Analytics is a challenging and exciting field that helps people make important informed decisions based on quantitative information. Business analysts make extensive use of data modeling, statistical techniques, and scenarios to manipulate data to find meaning, explain causation, and make predictions.

Currently, massive amounts of structured and unstructured data are collected and stored by computers as a result of business and society’s greater dependence on information technologies and software applications to transact business and every-day life. As such, data analytics skills are highly portable and becoming a frequently sought competency in workers. Analytics is a valuable partner to almost any field of study, including engineering, agriculture, social science, medical science, environmental science, forestry, marketing, accounting, and finance.

Business Analytics

Bachelor of Science in Business Administration Major Requirements

(185 credits required for the degree [http://bulletin.du.edu/undergraduate/undergraduateprograms/traditionalbachelorsprogram/bachelorofscienceinbusinessadministration/])

Minimum of 44 credits. Requirements include:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>INFO 3100</td>
<td>Automating Business Processes</td>
<td>4</td>
</tr>
<tr>
<td>INFO 3140</td>
<td>Foundations of Information Management</td>
<td>4</td>
</tr>
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<td>INFO 3500</td>
<td>Capstone/Senior Project</td>
<td>4</td>
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<tr>
<td>Electives</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Select eight credits of INFO coursework  

Total Credits 44

1 Either MKTG 2930 OR MKTG 3485 are approved as INFO major electives. Students may use one but not both.
2 Maximum of 4 internship hours will count towards the 8 hours of major electives required

Minor Requirements

The Business Analytics minor is available to all traditional DU undergraduate students.

24 credits, including:

<table>
<thead>
<tr>
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<th>Credits</th>
</tr>
</thead>
</table>
| INFO 1010 | Analytics I: Data Management and Analysis  

1 | 4 |
| INFO 1020 | Analytics II: Business Statistics and Analysis  

1 | 4 |
| INFO 3100 | Automating Business Processes         | 4       |
| INFO 3140 | Foundations of Information Management | 4       |
| Electives |                                       | 8       |

Select eight credits of INFO coursework  

Total Credits 24
BSBA and BSAcc students take INFO 1010 and INFO 1020 as part of the business core.

INFO 2020 is not an elective option for BSBA or BSAcc students, as this course is required in the business core.

Statistics

The Statistics minor is available to all traditional DU undergraduate students.

Minor Requirements

Minimum 20 credits for non-business majors and 16 credits for business majors. Requirements include:

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<td>Analytics I: Data Management and Analysis</td>
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</tr>
<tr>
<td>INFO 1020</td>
<td>Analytics II: Business Statistics and Analysis</td>
<td>4</td>
</tr>
</tbody>
</table>

Select three of the following courses (four for business majors):

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO 2020</td>
<td>Analytics III: Business Modeling and Analysis</td>
<td>2</td>
</tr>
<tr>
<td>INFO 3100</td>
<td>Automating Business Processes</td>
<td>4</td>
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<td>4</td>
</tr>
<tr>
<td>INFO 3700</td>
<td>Topics in Business Analytics</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Credits: 20

BSBA and BSAcc students take INFO 1010, INFO 1020 and INFO 2020 as part of the business core, and may not use these courses towards the minor. Business students must select four electives in order to complete this minor.

INFO 2020 is not an option for BSBA or BSAcc students.

Requirements for Distinction in the Major in Business Analytics

Upon reaching 90 credit hours completed, students with a 3.50 cumulative GPA or higher, and a 3.85 Daniels GPA or higher, are invited to either create a portfolio of in-depth business experiences or to write a thesis to earn Distinction. See Daniels Undergraduate Programs or faculty in the department for more information.

Business Analytics

This course plan is a sample schedule only. Individual course plans will vary based on incoming transfer credit, admission path to Daniels, prerequisites, availability of courses, minors, and other scheduling factors. You must meet with your Daniels academic advisor to develop an individual graduation plan for your specific needs.
Elective  INFO 3100  4  INFO 3200  4
INFO 3140  4  INFO 3240  4
BUS 3099  0  Elective  4
Common Curriculum Course  4

16  16  16

Fourth Year

Fall Credits Winter Credits Spring Credits
INFO 3300  4  Advanced Seminar (ASEM)  4  INFO Elective  4
INFO 3340  4  INFO 3400  4  INFO 3500  4
INFO Elective  4  INFO 3440  4  Elective  4
Common Curriculum Course  4  Elective  4

16  16  12

Total Credits: 189-190

1  Fulfills Analytical Inquiry: The Natural and Physical World
2  Fulfills Scientific Inquiry: Society and Culture
3  Common Curriculum Requirements (http://bulletin.du.edu/undergraduate/undergraduateprograms/traditionalbachelorsprogram/
degreesanddegreerequirements/)
4  INTZ 2501 is required for any student who studies abroad, and may be taken in any quarter within the year prior to studying abroad.

Common Curriculum requirements in the First Year are generally satisfied through the sequential full-year foreign language (FOLA) requirement.

Common Curriculum requirements in the Second Year are generally satisfied through the sequential full-year Scientific Inquiry: Natural requirement.

INFO 1010 Analytics I: Data Management and Analysis (4 Credits)
The amount of data businesses are able to maintain and process is growing exponentially, and the ability to manage that data successfully can give a business a tremendous competitive advantage. This course introduces the student to the business data landscape, as well as basic data management and analysis skills through spreadsheet and database applications. Student projects focus on data collection, data cleansing and mining, statistical and graphical analysis, basic modeling, and written presentation skills. Corequisite with INFO 1011.

INFO 1011 Microsoft Excel Certification Lab (0 Credits)
This course covers basic topics in Excel and is designed to prepare students for the Microsoft Office Specialist Excel exam (associate level) and to introduce students to the basic Excel features and functions that will be used in future classes and professional settings. In the Daniels College of Business, passing the Microsoft Office Excel Specialist Exam is a prerequisite for other classes, is a requirement for secondary admission, and is a graduation requirement. The course uses projects to represent real-world scenarios. No prerequisites or restrictions.

INFO 1020 Analytics II: Business Statistics and Analysis (4 Credits)
Businesses can never have perfect information; therefore, they must employ statistical techniques to improve the decision-making process. This course introduces students to the basic tenets of probability and statistics, with an emphasis on business applications. Statistical models as decision-support tools are taught. Student projects focus on data collection, data analysis, decision analysis, and written presentation skills. Prerequisites: INFO 1010, and (MATH 1200 or MATH 1951). Corequisite: INFO 1021.

INFO 1021 Microsoft PowerPoint and Word Certification Lab (0 Credits)
This course covers basic topics in Word and PowerPoint and is designed to prepare students for the Microsoft Office Specialist Word and PowerPoint exams (associate level) and to introduce students to the basic Word and PowerPoint features that will be used in future classes and professional settings. In the Daniels College of Business, passing the Microsoft Office Word Specialist Exam and Microsoft Office PowerPoint Specialist Exam is a prerequisite for other classes, is a requirement for secondary admission, and is a graduation requirement. The course uses projects to represent real-world scenarios. Corequisite: INFO 1020. No prerequisites or restrictions.

INFO 1031 Advanced Excel Certification Lab (0 Credits)
The course covers advanced topics in Excel. The course goes beyond just the topics on the Excel Expert Certification exam and looks at functions and features that students are likely to use in work situation. The course uses projects to represent real-world scenarios.

INFO 2020 Analytics III: Business Modeling and Analysis (4 Credits)
Businesses make decisions and improve processes using a variety of modeling and analytic techniques. This course introduces the student to the techniques of multiple regression analysis, time series analysis, spreadsheet modeling, and simulation for solving a variety of business problems. Applications include economic forecasting, supply chain management, and project management. Student projects focus on using spreadsheet modeling for problem solving, and emphasize written and oral presentation techniques. Prerequisites: INFO 1020 and all MOS certifications.

INFO 3100 Automating Business Processes (4 Credits)
This course focuses on using Microsoft Excel and Python to support decision making for managers. This course will cover advanced Excel functions and menu options along with basic spreadsheet modeling design and good practices. It will also cover automating tasks in Excel using VBA. We will then transition into using Python to create programs outside of the Microsoft Office environment. In both platforms the focus is on basic programming logic, reading and writing data, creating data summaries and pivot tables and basic statistical tests and summaries. Prerequisite: INFO 2020.
INFO 3110 Applied Nonparametric Statistics (4 Credits)
This course develops a more advanced understanding of the fundamental concepts of probability and statistics, and how they relate to managerial type problems and decision making. You will develop experience performing and interpreting standard and particularly nonparametric data analysis methodologies, such as the sign test, the signed rank test, the rank sum test, and nonparametric correlations. You will obtain familiarity with a statistical software package. Prerequisite: INFO 2020 (minimum grade of C-).

INFO 3140 Foundations of Information Management (4 Credits)
This course introduces students to the foundations of information management (e.g. database management). Specifically, this course will focus on database theory, appropriate database design, modeling tools, and the practical issues of database implementation and management. Designing and developing databases is an iterative process, and the class approach will be practical and hands-on. Prerequisite: INFO 2020.

INFO 3200 Data Mining and Visualization (4 Credits)
This course explores the concepts of storytelling with data, prediction modeling, and presenting statistical results. It covers the concepts of visualization terminology along with all the steps of the modeling process: define goal, get data, explore & visualize data, pre-process data, partition the data series, apply modeling technique(s), evaluation and compare performance, implement the model, and communicate the results. The modeling techniques covered include Time Series Forecasting, Clustering, Principal Components Analysis, Decision Trees, Naïve Bayes, KNearest Neighbor, Multiple and Logistic Regression, and Machine Learning Approaches. This course also covers the interpretation of real-time business data in terms of dashboards and scorecards. Prerequisite: INFO 2020.

INFO 3240 Enterprise Information Management (4 Credits)
This is the second in a series of two courses designed to introduce students to information management. This course focuses on procedural programming using T-SQL, an introduction to an enterprise information management system using Microsoft SQL Server and an introduction to an integrated development environment using Microsoft Visual Studio. Prerequisite: INFO 3100 and INFO 3140.

INFO 3300 Data Warehousing and Business Intelligence (4 Credits)
This course introduces students to the main components of a data warehouse for business intelligence applications. Students will learn how a data warehouse fits into the overall strategy of a complex enterprise, how to develop data models useful for business intelligence, and how to combine data from disparate sources into a single database that comprises the core of a data warehouse. Students will also explore how to define and specify useful management reports from warehouse data. Prerequisite: INFO 3240.

INFO 3320 Sports Analytics (4 Credits)
This course serves as an introduction to sports analytics. Analytical topics will include, but are not limited to, regression (or predictive) modeling, optimization, ranking methodologies, web scraping, among others. Sports topics will include topics from most professional sports, gambling (daily fantasy sports), and business operations. In addition, the students will learn how to communicate their results (business reports, dashboards, etc.) of the various modeling exercises and projects using RStudio and the RMarkdown suite of tools.

INFO 3340 Project Management and Simulation (4 Credits)
“Cheaper, better, faster” is the mantra of modern business. Innovation, providing new products and services or using improved business processes, has become a prerequisite for businesses to thrive and flourish. Project Management is a discipline which supports innovation by examining how to facilitate one-time events such as constructing a building, installing a software system, taking a product to market, reengineering a marketing process, or merging an acquired company. In this course, we examine the science, practice the art, and discuss the folklore of project management to enable students to contribute to and manage projects as well as to judge when to apply this discipline. Monte Carlo simulation modeling is also covered to explore the benefits and limitations of simulation as a tool for solving business problems, and to present students with the opportunity to build, analyze, and report on Monte Carlo simulations. Prerequisite: INFO 2020.

INFO 3350 Statistical Computing (4 Credits)
This course will provide the student with a base of skills necessary to program in one or more common scripting software packages. No prior programming knowledge is required. After completion of the course, the student will be able to independently perform most basic statistical procedures using either software package. The student will also have the tools necessary to learn advanced topics from the software package documentation by themselves. Prerequisite: INFO 2020.

INFO 3400 Complex Data Analytics (4 Credits)
This course explores the concepts of the considerations and management of big data projects. It also explores technical aspects of performing text analytics and natural language processing, social network analysis, and social media analysis. We focus on social data for many of the examples and also explore how disparate data sources can be combined to provide insight for business decisions. Prerequisite: INFO 3200.

INFO 3440 Optimization Modeling (4 Credits)
This course introduces concepts and techniques for the modeling and solution of business decision problems. It gives broad coverage to the formulation of optimization models and the use of commercially available software tools for solving them. These models include topics such as linear programming, integer programming, the transportation and assignment problems, network optimization models and non-linear programming. Emphasis is placed on the process of analyzing business scenarios, formulating models in spreadsheet and open-source software, interpreting model output, and presenting written project reports. Prerequisite: INFO 2020.
INFO 3477 Database-Driven Websites (4 Credits)
This course provides a comprehensive overview of website development. Students explore the prevailing vocabulary, tools, and standards used in the field and learn how the various facets including HTML5, CSS, JavaScript, VBScript, ASP, PHP, HTTP, clients, servers, and databases function together in today's web environment. In addition, software and services that are easily incorporated into a website (e.g. maps, checkout, blogs, content management) are surveyed and discussed. Students produce an interactive website on the topic of their choice for the final project and leave the course prepared to develop real world database driven websites. Prerequisite: INFO 3140.

INFO 3500 Capstone/Senior Project (4 Credits)
This course gives the student an opportunity to apply the knowledge and skills learned in this program to a real-world problem submitted by a partner business. Students take a business problem from problem definition, data collection, and model construction, through analysis and presentation of results to recommendations for specific business decisions. Prerequisites: All other Business Analytics major courses.

INFO 3700 Topics in Business Analytics (1-4 Credits)
Exploration of various topics and issues related to timely analytics applications. Prerequisite: INFO 2020.

INFO 3980 Internship (0-10 Credits)
Internship; requires written report.

INFO 3991 Independent Study (0-4 Credits)
Independent research/study; requires written report.

ITEC 3155 Business Data Skills and Concepts (4 Credits)
This course is designed to give students an understanding of the technology underlying accounting information systems and help students develop more advanced data analysis skills. We will use the programming language Python to develop an understanding of the digital business logic that supports the operations of modern firms. We will learn to use Business Process Modeling Notation (BPMN) to graphically document operations and their underlying business logic. We will discuss and analyze a set of studies that use survey data from a global sample of executives and analysts to develop an understanding of the levels of technological sophistication in modern firms. We will also discuss and analyze distributed databases, information security, and eXtensible Business Reporting Language. Prerequisites: ACTG 3034, ACTG 3038 and ACTG 3037.

ITEC 3325 Emerging Technologies (4 Credits)
This course is for students who want a strategic edge: to understand how the advanced information technologies that are emerging today will impact business in the near to medium future. This course will equip students with an understanding of the key information technologies central to the knowledge economy, their current and prospective business uses, and lifelong skills in how to think about business uses of these technologies - to identify, critically analyze, and evaluate them. This course is for students who want to become key players in the coming economy by combining substantial understanding of the technology side with substantial understanding of the business side – applications and strategy. Prerequisites: INFO 2020.

ITEC 3980 Internship (1-5 Credits)
Practical experience (field study); requires written report. Instructor approval required.

ITEC 3991 Independent Study (1-8 Credits)
Independent research/study; requires written report. Instructor approval required.

Faculty
Valerie Bartelt, Assistant Professor, PhD, Indiana University
Philip Beaver, Professor of the Practice of Business Information and Analytics, PhD, Naval Postgraduate School
Tianjie Deng, Associate Professor, PhD, Georgia State University
Leonard Rashad Dixon, Teaching Assistant Professor, MBA, University of Maryland
Ryan Thomas Elmore, Associate Professor, PhD, Pennsylvania State University
Stephen E. Haag, Professor of the Practice of Business Information and Analytics, PhD, University of Texas at Arlington
Tamara Lynn Brod Hannaway, Teaching Associate Professor, PhD, University of Colorado Denver
Anthony Hayter, Professor, PhD, Cornell University
Kellie Keeling, Associate Professor and Department Chair, PhD, University of North Texas
Young Kwark, Assistant Professor, PhD, University of Texas at Dallas
Stefani R. Langehennig, Assistant Professor of the Practice, PhD, University of Colorado Boulder
Young Jin Lee, Associate Professor, PhD, University of Washington
Kerry-Ann Lewis Pearcy, Teaching Assistant Professor, PhD, University of Denver
Zlatana Dobrilova Nenova, Assistant Professor, PhD, University of Pittsburgh

Christopher Michael Peña, Assistant Professor of the Practice, MA, University of Denver

Holly L. Roof, Teaching Assistant Professor, PhD, University of Denver

Scott Toney, Teaching Professor, MS, University of Texas at Dallas

Andrew Urbaczewski, Associate Professor, PhD, Indiana University

Benjamin Michael Williams, Assistant Professor, PhD, Southern Methodist University

Paul M. Bauer, Clinical Professor, Emeritus, PhD, University of Kansas

Ronald Farina, Associate Professor, Emeritus, PhD, University of Colorado

Thomas Obremski, Associate Professor, Emeritus, PhD, Michigan State University

Amy Phillips, Professor, Emerita, MEd, Plymouth State University

Richard Scudder, Associate Professor, Emeritus, PhD, University of Colorado-Boulder