DATA SCIENCE

Director: Ellen Seljan
Administrative Coordinator: Sara Asberry

Data science is an interdisciplinary field of study dedicated to extracting knowledge from data sets. In a world awash with data, nearly every field of endeavor and inquiry is being transformed by data science. This emerging discipline combines coursework in computing, statistics, and various domains of application spanning the arts, humanities, natural sciences, and social sciences. Our coursework will teach you best practices in data collection, management, measurement, visualization, analysis, and inference. Additionally, in our program, you will not only learn to harness data, but also understand its societal consequences. Training in data science at Lewis & Clark will foster quantitative problem-solving skills and cultivate students as lifelong interdisciplinary learners, capable of tackling wicked problems and exploring for the global good.

The interdisciplinary minor is supervised by a group of faculty from several departments. Student advising is provided by faculty teaching courses in the program.

The minor is designed to guide students in the pursuit of the following learning outcomes:

- Obtain, process, and transform complex data sets.
- Develop programming abilities conducive to problem solving in multiple high-level computer programming languages.
- Build and assess data-based statistical models for both prediction and causal inference.
- Recognize and analyze ethical issues in data science related to algorithmic bias, artificial intelligence, intellectual property, data security, data integrity, and privacy.
- Effectively communicate knowledge extracted from data orally, visually, and in written formats.

Minor Requirements
A minimum of 24 semester credits distributed as follows:

- DSCI 140 Introduction to Data Science
- CS 171 Computer Science I
- One introductory statistics course chosen from the list below.
- One advanced statistics course chosen from the list below.
- One social impact course chosen from the list below.
- One elective course chosen from the list below.

Introductory Statistics Courses
ECON 103 Statistics
HEAL 200 Biostatistics in Public Health
MATH 123 Calculus & Statistics for Modeling the Life Sciences
MATH 255 Statistical Concepts and Methods
POLS 201 Research Methods in Political Science
PSY 200 Statistics I

Advanced Statistics Courses
ECON 303 Econometrics
MATH 351 Linear Models
MATH 352 Simulation-Based Statistical Methods
MATH 451 Probability and Statistics I

MATH 452 Probability and Statistics II
PSY 311 Statistics II

Social Impact Courses
PHIL 241 Data, Privacy, and Ethics
RHMS 241 Data and Democracy

Data Science Electives
ART 212 Digital Media II
ART 312 Digital Media III
BIO 408 Phylogenetic Biology and Molecular Evolution
CS 172 Computer Science II
CS 369 Artificial Intelligence and Machine Learning
CS 383 Algorithm Design and Analysis
ECON 255 Technology, Institutions, and Economic Growth
ECON 312 Global Health Economics
ELI 290 Technologies of the Future
ESS 170 Climate Science
ESS 340 Spatial Problems in Earth System Science
HEAL 340 Epidemiology
MATH 215 Discrete Mathematics
MATH 225 Linear Algebra
MATH 351 Linear Models
MATH 352 Simulation-Based Statistical Methods
MATH 451 Probability and Statistics I
MATH 452 Probability and Statistics II
PHIL 315 Philosophy of Science
PHYS 380 Topics in Physics (if topic is computational physics)
PHYS 390 Biomedical Imaging
POLS 252 Public Opinion and Survey Research
POLS 420 Policy Analysis
PSY 425 Human-Computer Interaction
RHMS 360 Digital Media and Society
RHMS 408 Argument and Persuasion in Science
SOAN 390 Cyborg Anthropology

At least 12 semester credits must be exclusive to the minor (may not be used in any other set of major or minor requirements).

Faculty

Joel A. Martinez. Associate professor of philosophy, chair of the Department of Philosophy. Ethical theory, normative ethics, ancient philosophy, logic. PhD 2006 University of Arizona. BA 1997 New Mexico State University.


Courses

DSCI 140 Introduction to Data Science
Content: Study of knowledge extraction from data with integrated use of statistics, computer science, and scientific reasoning. Students will gain the foundational skills necessary to solve problems with data, learning how to make quantitative predictions and explain phenomena in numerous applications. By the end of the course, students will be able to access and manipulate publicly available datasets; assess the quality, usefulness, and limitations of real-world data; visualize data in multiple formats; conduct statistical analyses to test hypotheses; and draw causal inferences (and debunk spurious inferences). All analysis will be taught scientifically and reproducibly using R programming.
Prerequisites: None.
Usually offered: Annually, spring semester.
Semester credits: 4.

DSCI 245 Applied Data Science Practicum
Content: Academic and experiential bridge between classroom theory and real-world application in the domain of data science. Students enrolled in this course will work eight to 10 hours per week in small teams to solve problems and extract value from data. The problems and data sets will vary by year and course offering, but will universally provide opportunities to students to frame research questions, manage and clean data, execute analyses, and communicate results.
Prerequisites: None.
Usually offered: Annually.
Semester credits: 2.