M.S. in Data Science - Computational Track

Degree Requirements

Students in the Master of Science in Data Science (MSDS) program must successfully complete 30 credits based on any of the following options:

- Courses (30 credits)
- Courses (27 credits) + MS Project (3 credits)
- Courses (24 credits) + MS Thesis (6 credits)

Independent of the chosen option, all core courses in the respective tracks are required.

At most two courses can be chosen from outside the respective track with approval of the respective Program Co-Directors and advisors. Computational track students are allowed at most three electives that are non-Computer Science courses.

If a student chooses the MS project or MS thesis option, the project or thesis must be related to data science and requires approval from one of the Program Co-Directors and advisors.

The MSDS program has computational and statistics tracks that students must choose from at admission time.

Students intending to do an MS thesis may first register in the DS 700B Project course. They must receive a satisfactory (S) grade in DS 700B before DS 701B MS Thesis registration in the immediate following semester with the same advisor. The MS thesis topic should be continuation of the work done in 700B.

Students may choose an elective outside the list after approval of their respective advisor.

M.S. in Data Science

Code	Title	Credits
Core Course Requirements for Computational Track		
DS 637	Python and Mathematics for Machine Learning	3
DS 644	Introduction to Big Data	3
DS 675	Machine Learning	3
DS 677	Deep Learning	3
MATH 661	Applied Statistics	3

Code	Title	Credits
Electives and Foundation Courses		**15**
Data Science Electives		
DS 642	Applications of Parallel Computing	3
DS 650	Data Visualization and Interpretation	3
DS 669	Reinforcement Learning	3
DS 680	Natural Language Processing	3
DS 698	Special Emerging Topics	3
DS 700B	Master's Project	3
DS 701B	Master's Thesis	3
Computer Science Electives		
CS 610	Data Structures and Algorithms	3
CS 630	Operating System Design	3
CS 631	Data Management System Design	3
CS 632	Advanced Database System Design	3
CS 634	Data Mining	3
CS 639	Elec. Medical Records: Med Terminologies and Comp. Imp.	3
CS 643	Cloud Computing	3
CS 645	Security and Privacy in Computer Systems	3
CS 656	Internet and Higher-Layer Protocols	3
CS 659	Image Processing and Analysis	3
CS 661	Systems Simulation	3

CS 670	Artificial Intelligence	3
CS 676	Cognitive Computing	3
CS 677	Deep Learning (available only to students in statistics track)	3
CS 683	Software Project Management	3
CS 684	Software Testing and Quality Assurance	3
CS 681	Computer Vision	3
CS 708	Advanced Data Security and Privacy	3
CS 731	Applications of Database Systems	3
CS 732	Advanced Machine Learning	3
CS 735	High Performance Data Analytics	3
CS 744	Data Mining and Management in Bioinformatics	3
CS 782	Pattern Recognition and Applications	3
YWCC 691	Graduate Capstone Project (Counting towards the elective credits requires the program director's prior approval. In addition, it needs to be completed with an external partner (industry, lab, or government), or with a faculty only if the same faculty is not the student's MS project or MS thesis advisor.)	3
Math Electives		
MATH 630	Linear Algebra and Applications	3
MATH 631	Linear Algebra	3
MATH 644	Regression Analysis Methods	3
MATH 660	Introduction to statistical Computing with SAS and R (only available to students in computational track)	3
MATH 662	Probability Distributions	3
MATH 664	Methods for Statistical Consulting	3
MATH 665	Statistical Inference	3
MATH 678	Statistical Methods in Data Science	3
MATH 680	Advanced Statistical Learning	3
MATH 683	High Dimensional Stat Inferenc	3
MATH 699	Design and Analysis of Experiments	3
MATH 717	Inverse Problems and Global Optimization	3
MATH 786	Large Sample Theory and Inference	3
MATH 787	Non-Parametric Statistics	3
Other Electives		
BIOL 638	Computational Ecology	3
BME 698	Selected Topics	3
MGMT 635	Data Mining and Analysis	3
MGMT 630	Decision Analysis with Quantitative Modeling	3
FIN 600	Corporate Finance I	3
FIN 641	Derivatives Markets	3
FIN 642	Derivatives and Structured Finance	3
MRKT 630	Models Of Consumer Behavior	3
IS 601	Python for Web API Development	3
IS 631	Enterprise Database Management	3
IS 657	Spatiotemporal Urban Analytics	3
IS 665	Data Analytics for Info System	3
IS 687	Transaction Mining and Fraud Detection	3
IS 688	Web Mining	3
BNFO 601	Foundations of Bioinformatics I	3
BNFO 602	Foundations of Bioinformatics II	3
BNFO 615	Machine Learning for Bioinformatics	3
BNFO 620	Genomic Data Analysis	3
Total Credits		**30**

Recommended course sequence M.S. in Data Science for Computational Track

	Fall	Spring
Year 1	DS 637 Python and Mathematics for Machine Learning	CS 631 Data Management and System Design
	Math 661 Applied Statistics	DS 644 Big Data
	DS 675 Machine Learning	DS 677 Deep Learning
Year 2	Free elective or Master thesis course	Free elective or Masters thesis course
	Free elective or Master project course	
	Free elective	