to decision modeling and analysis using deterministic optimization models and solution methodologies. Prerequisites: (ANOP 102 or ENGR 215 or ENGR 226 or MATH 216 or MATH 227 or PSYC 215) and (ANOP 203 or CSCI 203). Open to juniors and seniors.

ANOP 390. Honors Course in Analytics and Operations Management. .5-1 Credits.
Offered Either Fall or Spring; Lecture hours:Varies,Other:3; Repeatable
Honors Course in Analytics and Operations Management. Prerequisite: permission of the instructor.

ANOP 400. Business Analytics Practicum. 1 Credit.
Offered Both Fall and Spring; Lecture hours:3
A culminating experience course where student teams collaborate with external clients on semester long projects leveraging the skills and concepts acquired within the Business Analytics major. Prerequisites: ANOP 330 and (ANOP 350 or ANOP 370 or MATH 358). Open to junior and senior Business Analytics majors. Others by permission of instructor.