BUSINESS ANALYTICS (ANOP)

Faculty

Professor: Matthew D. Bailey (Chair)

Associate Professors: Mihai Banciu (Associate Dean of Faculty for the Freeman College of Management), Jimmy Chen

Assistant Professors: Joyaditya Laik, Thiago Serra, Alia C. Stanciu

Visiting Assistant Professors: Xinwei Chen, Behnaz Malaei

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 (BA) is the scientific process of transforming data or quantitative models into actionable insight to improve decision-making. BA 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 BA 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.

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 (http://coursecatalog.bucknell.edu/archive/2021-2022/collegeofmanagementcurricula/curriculaoverview/Corerequirements/).

Business Analytics Requirements

Beyond completion of the Freeman College core requirements (http://coursecatalog.bucknell.edu/collegeofmanagementcurricula/curriculaoverview/Corerequirements/), all BA 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	1
ANOP 350	Simulation and Forecasting for Business Analytics	1
ANOP 370	Prescriptive Analytics	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.

Freeman College of Management students will take core courses and courses within their specific major that incorporate learning goals:

QUANTITATIVE [1, 6]

- Understand and demonstrate how to analyze and use data to model and improve organizational processes.

TECHNOLOGICAL SKILLS [4, 8]

- Understand technology's impact on organizations and the interplay between technology and the organization.

ORAL COMMUNICATION SKILLS [7]

- Students will demonstrate the ability to deliver effective oral presentations in a team environment.

WRITTEN COMMUNICATION SKILLS [7, 9]

- Students' written work will demonstrate ability to learn from their own performances through reflective writing.

MORAL REASONING [3, 5]

- Students will demonstrate the ability to articulate a moral argument, drawing on and applying insights from ethical theory.

FOUNDATIONAL KNOWLEDGE: FINANCE [1, 6]

- Students will demonstrate the mastery of key concepts in financial literacy.

FOUNDATIONAL KNOWLEDGE: MARKETING [1, 4, 6]

- Students will demonstrate mastery of key Marketing concepts.

INTEGRATIVE/SYNTHESIS SKILLS [1, 2]

- Students will demonstrate the ability to evaluate, identify, and understand different organizational perspectives and be able to integrate and synthesize diverse information.

Numbers in parentheses reflect related Educational Goals of Bucknell University.

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 or MGMT 102. MATH 216 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 270. Data Visualization for Business Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
An introduction to the principles of data visualization. Students use software tools to effectively create tables, charts, figures, infographics, and exhibitions to aid in oral or written communication of quantitative insights. Prerequisite: ANOP 102 or MGMT 102 or MATH 216 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. Prerequisite: MGMT 102 or ANOP 102 or MATH 216 or permission of the instructor.

ANOP 302. Financial Decision Modeling. 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: ANOP 102 and (ACFM 203 or ACFM 210), or their equivalents.

ANOP 310. Independent Study in Analytics and Operations Management. .25-1 Credits.
Offered Either Fall or Spring; Lecture hours:Varies,Other:3
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 or MGMT 102 or MATH 216 or PSYC 215.

ANOP 315. Special Topics in Analytics and Operations Management. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Special Topics in Analytics and Operations Management. Prerequisite: permission of the instructor.

ANOP 330. Predictive Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Study and apply methods for efficient data collection, management, and mining using large-scale datasets. Topics include prediction and classification methods, clustering, and association rules. Two prerequisites: (ANOP 102 or MGMT 102 or MATH 216 or PSYC 215) and (ANOP 203 or CSCI 203).

ANOP 350. Simulation and Forecasting for Business Analytics. 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. Two prerequisites: (ANOP 102 or MGMT 102 or MATH 216) and (ANOP 203 or CSCI 203).

ANOP 370. Prescriptive Analytics. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
An introduction to decision modeling and analysis using deterministic optimization models and solution methodologies. Two prerequisites: (ANOP 102 or MGMT 102 or MATH 216) and (ANOP 203 or CSCI 203).

ANOP 390. Honors Course in Analytics and Operations Management. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
Honors Course in Analytics and Operations Management. Prerequisite: permission of the instructor.

ANOP 400. Business Analytics Practicum. 1 Credit.
Offered Either Fall or Spring; Lecture hours:3
A culminating experience course where student teams collaborate with external clients in the private, public, and non-profit sectors to work on a semester long project leveraging the skills and concepts acquired within the Business Analytics major. Prerequisite: open only to senior Business Analytics majors or by permission of the instructor.