

Data Fluency

The Certificate in Data Fluency provides a formal pathway for undergraduates in concentrations other than applied mathematics, computational biology, computer science, math, and statistics (see details below) who wish to gain fluency and facility with the tools of data science. The driving intellectual question motivating certificate students is how we can infer meaning from data whilst avoiding false predictions. The required experiential learning component provides you with the opportunity to apply your data-science skills in applied settings, engage in research that uses data science, teach data science as an undergraduate teaching assistant, or undertake an internship that has a substantive data-science component. As with all undergraduate certificates (<https://www.brown.edu/academics/college/degree/undergraduatecertificates/>), the certificate has the following requirements:

- Students may not earn more than **one certificate** and may only have **one declared concentration**.
- Students must be enrolled in or have completed at least **two courses** toward the certificate at the time they declare in ASK.
- No more than **one course** may count toward your concentration and the certificate.
- Students may declare in ASK **no earlier** than the beginning of the fifth semester and must declare **no later** than the last day of classes of the antepenultimate (typically the sixth) semester, in order to facilitate planning for the capstone or other experiential learning opportunity.
- Students must submit a proposal for their experiential learning opportunity by the end of the **sixth semester**.

Excluded Concentrations: Applied Mathematics, Computational Biology, Computer Science, Mathematics, and Statistics. This includes joint concentrations in these areas; for example, Applied Mathematics-Economics is also excluded. According to the certificate guidelines, a student's concentration and certificate cannot have substantial overlap.

For more information on the Certificate in Data Fluency, please visit the Data Science Institute (<https://dsi.brown.edu/academics/certificate-data-fluency/>) website.

Certificate Requirements

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Core Courses:

DATA 0080	Data, Ethics and Society	1
CSCI 0111	Computing Foundations: Data	1
or CSCI 0150	Introduction to Object-Oriented Programming and Computer Science	
or CSCI 0170	Computer Science: An Integrated Introduction	
or CSCI 0190	Accelerated Introduction to Computer Science	
or CPSY 0950	Introduction to programming	
DATA 0200	Data Science Fluency	1

Elective Course: Select one follow-up Applied Math, Biostatistics, Computer Science or domain-specific course with a significant data component from the following list (or another course with approval from the certificate advisor):

ANTH 1201	Introduction to Geographic Information Systems and Spatial Analysis	
APMA 1650	Introduction to Probability and Statistics with Calculus	
BIOL 0495	Statistical Analysis of Biological Data	
BIOL 1555	Methods in Informatics and Data Science for Health	
BIOL 1565	Survey of Health Informatics	
CPSY 0900	Statistical Methods	
CPSY 1291	Computational Methods for Mind, Brain and Behavior	
CPSY 1580C	Visualizing Information	

CSCI 1411	Foundations of AI
CSCI 1420	Machine Learning
CSCI 1450	Advanced Introduction to Probability for Computing and Data Science
CSCI 1470	Deep Learning
CSCI 1951A	Data Science
DATA 1030	Hands-on Data Science
DATA 1150	Data Science Fellows ¹
DATA 1500	Data Visualization & Narrative
ECON 1620	Introduction to Econometrics
ECON 1660	Big Data
EDUC 1230	Applied Statistics for Ed Research and Policy Analysis
ENVS 1105	Introduction to Environmental GIS
EEPS 1320	Introduction to Geographic Information Systems for Environmental Applications
EEPS 1330	Global Environmental Remote Sensing
EEPS 1340	Machine Learning for the Earth and Environment
HIST 1825J	History of Artificial Intelligence
MATH 1210	Probability
MUSC 1210	Seminar in Electronic Music: Real-Time Systems
PHP 1501	Essentials of Data Analysis
PHP 1510	Principles of Biostatistics and Data Analysis
PHP 1560	Using R for Data Analysis
SOC 1020	Methods of Social Research
SOC 1100	Introductory Statistics for Social Research
SOC 1340	Principles and Methods of Geographic Information Systems

Capstone: 0-1

The required experiential learning component provides students with the opportunity to apply their data-science skills in their concentration, engage in research that uses data science, teach data science as UTAs, or undertake an internship that has a data-science component. The capstone may be completed for credit via an independent study course or not for credit. ²

Options for fulfilling this requirement include:

1. Participate in a Brown University credit experience (i.e. independent study).
2. Participate in a non-credit experience: summer Internship; TA for data-related course; work with a local organization on a data-related project. A 10-12 page reflective paper is required for this option.
3. Be a Data Science Fellow. ¹

Total Credits 4-5

¹ Students may complete DATA 1150 and the concurrent Data Science Fellows project to fulfill both the elective and experiential components of the certificate.

² Students must submit a proposal for their experiential component by the end of the sixth semester.