Data Science and Analytics Program with Business Concentration (BS)

The following is a general overview of the program. Reviewing this sheet is NOT a replacement for advising meetings which are recommended twice per year; students are NOT encouraged to self-advise. Requirements and course offerings may change for students not yet admitted or declared. Some courses are only available daytime Boca. Note for **Second Bachelor's** Students: FLENT, Gen Ed, and *some* electives are not required.

Important Academic Policies

Please visit www.business.fau.edu/academicpolicies. It is especially important for prospective business majors to be aware of:

- **Limitation on Repeated Courses**
  (max two attempts per course)
- **Limitation on Number of Withdrawals**
- **Deadlines to Declare a Major**

Requirements for All FAU Bachelor's Degree Programs

Requirement	Description
Free electives to reach minimum 120 credits	Verify with your advisor how many free electives (if any) you need to graduate
Foreign Language Admission Requirement (FLENT)	Two passing years of the same high school foreign language or accepted equivalent
Civic Literacy (entering FL SUS or SCS Fa18 or later)	www.fau.edu/ugstudies and click "Civic Literacy"

Timely Graduation

For timely graduation, students should plan courses in consultation with an academic advisor, create a balance between taking core, concentration, and elective courses each semester, and prioritize courses that may not be offered every term. Transfer students should complete all lower division requirements before transferring to FAU.

General Education (Gen Ed) Requirements

Students with an AA (Associate of Arts) degree from a regionally accredited Florida Public Institution are deemed to have met the Gen Ed Requirement. To view the Gen Ed checklist, visit www.fau.edu/uas/curriculum, scroll down to "Business," and click "Data Science & Analytics."

Category	Required Credits
Communication	6 credits
Natural Science	6 credits
Mathematics	3 credits (choose a MAC or MGF course)
Social Science	6 credits
Humanities	6 credits (Choose two WAC courses)
Additional Enrichment	3 credits (If exempt from Civic Literacy credits, choose 6 credits additional enrichment)

Required Upper Division and Free Elective Courses

Requirement	Suggested Option: Internship
All students are required to graduate with a minimum of 45 upper division credits and a minimum of 120 overall credits. This means that most Data Science majors will need elective credits to graduate. Students can speak with an academic advisor to determine exactly how many elective credits will be needed and review strategies to satisfy those requirements.	Students interested in an internship to satisfy some elective requirements may schedule an appointment with a College of Business career and internship advisor.

Data Science Core (Minimum Grade "C")

Course Title	Prefix & Num.	Pre-requisites (Minimum Grade of "C")
Introductory Statistics	STA2023	MAC1105, MGF1106, MGF1130, MAC2233, ALEKS 30,or MPF 10
Tools for Data Science	CAP 2751	
Experimental Design and Data Analysis	CAP 2753	STA2023
Mathematics for Data Science	MAP 2192	MAC 1105, MGF 1106, or MGF1130
Data Management and Analysis with Excel	QMB 3302	
Artificial Intelligence for Social Good	CCJ 3071	
Data Science Capstone	ISC 4941	90 credits; all Data Science core courses

Business Concentration Courses (Minimum Grade "C")

Course Title	Prefix & Num.	Pre-requisites (Minimum Grade of "C")
Business Communication for Data Analysts	GEB 3231	ISM3116 (pre-requisite or co-requisite)
Introduction to Business Analytics and Big Data	ISM 3116	
Data Mining and Predictive Analytics	ISM 4117	60 credits
Advanced Business Analytics	ISM 4403	60 credits, ISM3116
Choose THREE Business Concentration Electives:	Choose **THREE**:	
Rev Mgmt & Pred Analysis in Hosp & Tour Industry	HFT 4481	60 credits
Contemporary Issues of Digital Data Management	ISM 4041	
Database Management Systems	ISM 4212	QMB3302 (must receive permit from advisor), ISM3011, or ACG4401
Management of Information Assurance and Security	ISM 4323	
Social Media and Web Analytics	ISM 4420	
Bus. Analytics for Mktg & Cust Relationship Mgmt	MAR 4615	MAR3023

Data Science Electives: Choose Two Courses (Minimum Grade "C")

Choose any two data science electives from the table on the next page. The courses can come from the same department or from two different departments. Pre-requisites as listed in the FAU catalog are noted on the table for each course; however, any questions or concerns regarding registration or pre-requisites for non-business courses should be directed to the FAU College that offers the course.

Data Science Elective Table: Choose Two Courses (Minimum Grade "C")

Course Title	Prefix & Num.	Pre-requisites
Arts and Letters Electives		
Research Methods in Bioarchaeology	ANT 4192	ANT 4141, ANT 4514 or permission of instructor
Information Technology in Public Administration	PAD 3712	
Introduction to the Nonprofit Sector	PAD 4144	
Quantitative Inquiry for Public Managers	PAD 4702	STA 2023
Research Methods for Public Management	PAD 4704	
RI: Research Methods in Political Science	POS 3703	
Public Opinion and American Politics	POS 4204	POS 2041 with minimum grade of "C
Sociological Analysis: Quantitative Methods	SYA 4400	SYA 3010 and SYA 3300
Business Electives		
Rev Mgmt & Pred Analysis in Hosp & Tour Industry	HFT 4481	60 credits
Contemporary Issues of Digital Data Management	ISM 4041	
Database Management Systems	ISM 4212	QMB3302 (must receive permit from advisor), ISM3011, or ACG4401
Management of Information Assurance and Security	ISM 4323	
Social Media and Web Analytics	ISM 4420	
Bus. Analytics for Mktg & Cust Relationship Mgmt	MAR 4615	MAR3023 with minimum grade "C"
Engineering Electives		
Introduction to Deep Learning	CAP 4613	COP 3530 or COP 3410 w/min. grade of "C" or instructor perm.
Introduction to Artificial Intelligence	CAP 4630	COP 3530 or COP 3410 w/min. grade of "C" or instructor perm.
Introduction to Data Mining and Machine Learning	CAP 4770	COP 3530 and (STA 4821 or STA 2023 or equivalent)
Introduction to Data Science and Analytics	CAP 4773	(COP3530 or COP3410) & (STA4821 or STA2023) w/min. grade "C" or inst. perm.
Introduction to Computer Systems Performance Eval.	CEN 4400	COP 3014 and (STA 4821 or STA 2023 or equivalent)
Introduction to Database Structures	COP 3540	COP 3530
Introduction to Internet Computing	COP 3813	COP 3014
Python Programming	COP 4045	COP 3530 with minimum grade of "C"
Applied Database Systems	COP 4703	COP 3540
Science Electives		
Solar System Astronomy	AST 3110	AST 2002 and PHY 2053
Laboratory Methods in Biotechnology	BSC 4403L	MCB 3020, MCB 3020L, BCH 3033 and PCB 3063
Concepts in Bioinformatics	BSC 4434C	PCB 3063; may have major restrictions
RI: Introduction to Data Science	CAP 3786	COP 2220 or MAD 2502
Cryptography and Information Security	CIS 4362	MAS 2103 and MAD 2502
Spatial Data Analysis	GEO 4167C	GEO 4022
Photogrammetry and Aerial Photograph Interpretation	GIS 4021C	
Applications of Geographic Information Systems	GIS 4048C	GIS 4043C or equivalent
Geospatial Databases	GIS 4118	GIS 4043C
Graph Theory	MAD 4301	MAD 2104 and MAS 2103
Applied Mathematical Modeling	MAP 4103	(MAP 2302 or MAP 3305) and (MAS 2103 or MAC 2313)
RI: Industrial Problems in Applied Math	MAP 4913	(MAP 2302 or MAP 3305) and (MAS 2103 or MAC 2313)
Epidemiology of Infectious Diseases	MCB 4276	
Topology for Data Science	MTG 4325	MAD 2104, MAS 2103 and (COP 2220 or MAD 2502)
Practical Cell Neuroscience	PCB 4843C	PCB 3063 with minimum grade of "B-"
Computational Physics	PHZ 3151C	MAC 2313, PHY 3101C
SAS for Data and Statistical Analyses	STA 3024	STA 2023 or equivalent
Computational Statistics	STA 3100	(MAC 2311 or MAC 2281) and STA 2023 or higher
Introduction to Biostatistics	STA 3173	MAC1105
Applied Statistics 1 Lab	STA 4202L	STA4442; co-requisite STA4234
Statistical Designs	STA 4222	STA 4234, and one of MAC 2282 or 2312
Applied Statistics 1	STA 4234	STA 4442; co-requisite: STA 4202L
Probability and Statistics 1	STA 4442	MAC 2282 or MAC 2312
Probability and Statistics 2	STA 4443	STA 4442
Applied Statistics 2	STA 4702	STA 4234
Applied Time Series and Forecasting	STA 4853	STA 4234 or equivalent
Social Work and Criminal Justice Electives		
Teen Technology Misuse	CCJ 4554	
Methods of Research in Criminal Justice	CCJ 4700	STA2023
Criminal Justice Technology	CJE 3692C	
Crime Analysis	CJE 4663	
Computer Crime	CJE 4668	
Research Methods in Social Work	SOW 4403	SOW 3302

Additional Information and Resources

College of Business Student Academic Services

Current students can make an appointment with an academic advisor or a career advisor via www.fau.edu/successnetwork.

Prospective students can call in for assistance making an appointment.

Boca: 561-297-3688 | Davie: 954-236-1290 | www.business.fau.edu | COBAdvising@fau.edu | businessintern@fau.edu

ITOM Department: www.business.fau.edu/itom | Data Analytics Website: From ITOM site, click Academic Programs and then BS Data Science.

Data Science Curriculum Information

The capstone for the Data Science major requires completion of a **complex project** requiring extensive research and lab work in the areas of science and computer science. Students **must have some prior experience leading projects, doing research, and working with faculty members** to be successful in this program. FAU's Office of Undergraduate Research and Inquiry can help students to develop research skills before beginning the upper division Data Science coursework. www.fau.edu/ouri

Some courses in this program are only available in person during the daytime on Boca Campus.

Data Science Core

Required Courses

Course Title and Description	Offered
Introductory Statistics (STA 2023) 3 credits *Pre-req: MAC1105, MGF1106, MAC2233, ALEKS score of 30, or MPF Score of 10* An introductory course covering descriptive statistics, probability, binomial and normal distributions, sampling distributions and hypothesis tests, and sampling procedures. Laboratory required. This is a General Education course.	Fall Spring Summer
Tools for Data Science (CAP 2751) 3 credits This course focuses on data manipulation, curation, visualization, exploration, interpretation and modeling using standard packages and tools employed in the field of data science, as well as best practices for maintaining data and software using version control.	Fall
Experimental Design and Data Analysis (CAP 2753) 3 credits *Pre-req: STA2023* This course deals with principles of experimental design and data analysis. Topics covered include design of experiments, sampling and analysis of resulting data.	Spring
Mathematics of Data Science (MAP 2192) 3 credits *Pre-req: MAC1105 or MGF1106* This course surveys mathematical foundations in data science. Topics may include modeling with functions, matrices, solving linear systems, differentiation, integration, multivariate thinking and geometry, regression models, optimization, sensitivity analysis and graph theory.	Fall Spring
Data Management and Analysis with Excel (QMB 3302) 3 credits An introductory course covering basic Excel skills for managing information and data, analyzing data, visualizing data through charts and pivot tables, creating scenarios, using functions and automating tasks.	Fall Spring
Artificial Intelligence for Social Good (CCJ 3071) 3 credits In this course, students learn about the social implications of artificial intelligence, data science and big data; strategies to ensure these systems are accountable to the communities and contexts they are meant to serve; and applied in ways the promote justice and equity.	Fall Spring
Data Science Capstone (ISC 4941) 3 credits *Pre-req: 90 credits; all Data Science core courses* Students in the B.S. program with Major in Data Science and Analytics apply theoretical knowledge, methods and tools to a real-world data science problem. Students can work individually or in teams under the supervision of the course instructor or another faculty member.	Fall Spring

Additional Capstone Information

Capstone Method	Objectives	Grading

Project	An approved PROJECT that will be evaluated by the following:
	  a. Ability to design, identify, and apply analytic methods to a specific problem
	  b. Ability to implement a solution using a suitable programming language and tools.
	  c. Ability to measure and analyze the performance and robustness of the solution.
	  d. Ability to write reports and present results
		a. Project Proposal: 15%
		b. Weekly Progress: 40%
		c. Assignments: 10%
		d. Final presentation: 10%
		e. Final report:10%
		f. Final Demo:10%
		e. Instructor Review: 5%

Research Experience	A RESEARCH experience which includes two consecutive DIR courses working in a laboratory with the following deliverables describing the results of their research are required in the senior year.
	  a. Submission of a grant proposal is required no later than the second semester of the junior year.
	  b. Presentation of a poster or seminar at a local, regional, national or international research conference/symposium describing the results of the research is required in the senior year.
		a. Weekly Progress: 50%
		b. Grant submission: 25%
		c. c. Presentation: 25%

Thesis	A THESIS experience which involves the direct research mentorship by an eligible faculty member with the deliverables describing the results of their research which is to be directly evaluated by the mentor and if needed, a thesis committee:
	  a. Written paper.
	  b. Seminar.
		a. Weekly Progress: 50%
		b. Written Paper: 25%
		c. c. Seminar: 25%

Business Concentration

Required Business Concentration Courses

Course Title and Description	Offered
Business Communication for Data Analysts (GEB 3231) 3 credits Pre-req or co-req: ISM3116 This course introduces students to essential communication skills used by successful data analysts: interpersonal/team membership, concise business and technical writing, confident speaking, effective organizational strategies, critical thinking/analysis, appropriate technical language and formats and productive job-search approaches within the Management Information Systems (MIS) field. This course builds on analysis of data developed in ISM 3116 to show how it can be communicated effectively to audiences both within and outside the MIS field	Fall Spring
Introduction to Business Analytics and Big Data (ISM 3116) 3 credits Pre-req: QMB3302 (must receive a permit from advisor) or ISM3011 Provides an understanding of the business intelligence processes and techniques used in transforming data to knowledge and value in organizations. Students also develop skills to analyze data using generally available tools (e.g., Excel).	Fall Spring Summer
Data Mining and Predictive Analytics (ISM 4117) 3 credits Pre-req: 60 credits earned Introduces the core concepts of data mining (DM), its techniques, implementation and benefits. Also identifies industry branches that most benefit from DM, such as retail, target marketing, fraud protection, health care and science and web and e-commerce. Detailed case studies and using leading mining tools on real data are presented.	Fall Spring
Advanced Business Analytics (ISM 4403) 3 credits Pre-req: 60 credits earned; ISM3116 An in-depth examination of business analytics methods of visualization, data mining, text mining and web mining using various analytical tools. Applications to smaller firms are investigated in a laboratory setting.	Spring only

Business Elective Options

Course Title and Description	Offered
Revenue Management and Predictive Analytics in the Hospitality and Tourism Industry (HFT 4481) 3 credits Pre-req: 60 credits earned Exploration of revenue management, big data and predictive analytics within the hospitality and tourism industry. The course uses a viewpoint of firm value and overall contribution to financial performance. Students identify direct links between big data and firm performance while utilizing strategic management, prediction and forecasting. A variety of data sources are examined. Through analysis, students learn to manage firms using an analytic culture that turns information into insight.	Spring only
Contemporary Issues of Digital Data Management (ISM 4041) 3 credits Covers business processes and frameworks for data collection, storage, retrieval and transfer of digital data. Discusses the various ways through which industry and government compile data for purposes such as marketing, customer relationship management, fraud and crime prevention, e-government, etc. Considers also the business, legal, ethical and social context of data gathering and utilization.	Fall Spring
Database Management Systems (ISM 4212) 3 credits Pre-req: QMB3302 (must receive a permit from advisor) or ISM3011 or ACG4401 Focuses on the development of well-formed databases for the purpose of data management from the initial design of the database to the implementation and query and to the application of database management tools and techniques such as data security for use in business and government organizations.	Fall Spring Summer
Management of Information Assurance and Security (ISM 4323) 3 credits Emphasizes information security policy development, security management planning, risk assessment and risk management, disaster recovery and business continuity, and personnel issues related to security management.	Fall Spring
Social Media and Web Analytics (ISM 4420) 3 credits Covers concepts and techniques for retrieving, exploring, visualizing and analyzing social network and social media data, website usage and clickstream data. Students learn to use key metrics to assess goals and return on investment, perform social network analysis to identify important social actors, subgroups and network properties in social media.	Fall Spring
Business Analytics for Marketing and Customer Relationship Management (MAR 4615) 3 credits Pre-req: MAR3023 In this course, students learn about managing customer databases, statistical tools needed for customer data analysis, implementation of selective tools in spreadsheets and application of the generated knowledge for marketing decisions, especially in customer relationship management.	