DATA SCIENCE (MS)

Students earning a MS in Data Science will gain a wide variety of skills needed to work with many different types of data, and to analyze, visualize, and extract useful information from data in a variety of ways. They will apply those skills in various contexts, especially during their capstone consulting class or thesis work. This 30-credit program has two tracks (thesis and non-thesis), can be completed full-time or part-time, and includes courses from Computer Science, Statistics, and Mathematics.

Related Programs

Combined

- Data Science (BS/MS) (https://catalog.luc.edu/undergraduate/accelerated-bachelors-masters-program/data-science-bsms/)
- Data Science/Applied Statistics (BS/MS) (https://catalog.luc.edu/undergraduate/accelerated-bachelors-masters-program/data-science-applied-statistics-bs-ms/)
- Data Science/Mathematics (BS/MS) (https://catalog.luc.edu/undergraduate/accelerated-bachelors-masters-program/data-science-mathematics-bs-ms/)

Curriculum

The Master of Science in Data Science requires 30 hours of coursework and a capstone project. Students may elect to conduct research and write a thesis instead of the capstone.

Non-Thesis Track

Code	Title	Hours
Statistics Requirements		**6**
STAT 408	Applied Regression Analysis	
STAT 410	Categorical Data Analysis	
Computer Science Requirements		**6**
COMP 453	Database Programming	
COMP 458	Big Data Analytics	
Data Science Core		**9**
DSCI 401	Introduction to Data Science	
STAT 438	Introduction to Predictive Analytics	
or COMP 479	Machine Learning	
DSCI 470	Data Science Consulting (Capstone)	
Three Statistics or Computer Science 400 Level Electives [1,2]		**9**
Total Hours		**30**

[1]   A list of electives can be found later in this document.
[2]   For electives, students must take one COMP class for 3 credit hours, one STAT class for 3 credit hours, and one course in either COMP or STAT for 3 credit hours.

Thesis Track

Code	Title	Hours
Statistics Requirements		**6**
STAT 408	Applied Regression Analysis	
STAT 410	Categorical Data Analysis	
Computer Science Requirements		**6**
COMP 453	Database Programming	
COMP 458	Big Data Analytics	
Data Science Core		**7**
DSCI 401	Introduction to Data Science	
STAT 438	Introduction to Predictive Analytics	
or COMP 479	Machine Learning	
Research		**11**
DSCI 494	Data Science Research Design	
DSCI 499	Data Science Research	
DSCI 595	Thesis Supervision	
Total Hours		**30**

Electives

The list of electives is divided into primary and secondary electives. Primary electives are recommended classes to all data science students. Secondary electives are courses that may be a good fit for students with a specific area of emphasis. Students need to coordinate with the Graduate Program Director if they plan to take a secondary elective.

Code	Title	Hours
Primary COMP electives		
COMP 406	Data Mining	3
COMP 429	Natural Language Processing	3
COMP 484	Artificial Intelligence	3
COMP 487	Deep Learning	3
COMP 488	Computer Science Topics (If the topic is relevant to data science. Example: Topics in Computer Vision)	1-4
Primary STAT electives		
STAT 411	Applied Survival Analysis	3
STAT 421	Math Modeling & Simulation	3
or COMP 421	Math Models & Simulation	
STAT 451	Applied Nonparametric Methods	3
STAT 444	Longitudinal Data Analysis and Mixed Modeling	3
STAT 488	Topics in Statistics (If the topic is relevant to data science. Examples: Multivariate Statistics, Bayesian Statistics)	1-3
Secondary COMP electives		
COMP 436	Markup Languages	3
COMP 441	Human-Computer Interaction	3
COMP 460	Algorithms & Complexity	3
COMP 405	Database Administration	3
COMP 412	Open Source Computing	3
COMP 413	Intermediate Object-Oriented Development	3
COMP 418	Combinatorial Mathematics	3
COMP 424	Client-Side Web Design	3
COMP 474	Software Engineering	3
COMP 422	Software Development for Wireless and Mobile Devices	3
COMP 417	Social and Ethical Issues in Computing	3
COMP 490	Independent Project	1-6
COMP 499	Internship	1-6
COMP 477	IT Project Management	3
Secondary STAT electives		
STAT 403	SAS Program & Applied Statistics	3

STAT 407	Statistical Design	3
STAT 404	Probability & Statistics I	3
STAT 405	Probability & Statistics II	3
STAT 498	Independent Study Statistics	1-6

Suggested Sequence of Courses

The below sequence of courses is meant to be used as a suggested path for completing coursework. An individual student's completion of requirements depends on course offerings in a given term as well as the start term for a major or graduate study. Students should consult their advisor for assistance with course selection.

Non-thesis Track

Course	Title	Hours
Year One		
Fall		
DSCI 401	Introduction to Data Science	4
STAT 408	Applied Regression Analysis	3
COMP 453	Database Programming	3
	Hours	**10**
Spring		
STAT 410	Categorical Data Analysis	3
COMP 458	Big Data Analytics	3
COMP or STAT 400-Level Elective [1]		3
	Hours	**9**
Year Two		
Fall		

STAT 438
    or COMP 479
	Introduction to Predictive Analytics
	    or Machine Learning
		3

COMP or STAT 400-Level Elective [1]		3
COMP or STAT 400-Level Elective [1]		3
DSCI 470	Data Science Consulting	2
	Hours	**11**
	Total Hours	**30**

[1] For electives, students must take one COMP class for 3 credit hours, one STAT class for 3 credit hours, and one course in either COMP or STAT for 3 credit hours.

Thesis Track

Course	Title	Hours
Year One		
Fall		
DSCI 401	Introduction to Data Science	4
STAT 408	Applied Regression Analysis	3
DSCI 494	Data Science Research Design	2
	Hours	**9**
Spring		
STAT 410	Categorical Data Analysis	3
DSCI 499	Data Science Research	3
COMP 458	Big Data Analytics	3
	Hours	**9**
Year Two		
Fall		

STAT 438
    or COMP 479
	Introduction to Predictive Analytics
	    or Machine Learning
		3

DSCI 499	Data Science Research	3
COMP 453	Database Programming	3
	Hours	**9**
Spring		
DSCI 499	Data Science Research	2
DSCI 595	Thesis Supervision	1
	Hours	**3**
	Total Hours	**30**

Responsible Conduct of Research

All PhD students and students in thesis-based Master's degree programs must successfully complete UNIV 370 Responsible Conduct in Research and Scholarship or other approved coursework in responsible conduct of research as part of the degree requirements. It is strongly recommended that students complete this two-day training before beginning the dissertation/thesis stage of the program.

Graduate & Professional Standards and Regulations

Students in graduate and professional programs can find their Academic Policies in Graduate and Professional Academic Standards and Regulations (https://catalog.luc.edu/academic-standards-regulations/graduate-professional/) under their school. Any additional University Policies supersede school policies.

Learning Outcomes

- The ability to manage large data sets in preparation for data science analysis.
- A working knowledge of statistical techniques and computer algorithms, and the ability to apply these methods to a wide array of real-world problems.
- The ability to perform a data science analysis from beginning to end while adhering to the principles of reproducible and ethical research.
- The ability to program in both the R and Python programming languages.
- Complete a project demonstrating competence in the field of data science. Non-thesis track: Students will be required to complete a real-world data science project prior to graduating from this program, either through our consulting course, an internship, an independent study, or other appropriate project. Thesis track: Students will be required to undertake a research project culminating in a thesis.