Data Science

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Majors: Data Science
Minors: Data Science

Data science is a rapidly growing interdisciplinary field that lies at the intersection of mathematics, statistics, computer science, and a domain of application. Knowing the context surrounding data being analyzed is critical to making informed decisions, so data science majors at Franklin College take courses from a related field to which data science techniques can be applied. A data science capstone course then gives students experience applying the entire data science life cycle to data from their related field. A data science minor is also available for students who would prefer to focus more heavily on the area of application while still learning some of the key ideas and technical skills from the field of data science. In addition to gaining technical skills, both data science majors and minors learn about the importance of approaching data science projects from a human-centered perspective.

All required courses for a major or minor in data science, including all related field and prerequisite requirements, must be completed with a C- or better. Prerequisites for non-majors must also be completed with a C- or better. Education students should consult that department for minimum requirements.

Data Science Major

Core Requirements

CMP 150 Computer Tools for Problem Solving
CMP 352 Data Structures
CMP 370 Database Design and Processing
DAT 110 Human Perspectives in Data Science
DAT 141 Python for Computing and Data Science I
DAT 142 Python for Computing and Data Science II
DAT 471 Data Science Capstone
DAT 499 Senior Competency Practicum
MAT 135 Calculus
MAT 140 Introduction to the Mathematical Sciences
MAT 142 Calculus II
MAT 181 Discrete Mathematics I
MAT 182 Discrete Mathematics II
MAT 224 Basic Applied Statistics
MAT 233 Linear Algebra
MAT 343 Probability Theory
MAT 345 Statistical Consulting Project
PDP 330 Big Data and the Professional Workplace

Professional Development Requirements

PDP 200 Preparing for your Internship

INT 261 Math/Computing/Statistics Internship (4 credit hours)

Related Field Requirements

One of the following courses

ECO 380 Econometrics
MAT 344 Mathematical Statistics

At least two additional courses at the 200-level or above from a discipline other than CMP/DAT/MAT to which data science can be applied. Data from this discipline should be the focus of the student's DAT 471 Data Science Capstone. Students should choose these courses in consultation with their academic advisor.

Data Science Minor

Core Requirements

DAT 110 Human Perspectives in Data Science
DAT 141 Python for Computing and Data Science I
MAT 224 Basic Applied Statistics

One of the following

CMP 150 Computer Tools for Problem Solving
DAT 142 Python for Computing and Data Science II

One of the following options

Option 1: **MAT 345** Statistical Consulting Project AND **PDP 330** Big Data and the Professional Workplace*

Option 2: **MAT 345** Statistical Consulting Project OR **PDP 330** Big Data and the Professional Workplace, AND one additional course from the following**:

ACC 235 Data Management and Analysis
BIO 365 Geographic Information Systems
CMP 352 Data Structures
CMP 360 Operations Research
CMP 370 Database Design and Processing
ECO 380 Econometrics
EXE 402 Research Methods in Exercise Science and Athletic Training II
MAT 135 Calculus
MAT 181 Discrete Mathematics I
MMJ 210 Advanced Reporting and Database Research
PSY 420 Advanced Statistics & Research Methods in Psychology II
SOC 227 Inquiry in the Social Sciences
SOC 425 Research Methods I

*Option 1 is not available to MAT majors

**Some of the additional courses listed for Option 2 have significant pre-requisite requirements that must be fulfilled prior to taking those courses. In addition, the additional course for Option 2 may not be used to fulfill a requirement for a MAT or CMP major, but may be used for MAT/CMP double-majors.

Complete course descriptions for each of these offerings may be found elsewhere in this catalog under the appropriate major headings.

Data Science Course Descriptions

DAT 110 Human Perspectives in Data Science		3 credit hours
Spring	Comparative Perspectives exploratory	

This course provides an introduction to data-driven decision-making and artificial intelligence through a human-centered lens. While many people tend to view data as completely objective and free from human influence, humans make many choices at each step of the data science process. Those choices can influence the final output of data-driven models and can sometimes lead to unintended negative consequences for the people to whom the models are applied. Beyond just identifying possible problems that can arise, students in this course will also be introduced to specific strategies that can be employed when working with data to prevent some of these unintended consequences.

DAT 141 Python for Computing and Data Science I		3 credit hours
Fall		

An introduction to computers and structured programming using the Python programming language. Computer science topics include: problem-solving strategies, algorithm formulation, primitive data types, expressions, control structures, proper coding style, debugging, testing, and documentation. Data science topics include: basic descriptive statistics, data visualization, and data frames. Same as CMP 141.

DAT 142 Python for Computing and Data Science II		3 credit hours
Spring		Prereq: CMP/DAT 141

An introduction to object-oriented design and programming using the Python programming language. Computer science topics include: recursion, object-oriented design, encapsulation, inheritance, polymorphism, file input and output, exception handling, and regular expressions. Data science topics include: natural language processing, data mining, machine learning algorithms, and an introduction to deep learning. Same as CMP 142.

DAT 471 Data Science Capstone		3 credit hours
Spring		Pre-req: Senior standing and departmental consent Co-req: DAT 499

This course draws on the knowledge and skills learned in the data science curriculum. A major data science project from a related domain of application that involves defining a problem, collecting data, exploring data, building models to analyze the data, and evaluating the models will be completed. A research paper that summarizes the methods and results and an oral presentation to clients and faculty evaluators are required. Taken concurrently with DAT 499.

DAT 499 Senior Competency Practicum		0 credit hours
Spring		Co-req: DAT 471

The senior competency practicum consists of two components. The first component is the written report from the capstone project completed in DAT 471. The second component is a formal presentation of the senior capstone project from DAT 471. A team of at least three individuals will judge the student's knowledge of the data science workflow and data science techniques, as well as their ability to communicate with the audience. Taken concurrently with DAT 471. Students must earn a C- or higher.

Digital Fluency Endorsement

The overarching mission of the Digital Fluency initiative is to improve students' digital skills and diversify their career options. The digital fluency initiative also serves as a differentiator for students and our institution. This endorsement enables our students to distinguish themselves in the marketplace while also providing Franklin College with a unique value proposition for prospective students.

Program Outline

Recognizing that learning happens both in and out of the classroom, requirements for the digital fluency endorsement include class offerings and professional development opportunities such as internships, workshops, or successful attainment of external credentials. A detailed outline of these requirements is below.

Curricular requirements: The following courses each feature a major component of digital fluency. To earn the endorsement, students must earn a "C-" or better in 4 of these courses. At least 2 of the 4 courses must be outside the student's major and of a different course code than the major. Classes may be added to or removed from this list at the discretion of the Vice President for Academic Affairs and Dean of the College in consultation with the Faculty Curriculum Committee. Further, students may petition the Academic Rules Committee to include a class not on the current list.

ACC 235 Data Management and Analysis
ART 140 Graphic Design I
ART 190 Digital Fine Art Photography I
BIO 240 Ecology
BIO 324 Scientific Communication and Public Engagement
BIO 365 Geographic Information Systems
BUS 365 Digital Marketing & Salesforce Fundamentals
CMP 130 Introduction to Computing
CMP/DAT 141 Python for Computing and Data Science I
CMP 150 Computer Tools for Problem Solving
DAT 110 Human Perspectives in Data Science
ENG/NPL 485 Communications Consulting Project
EXE 341 Organization and Administration of Health Programs
MAT/SOC 224 Basic Applied Statistics
MAT/ECO/PSY 345 Statistical Consulting Project
MMJ 180 Publication Design
MMJ/PRL/SPR 195 Digital Media Production I
PDP 330 Big Data and the Professional Workplace
PRL 222 Social Media Strategy and Tactics
PSY 227 Introductory Statistics and Research Methods in Psychology
PSY 421 Theories of Personality
LEA/NPL/SOC 315 Leadership Capstone

Additionally, Immersive Term courses with a significant digital fluency component can be counted towards the 4 course requirements. Contact the Director of Digital Fluency with questions about qualifying Immersive Term courses.

Co-curricular requirements: In addition to the curricular requirements noted above, students must complete or attend 4 extra-curricular offerings prior to graduation. These offerings include internships, workshops, and

external credentials. Examples of potential opportunities are listed below. This list will change each year. In addition, other events or programming may be counted with prior approval of the Vice President for Academic Affairs and Dean of the College.

- PDP 110 Introduction to Digital Fluency
- Internship with a digital or tech focus
    - Internships must be pre-approved by the Director of Digital Fluency. To qualify, a student's work should be with a tech product, service, infrastructure, or tech-enabled company.
- Professional certifications, not earned as part of a course, from organizations such as Adobe, Salesforce, Microsoft, Google, Amazon Web Services, Eleven Fifty Academy, etc.
- Digital fluency related workshops provided by the Center for Tech Innovation
- Digital leadership workshops provided by Leadership Johnson County
- Digitally focused workshops provided by the Director of Professional Development or Director of Career Development.

The Director of Digital Fluency will help interested students identify and apply for funding opportunities to support activities and certifications that have an additional cost.

Students can formally declare that they are pursuing this endorsement via the major/minor declaration page on GrizLink.