Bachelor of Science in Data Science

The Bachelor of Science in Data Science offers students technical depth in data science. Students pursuing this degree will cover the foundational aspects of data science, then progress through more difficult tools, techniques, and methodologies used in data science. Students can tailor their program of study through concentrations including deep learning and business intelligence. Upon completion of this program, students will be able to confidently approach problems or challenges in virtually any discipline: business, finance or economics, engineering, healthcare, or the physical or social sciences. Graduates will be able to deliver reproducible data analyses and solutions. Graduates will understand ethical, privacy, and security considerations in the conduct of data analyses. Graduates will be able to communicate the story in the data through the use of data visualization techniques.

This program has specific admission requirements.

Degree Program Objectives

Upon completion of this program of study, students will be able to:

- Recognize requirements for data. Efficiently collect the required data from a variety of sources and organize it appropriately.
- Determine the best method to conduct an analysis for a specified situation and given data. Conduct the analysis or analyses and completely evaluate all aspects of the results.
- Deliver reproducible analyses and results.
- Effectively communicate any or all aspects of an analysis and all aspects of the results of that analysis to either or both a technical or non-technical audience. Information communicated could include the method used for analysis, any parameter settings that would affect the analysis or results, and an error analysis, etc.
- Explain the ethical, privacy, and security issues related to data science analyses and communication.
- Obtain real-world experience through project-based coursework and the Senior Project.
- Stand out with a specific technical area of expertise by completing a concentration in any of the available concentrations.

Programmatic Admission Requirements

For admission to the BS of Data Science, applicants must have completed preparation in mathematics equivalent to pre-calculus or higher. A review of high school or college transcripts showing completion of this requirement will be conducted during the admission process.

Please visit our AMU (https://www.amu.apus.edu/admissions/undergraduate-requirements.html) or APU (https://www.apu.apus.edu/admissions/undergraduate-requirements.html)undergraduate admission page for more information on institutional admission requirements.

Need help?

If you have questions regarding a program's admission requirements, please contact an admissions representative at 877-755-2787 or info@apus.edu.

Degree at a Glance

Code	Title	Semester Hours
General Education Requirements		30
Major Required		69
Select one of the following concentrations:		18
Flex (p. 3)		
Business Intelligence (p. 3)		
Deep Learning (p. 4)		
Final Program Requirements		3
Total Semester Hours		120

Degree Program Requirements

General Education Requirements (30 semester hours)

Code	Title	Semester Hours
Arts and Humanities (6 semester hours) [1]		
Select 2 courses from the following:		6
ARAB100	Arabic I	
ARAB101	Arabic II	
ARTH200	Art Appreciation	
ARTH241	Film and Literature	
DSIN141	Image Enhancement using Adobe Photoshop	
FREN100	French I	
FREN101	French II	
GERM100	German I	
GERM101	German II	
JAPN100	Introduction to Japanese	

LITR215	Literature of American Encounters, Revolution, and Rebellion	
LITR218	From Abolition to #MeToo: Literature of the American Civil Rights Movement	
LITR222	Pivotal Figures in Early British Literature	
LITR225	British Literature from Wordsworth through the Wasteland	
LITR231	Leadership in World Literature: Antiquity to the Early Modern Period	
LITR233	Literature of the Newly Globalized World: The Individual's Struggle to Adapt	
MUSI200	Music Appreciation	
MUSI250	World Music and Cultures	
PHIL101	Introduction to Philosophy	
PHIL110	Critical Thinking	
PHIL200	Introduction to Ethics	
PHIL202	Philosophy of Science	
PORT100	Introduction to Brazilian Portuguese	
RELS201	Introduction to World Religions	
RUSS100	Russian I	
SPAN100	Spanish I	
SPAN101	Spanish II	
STEM270	Thinking and Acting Ethically	
Civics, Political and Social Sciences (6 semester hours)		
Select 2 courses from the following:		6
ANTH100	Introduction to Anthropology	
ANTH202	Introduction to Cultural Anthropology	
CHFD220	Human Sexuality	
COMM211	Social Media and Society	
COMM240	Intercultural Communication	
ECON101	Microeconomics	
ECON102	Macroeconomics	
EDUC200	Humane Education: A Global Interdisciplinary Perspective	
GEOG101	Introduction to Geography	
HOSP110	Practical Food Safety and Awareness	
IRLS210	International Relations I	
LITR212	Forgotten America--Under Represented Cultures in American Literature	
LITR235	Four Points of the Compass: Culture and Society Around the World	
POLS101	Introduction to Political Science	
POLS210	American Government I	
PSYC101	Introduction to Psychology	
SOCI111	Introduction to Sociology	
SOCI212	Social Problems	
SOCI220	American Popular Culture	
STEM280	Exploring Society and Cultures via Science Fiction	
Communication: Writing, Oral, and Multimedia (9 semester hours)		
COMM120	Information and Digital Literacy	3
ENGL110	Making Writing Relevant	3
Select 1 course from the following:		3
COMM200	Public Speaking	
ENGL101	Proficiency in Writing	
ENGL115	Argumentation and Rhetoric	
ENGL210	Introduction to Literature	
ENGL220	Technical Writing	
ENGL221	Scientific Writing	
ENGL226	Effective Business Communication	
HRMT101	Human Relations Communication	
IRLS200	Information Literacy and Global Citizenship	
ITCC231	Introduction to Information Technology Writing	
MGMT100	Human Relations	
History (3 semester hours)		
Select 1 course from the following:		3
HIST101	American History to 1877	
HIST102	American History since 1877	
HIST111	World Civilization before 1650	
HIST112	World Civilization since 1650	
HIST121	Western Civilization before The Thirty Years War	
HIST122	Western Civilization since The Thirty Years War	
HIST221	African-American History before 1877	
HIST222	African-American History since 1877	
HIST223	History of the American Indian	
HIST270	History of Science	
STEM185	The History and Context of STEM	
Mathematics and Applied Reasoning (3 semester hours)		
MATH225	Calculus	3
Natural Sciences (3 semester hours)		
Select 1 course from the following:		3
BIOL180	Introduction to Biology	
BIOL181	Introduction to Human Anatomy and Physiology	
CHEM180	Introduction to Chemistry	
ERSC180	Introduction to Meteorology	
ERSC181	Introduction to Geology	
EVSP180	Introduction to Environmental Science	
PHYS180	Introduction to Physics	
SPST180	Introduction to Astronomy	

STEM100	Introduction to STEM Disciplines	
Total Semester Hours		30

[1] All literature courses require successful completion of ENGL101 - Proficiency in Writing or ENGL110 - Making Writing Relevant.

Major Required (69 semester hours)

Code	Title	Semester Hours
MATH210	Discrete Mathematics	3
MATH220	Linear Algebra	3
MATH226	Calculus II	3
MATH227	Calculus III	3
MATH240	Differential Equations	3
DATS200	Functional Methods and Coding	3
DATS201	Analytical Methods I	3
DATS211	Introduction to Data Science	3
DATS221	Exploratory Data Analysis	3
DATS225	Data Visualization	3
MATH302	Statistics	3
MATH328	Probability Theory with Applications	3
MATH340	Multivariate Statistics	3
MATH410	Design of Experiments	3
DATS301	Analytical Methods II	3
DATS311	Intermediate Data Science	3
DATS371	Fundamentals of Simulation	3
DATS411	Advanced Data Science	3
DATS442	Bayesian Methods (Bayesian Inference, Naïve Bays)	3
DATS443	Generalized Linear Equations Using R	3
STEM380	Coevolution of Society, Culture, and Technology	3
STEM471	Analytics, Algorithms, AI, and Humanity	3
Select 1 course from the following: [1]		3
DATS381	Behind the Data, Our values and beliefs	
DATS435	Optimization and Machine Learning	
DATS481	Introduction to Python	
DATS482	Python and Data Science	
Total Semester Hours		69

[1] Selected Upper Division Computer Science, Computer Technology and Business/Analytics Courses are also available with permission of Advisor.

You must choose a concentration for this degree program and may select from the Flex Concentration, the Concentration in Business Intelligence or the Concentration in Deep Learning.

Flex Concentration (18 semester hours)

The Flex Concentration offers students breadth in data science. Students will learn foundational material in machine learning, sentiment analysis, advanced methods in data science, and simulation. This concentration is a good option for students intending to go onto a master's program in data science where they can pursue in-depth knowledge.

Objectives

Upon successful completion of this concentration, the student will be able to:

- Conduct a variety of data analyses using appropriate tools and methods for specified problems or challenges.
- Explain why the method and tools selected to conduct an analysis are the best for that specific analysis.
- Develop and present final reports on data analyses.

Concentration Requirements (18 semester hours)

Code	Title	Semester Hours
DATS331	Machine Learning I	3
DATS332	Machine Learning II	3
DATS351	Sentiment Analysis	3
DATS373	Simulation Techniques	3
DATS401	Analytical Methods III	3
MATH330	Linear Optimization	3
Total Semester Hours		18

Concentration in Business Intelligence (18 semester hours)

The Concentration in Business Intelligence is intended for students with professional interests in business analytics and prediction/optimization. The courses included in this concentration provide the foundation for this path. Students will study relevant aspects of business as well as data analysis tools and methods required to transform data into knowledge that supports actionable decision-making.

Objectives

Upon successful completion of this concentration, the student will be able to:

- Explain how data is used to form knowledge in business applications.
- Describe the use of data analytics to generate descriptive and predictive analyses.

- Explain how optimization can be used to create regions of solutions for business problems.
- Evaluate risk associated with predictive analytics.

Concentration Requirements (18 semester hours)

Code	Title	Semester Hours
ACCT105	Accounting for Non Accounting Majors	3
BUSN100	Basics of Business	3
BUSN250	Analytics I	3
BUSN350	Analytics II	3
BUSN410	Critical Thinking Strategies for Business Decisions	3
Select 1 course from the following:		3
BUSN450	Advanced Analytics	
DATS465	Risk Modeling and Assessment	
Total Semester Hours		18

Concentration in Deep Learning (18 semester hours)

The Concentration in Deep Learning first provides foundational knowledge. Probabilistic graphical models provide the basis for designing artificial neural networks. The tools and methods of machine learning covered continue developing foundational knowledge. Next, deep learning, that has grown from the study of artificial neural networks, is studied in detail. Last, students can choose to learn about advanced methods in data science or today's state-of-the-art programs in artificial neural networks, e.g. TensorFlow by the Google Brain Team operated by Jupyter notebooks in Python.

Objectives

Upon successful completion of this concentration, the student will be able to:

- Conduct analyses using appropriate machine learning tools.
- Design, develop, and utilize a variety of artificial neural networks including recurrent and convolutional networks.
- Explain the basic principles of deep learning, e.g. the use of multiple types of layers, optimization, and hyperparameters.

Concentration Requirements (18 semester hours)

Code	Title	Semester Hours
DATS331	Machine Learning I	3
DATS332	Machine Learning II	3
DATS344	Probabilistic Graphical Models	3
DATS431	Machine Learning III	3
DATS432	Deep Learning	3
Select 1 course from the following:		3
DATS401	Analytical Methods III	
DATS433	Artificial Neural Networks using TensorFlow (Recommended)	
Total Semester Hours		18

Final Program Requirements (3 semester hours)

Code	Title	Semester Hours
DATS499	Senior Capstone Project	3
Total Semester Hours		3