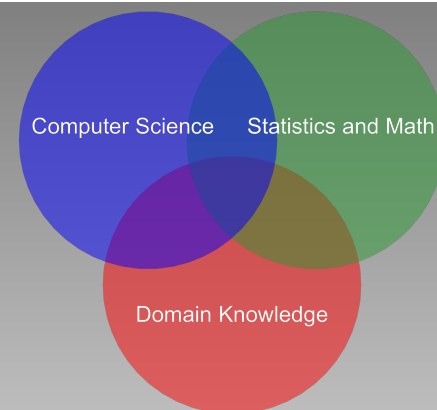


Data Science Minor

Department of Mathematics, Statistics, and
Computer Science



Data Science

Macalester's data science program develops the concepts and skills needed to extract actionable information from masses of data. New to the liberal arts curriculum, data science is a natural fit. It enables students and researchers to work with data in many disciplines: the social sciences (e.g. census, voting, crime, and survey data), the natural sciences (e.g. gene sequences, remote sensing), humanities (e.g. digitized historical records, archeological data), and the arts (e.g. music databases). Macalester's data science minor combines course work in computer science and statistics with studies in "domain areas" that make use of data science and are found across the liberal arts curriculum.

Minor Requirements

- 1) Two **Computer Science** courses chosen from:
 - COMP 123: Core Concepts in Computer Science
 - COMP 124: Object Oriented Programming
 - COMP 302: Intro to Databases
 - COMP 365: Computational Linear Algebra
 - COMP 440: Collective Intelligence
 - COMP 484: Intro to Artificial Intelligence
- 2) Two **Statistics** courses chosen from:
 - MATH 155: Intro to Statistical Modeling
 - MATH 253: Statistical Computing & Machine Learning
 - MATH 353: Survival Analysis
 - MATH 354: Bayesian Statistics
- 3) Two courses in a **Domain Area** focused around a thematic area in which data science is being done.
- 4) A final **Integrative Essay** which discusses a completed data science project or which proposes an integrative project in the domain area

More information at <http://www.macalester.edu/MSCS>

Pre-Approved Domain Areas

Two courses from a domain area below. Other areas approved on a case-by-case basis

Astronomy

PHYS 120: Astronomical Techniques
PHYS 440: Observational Astronomy

Bioinformatics

BIOL 260: Genetics
COMP 302: Computational Biology

Computational Linguistics

LING 100: Intro to Linguistics
LING 294: Computational Methods

Data-Driven Journalism

MCST 114: News Reporting and Writing *and one of*
MCST 355: Electronic Journalism
MCST 357: New Media

Ecology

BIOL 285: Ecology *and one of*
BIOL 342: Animal Behavior/Ecology
BIOL 344: Aquatic Ecology
BIOL 345: Field Botany

Environmental Science and Policy

ENVI 231: Environmental Econ *and one of*
ENVI 130: Science of Renewable Energy
ENVI 140: The Earths Climate System
ENVI 150: Climate and Society
ENVI 160: Dynamic Earth, Global Change

Geographic Analytics

GEOG 225: GIS *and one of* GEOG 262: Metro Analysis;
GEOG 362: Remote Sensing; GEOG 364: GIS and
Community Partnership; GEOG365: Urban GIS; GEOG
366: GIS for Global Urban Environment; GEOG 367:
Environmental GIS; GEOG 368: Health GIS; GEOG 378:
Statistical Methods

Neuroscience

NEUR 244: Cognitive Neuroscience
NEUR 385: Functional MRI

Political Analytics

POLY 214: Cyber Politics
POLY 269: Empirical Research Methods

Quantitative Economics

ECON 358: Securities Analysis
ECON 381: Econometrics
ECON 420: Quantitative Macro Analysis
ECON 485: Empirical Finance

Quantitative Public Health

BIOL 355: Virology
BIOL 357: Immunology
GEOG 256: Medical Geography
MATH 125: Epidemiology

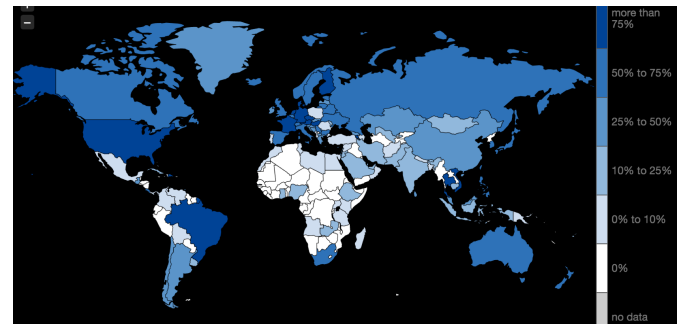
Data Science and the Liberal Arts

Data science seeks to better understand how the world around us works. The field embraces the need for a continuous interdisciplinary cycle that alternates between question formulation, data exploration, and domain insight. Instead of providing methods to answer narrow, rigidly specified questions, data science empowers students with tools to study complex issues and communicate findings via oral, online, and print artifacts.

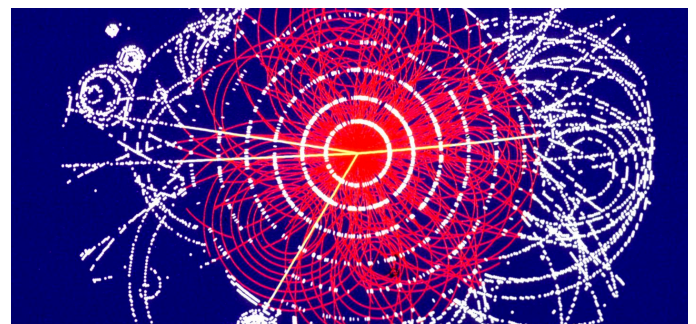
Why Data Science at Macalester?

- Driven by student interest: many students already are choosing these courses, and an increasing number are pursuing graduate programs and careers in data science.
- Macalester's combined Math, Stats, & CS Department is an ideal environment for a data science curriculum.
- Many faculty have interests, experience, and degrees in data science.
- Aligns with Macalester's mission and strategic plan: emphasizes a connection to vocation, entrepreneurship, and service to society; encourages interdisciplinarity; provides an issue-focused program that offers skills to increase learning capacity.
- Resonates with current digital humanities initiatives at Macalester.
- Builds on support from the Howard Hughes Medical Institute that funds data science internships.
- Student projects build on and strengthen connections between the department and partners such as the Minnesota Depts. of Transportation and Health, Target, Thomson Reuters, Children's Hospital, and many research institutions.
- Our mathematics and statistics courses pervasively include R programming, strengthening the connection between mathematics, statistics, and computer science.

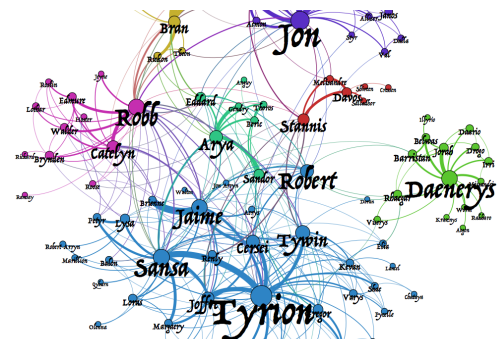
Examples of Data Science Projects at Macalester



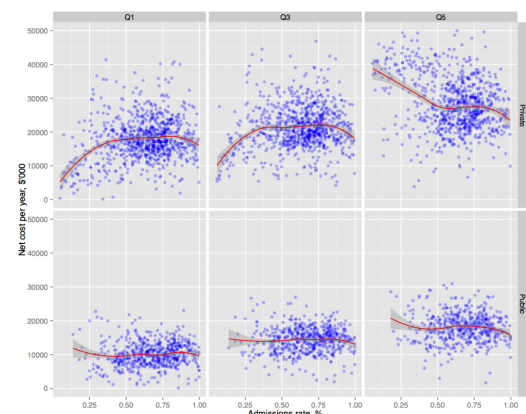
A visualization of the localness of information sourcing in the Vietnamese language edition of Wikipedia.



Classifying Higgs Boson events from super collider data.



A network visualization of characters that appear together in Game of Thrones.



Tuition paid by students in the lowest, middle, and highest family income quantiles.