

Program Requirements

Course	Course Description	Credit	Status	Prerequisites	Timetable	Notes
¹ DATA100	Introduction to Data Science	3	New		Spring 2017. Every semester	QA
MT122	Elementary Statistics or equivalent	3				QA
CS128/ CS128L	Introduction to Software Application Development and LAB	4				
CS150	Database Systems	3				
DATA200	Intermediate Data Science	3	New	DATA100, CS128, MT122 or equivalent Co/Pre: CS150	Spring 2018. Annual	
MT223	Intermediate Statistics	3		MT122 or equivalent		
MT288	Network Analysis	3	New		Fall 2017. Annual	
EN300	Technical Writing	3				
DATA470	Data Science Capstone Project	3	New	Senior standing, DATA200, MT223, MT288	Fall 2018. Annual	
	Domain Knowledge - 4 courses	12+				
	Electives - 2 courses	6				
	Total Program Requirements	46+				

Data Science Core (28 credits):

The data science core is designed to develop computational, statistical and mathematical thinking, as well as knowledge of the foundations of data science and communication skills. The capstone project allows students to demonstrate the attainment of an advanced level of the program learning goals.

Computational Thinking:

CS128 –Intro to Software App Development
CS150 – Database System

Foundations of Data Science

DATA100 – Introduction to Data Science
DATA200 – Intermediate Data Science

Statistical and Mathematical Thinking:

MT122 – Elementary Statistics
MT223 – Intermediate Statistics
MT288 – Network Analysis

Communication Skills

EN300 – Technical Writing
Data visualization in DATA100, DATA200

Applied Data Science

DATA470 – Data Science Capstone

¹ A new course code DATA is proposed to indicate a data science course. CS150, CS307, CS322, CS340, CS350, MT122, MT223, MT228, MT229, MT422, and MT424 will be cross-listed with the DATA course code. MT223 will be renumbered as DATA260.

Domain Knowledge – Areas of Specialization (12+ credits):

The majority of data science programs include courses in statistics, computing, and business. Recent proposals for new data science programs have begun to integrate courses in other disciplines as well. Ohio State University requires their data analytics majors to take 4 elective courses from one area of specialization, choosing courses from biomedical informatics, business analytics, computational analytics, or social science analytics. Data analytics majors at Denison University choose 3 electives from anthropology & sociology, biology, economics, physics, political science, or psychology.

The B.S. in Data Science at John Carroll University is designed to expose students to broad issues and applications beyond the data science core. The areas of specialization provide discipline-specific experiences that enhance student understanding of data acquisition and management, data analysis, linguistics and natural language processing, data modeling, data visualization and communication, as well as ethical and social considerations of data. Students select 4 courses from one area of specialization.

4 courses selected from one area of specialization. Prerequisites are included in the course count.		
Communications <ul style="list-style-type: none"> • CO201 Communications Research • CO225 Journalism • CO325 Investigative Reporting • CO346 Campaign Issues • CO315 Integrated Marketing Communications • CO360 IMC Research • CO455 Health & Environ. Writing 	Digital Humanities <ul style="list-style-type: none"> • EN2xx Literature • EN311 Old English • EN312 Late Medieval Literature • EN488 History of the English Lang • EN498 Independent study 	Entrepreneurship <ul style="list-style-type: none"> • ER201 Creativity, Innovation and Idea Development • ER301 Intro to Entrepreneurship • ER304 Social Entrepreneurship • ER305 Accounting & Finance for Entrepreneurs • ER306 Entrepreneurial Marketing and Sales • ER480 Entrepreneurship Field Experience
Exercise Science <ul style="list-style-type: none"> • EPA205/205L Human Anatomy • EPA206/206L Human Physiology • EPA230 Nutrition for Athletics and Physical Activity • EPA407 Exercise Physiology • EPA409 Kinesiology • EPA432 Motor Learning • EPA440 Independent Study 	Health Disparities&Social Justice <ul style="list-style-type: none"> • BL155/157 Principles of Biology • BL156/158 Principles of Biology II • BL240 Epidemiology • BL260 Poverty & Disease • BL399 Special Problems Biology • PO160 Health Care and Social Justice in Latin America, and PO2xx Health Care Access in Latin America 	Physics <ul style="list-style-type: none"> • PH135,135L Physics I • MT135 Calculus and Analytic Geometry I • PH136, 136L Physics II • MT136 Calculus and Analytic Geometry II
Political Science <ul style="list-style-type: none"> • PO200 Introduction to Methods • PO203 GIS I • PO300/L Research Methods & Lab • PO319 U.S. Elections • PO324 Crisis Mapping, New Media and Politics • PO337 Comparative Health Politics • PO399/498 Independent Study 	Psychology <ul style="list-style-type: none"> • PS100 Introduction to Psychological Science • PS301/301L Experimental Design & Analysis • PS401/401L Research Methods • PS435 Tests & Measurements • PS499 Individual Research 	Sociology & Criminology <ul style="list-style-type: none"> • SC101 Intro to Sociology • SC350 Sociological Research Methods I • SC351 Sociological Research Methods II • SC493 Independent Study • SC497 Undergraduate Research

Electives (6 credits):

The electives deepen the understanding of skills and methods used in data science. Students will choose 2 courses from the following list:

- CS/DATA307 BioInformatics
- CS/DATA322 Big Data Analytics
- CS/DATA340 Data Visualization
- CS/DATA350 Advanced Database
- MT/DATA421 Mathematical Statistics
- MT/DATA422 Applied Statistics
- MT/DATA424 Applied Regression

Sample 4 Year Plan

The major is designed for undergraduate students to complete in four years; however, the prerequisite structure makes it possible to complete in three years as well.

Sample 4 Year Plan	
Fall	Spring
DATA100	MT122, CS128
CS150, MT288	DATA200, MT223
EN300, Elective or Domain	2 Electives or Domain
DATA470, Elective or Domain	2 Electives or Domain

First and Second Year

The first year provides the background knowledge and fundamental skills required to develop expertise in data science. Students take classes in programming and database design, along with topics in statistics and mathematics such as exploratory data analysis, probability fundamentals and network analysis. Students encounter programming in Processing (Java-based), Python, and R. In the second year, courses integrate the skills gained in the first year, enabling students to build a portfolio of data science skills including data mining, machine learning, and statistical inference.

Third and Fourth Year

Students focus on applying the skills gained in a variety of problem domains, including individual and group projects that provide practical experience of data science. Students will enhance their data science skills by acquiring domain knowledge in one of several disciplines through courses that include data analysis, modeling, or application. Communication and team working skills are developed in a variety of domains allowing them to operate effectively as data scientists. Students are encouraged to complete an internship in data science (at least one summer between sophomore and junior year). The degree culminates through a capstone project experience that applies coursework to open-ended data science problems.