



Master of Science in Data Science

Revised 06/12/2025

mdsprogram@umich.edu

## Pre-Core (17-19 Credits)

Course #	Course Title	Cr	Notes
<b>MATH/DATASCI 403</b>	Introduction to Discrete Mathematics	3	First Fall semester
<b>EECS 402</b>	Programming for Scientists and Engineers	4	First Fall semester
<b>EECS 403</b>	Graduate Foundations of Data Structures and Algorithms	4	Enforced Prerequisites: MATH 403 and EECS 402
<b>BIOSTATS 601 or MATH/STATS 425 or STATS 510</b>	Probability and Distribution Theory	4	
	Introduction to Probability	3	
	Probability and Distribution	3	
<b>BIOSTATS 602 or STATS 426 or STATS 511</b>	Biostatistical Inference	4	Enforced Prerequisite: MATH/STATS 425 (or equivalent) Enforced Prerequisite: STATS 510
	Introduction to Theoretical Statistics	3	
	Statistical Inference	3	

## Expertise in Data Management and Manipulation (7-8 Credits)

Course #	Course Title	Cr	Notes
EECS 484 <i>or</i> CSE 584	Database Management Systems	4	Enforced Prerequisite: EECS 403
	Advanced Database Systems	4	
EECS 485 <i>or</i> EECS 486 <i>or</i> CSE 549/SI 650 <i>or</i> SI 618 <i>or</i> DATASCI 507	Web Systems	4	EECS 485 available to MDS students in Spring term only
	Information Retrieval and Web Search	4	
	Information Retrieval	3	
	Data Manipulation and Analysis	3	
	Data Science and Analytics using Python	3	

## Expertise in Data Science Techniques (6-8 Credits)

Course #	Course Title	Cr	Notes
<b>BIOSTAT 650 or STATS 413 or STATS 500</b>	Applied Statistics I: Linear Regression	4	Enforced Prerequisite: BIOSTAT 601 (or equivalent)
	Applied Regression Analysis	4	
	Statistical Learning I: Regression	3	
<b>BIOSTAT 626 or EECS 545 or EECS 553 or EECS 476 or CSE 576 or SI 670 or SI 671 or DATASCI 415 or DATASCI 503</b>	Machine Learning for Health Sciences	3	Enforced Prerequisite: BIOSTAT 601 (or equivalent)
	Machine Learning (CSE)	3	
	Machine Learning (ECE)	3	
	Data Mining	4	Enforced Prerequisite: EECS 403
	Advanced Data Mining	4	
	Applied Machine Learning	3	
	Data Mining: Methods and Applications	3	
	Data Mining and Statistical Learning	4	Enforced Prerequisites: MATH/STATS 425 and 426 (or equivalencies)
	Statistical Machine Learning	4	

## Capstone (3-4 Credits)

- Please refer to [MDS Capstone Guidelines](#) for details.

Course #	Course Title	Cr	Notes
<b>BIOSTAT 610 or</b>	Reading in Biostatistics	*	Enforced Prerequisites: STATS 500 and 503 (or equivalencies)
<b>BIOSTAT 699 or</b>	Analysis of Biostatistical Investigations	4	
<b>CSE 599 or</b>	Directed Study	*	
<b>SI 691 or</b>	Independent Study	*	
<b>SI 699-xx5 or</b>	Big Data Analytics	3	
<b>STATS 504 or</b>	Practice and Communication in Applied Statistics	3	
<b>STATS 750</b>	Directed Reading	*	

## Electives (9 Credits minimum) - 1 course of 3 credits or more from each category.

- Electives must include at least 2 advanced graduate courses (500-level or above in LSA and CoE, or 600-level or above in UMSI and SPH).
- CSE/ECE 598 Special Topics will have specific sections approved on a semesterly basis according to their category.

### Principles of Data Science

BIOSTAT 601 (Probability and Distribution Theory) | BIOSTAT 602 (Biostatistical Inference) | BIOSTAT 617 (Sample Design) | BIOSTAT 626 (Machine Learning Methods) | BIOSTAT 680 (Stochastic Processes) | BIOSTAT 682 (Bayesian Analysis) | ECE 501 (Probability and Random Processes) | ECE 502 (Stochastic Processes) | EECS 545 (Machine Learning (CSE)) | ECE 551 (Matrix Methods for Signal Processing, Data Analysis, and Machine Learning) | EECS 553 (Machine Learning (ECE)) | ECE 559 (Optimization Methods for SIPML) | ECE 564 (Estimation, Filtering, and Detection) | SI 670 (Applied Machine Learning) | DATASCI 451 (Introduction to Bayesian Data Analysis) | DATASCI 470 (Introduction to Design of Experiments) | STATS 510 (Probability and Distribution Theory) | STATS 511 (Statistical Inference) | DATASCI 551 (Bayesian Modeling and Computation)

### Data Analysis

BIOSTAT 651 (Generalized Linear Models) | BIOSTAT 653 (Longitudinal Analysis) | BIOSTAT 666 (Statistical Models and Numerical Methods in Human Genetics) | BIOSTAT 675 (Survival Time Analysis) | BIOSTAT 685/STATS 560 (Non-Parametric Statistics) | BIOSTAT 695 (Categorical Data) | BIOSTAT 696 (Spatial Statistics) | ECE 556 (Image Processing) | STATS 414 (Topics in Applied Data Analysis) | STATS 501 (Applied Statistics II) | DATASCI 503 (Statistical Machine Learning) | STATS 509 (Statistics for Financial Data) | STATS 531 (Analysis of Time Series) | STATS 600 (Regression Analysis) | STATS 601 (Advanced Statistical Learning) | STATS 605 (Advanced Topics in Modeling and Data Analysis) | STATS 700 (Topics in Applied Statistics I)

### Computation

BIOSTAT 615 (Statistical Computing) | BIOSTAT 625 (Computing with Big Data) | EECS 481 (Software Engineering) | EECS 485 (Web Systems) | EECS 486 (Information Retrieval and Web Search) | EECS 504 (Foundations of Computer Vision) | EECS 542 (Advanced Topics in Computer Vision) | CSE 548/SI 649 (Information Visualization) | CSE 549/SI 650 (Information Retrieval) | CSE 572 (Randomness and Computation) | CSE 586 (Design and Analysis of Algorithms) | CSE 587 (Parallel Computing) | CSE 592 (Artificial Intelligence) | CSE 595/SI 561 (Natural Language Processing) | SI 564 (SQL and Databases 1.5 credits) + SI 644 (Advanced SQL and Databases 1.5 credits) | SI 608 (Networks) | SI 618 (Data Manipulation and Analysis) | SI 630 (Natural Language Processing: Algorithms and People) | SI 664 (Database Application Design) | SI 671 (Data Mining: Methods and Applications) | DATASCI 406 (Computational Methods in Statistics and Data Science) | STATS 506 (Computational Methods and Tools in Statistics) | DATASCI 507 (Data Science and Analytics using Python) | DATASCI 551 (Bayesian Modeling and Computation) | STATS 606 (Computation and Optimization Methods in Statistics)

## Program Notes:

- Each course taken cannot satisfy more than 1 program requirement.
- At least 25 units of graduate-level coursework must be completed during residency in the Data Science program. Of these 25, 18 must be at the advanced graduate level (500-level or above in LSA and CoE; 600-level or above in UMSI and SPH).
- Rackham Graduate School requires a cumulative GPA of B (3.0) or better to be eligible to graduate.
- Program requirements on page 1 may be fulfilled by approved course waivers from having taken equivalent classes in prior education with grades B- or better. Waiver requests are considered for admitted students before the start of the program.