

DATA SCIENCE

Director: Ellen Seljan

Administrative Coordinator: TBA

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
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

Social Impact courses are under development; see program director for currently available substitutions.

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
GEOL 170	Climate Science
GEOL 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

Peter Drake. Associate professor of computer science, chair of the Department of Mathematical Sciences. Artificial intelligence, data science, software development. PhD 2002 Indiana University. MS 1995 Oregon State University. BA 1993 Willamette University.

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.

G. Mitchell Reyes. Professor of rhetoric and media studies, chair of the Department of Rhetoric and Media Studies. Rhetoric, public memory, public discourse, rhetoric of science. PhD 2004, MA 2000 Pennsylvania State University. BS 1997 Willamette University.

Ellen C. Seljan. Associate professor of political science, chair of the Department of Political Science, director of the Data Science program.

American politics and public policy. PhD 2010 University of California at San Diego. BA 2004 Drew 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.