



Master of Science in Data Science

Revised 07/06/2023

mdsprogram@umich.edu

Pre-Core (17-19 Credits)

Course #	Course Title	Cr	Notes
MATH 403	Introduction to Discrete Mathematics	3	
EECS 402	Programming for Scientists and Engineers	4	First Fall semester
EECS 403	Data Structures for Scientists and Engineers	4	Prerequisite: EECS 402
BIOSTATS 601 or STATS 425 or STATS 510	Probability and Distribution Theory	4	
	Introduction to Probability	3	
	Probability and Distribution	3	
BIOSTATS 602 or STATS 426 or STATS 511	Biostatistical Inference	4	
	Introduction to Theoretical Statistics	3	
	Statistical Inference	3	

Data Science Seminar (1 Credit)

Course #	Course Title	Cr	Notes
EECS 409	Data Science Seminar: MIDAS Mini-Symposium Series	1	Mini-Symposia

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

Course #	Course Title	Cr	Notes
EECS 484 or EECS 584	Database Management Systems	4	
	Advanced Database Systems	4	
EECS 485 or EECS 486 or EECS 549/SI 650 or SI 618 or STATS 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
BIOSTAT 650 or STATS 500 or STATS 513 or BIOSTAT 626 or EECS 545 or EECS 476 or EECS 576 or SI 670 or SI 671 or STATS 415 or STATS 503	Applied Statistics I: Linear Regression	4	
	Statistical Learning I: Regression	3	
	Regression and Data Analysis	3	
	Machine Learning for Health Sciences	3	
	Machine Learning	3	
	Data Mining	4	
	Advanced Data Mining	4	
	Applied Machine Learning	3	
	Data Mining: Methods and Applications	3	
	Data Mining and Statistical Learning	4	
	Stat Learning II: Multivariate Analysis	4	

Capstone (3-4 Credits)

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

Course #	Course Title	Cr	Notes
BIOSTAT 610 or	Reading in Biostatistics	*	
BIOSTAT 698 or	Modern Statistical Methods in Epidemiologic Studies	4	
BIOSTAT 699 or	Analysis of Biostatistical Investigations	4	
EECS 599 or	Directed Study	*	
SI 691 or	Independent Study	*	
STATS 504 or	Practice and Communication in Applied Statistics	3	
STATS 750	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, UMSI, and CoE, or 600-level or above in SPH).
- EECS 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) | EECS 501 (Probability and Random Processes) | EECS 502 (Stochastic Processes) | EECS 545 (Machine Learning) | EECS 551 (Matrix Methods for Signal Processing, Data Analysis, and Machine Learning) | EECS 553 (Theory and Practice of Data Compression) | EECS 559 (Optimization Methods for SIPML) | EECS 564 (Estimation, Filtering, and Detection) | SI 670 (Applied Machine Learning) | STATS 451 (Introduction to Bayesian Data Analysis) | STATS 470 (Introduction to Design of Experiments) | STATS 510 (Probability and Distribution Theory) | STATS 511 (Statistical Inference) | STATS 551 (Bayesian Modeling and Computation)

Data Analysis

BIOSTAT 651 (Generalized Linear Models) | BIOSTAT 653 (Longitudinal Analysis) | BIOSTAT 665 (Population Genetics) | BIOSTAT 666 (Statistical Models and Numerical Methods in Human Genetics) | BIOSTAT 675 (Survival Analysis) | BIOSTAT 685 (Non-Parametric Statistics) | BIOSTAT 695 (Categorical Data) | BIOSTAT 696 (Spatial Statistics) | EECS 556 (Image Processing) | STATS 414 (Topics in Applied Data Analysis) | STATS 501 (Applied Statistics II) | STATS 503 (Statistical Learning II: Multivariate Analysis) | STATS 509 (Statistics for Financial Data) | STATS 531 (Analysis of Time Series) | STATS 600 (Linear Models) | STATS 601 (Analysis of Multivariate and Categorical Data) | STATS 605 (Advanced Topics in Modeling and Data Analysis) | STATS 700 (Topics in Applied Statistics)

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 (Computer Vision) | EECS 542 (Advanced Topics in Computer Vision) | EECS 548/SI 649 (Information Visualization) | EECS 549/SI 650 (Information Retrieval) | EECS 572 (Randomness and Computation) | EECS 586 (Design and Analysis of Algorithms) | EECS 587 (Parallel Computing) | EECS 592 (Artificial Intelligence) | EECS 595/SI 561 (Natural Language Processing) | SI 608 (Networks) | SI 618 (Data Manipulation and Analysis) | SI 630 (Natural Language Processing: Algorithms and People) | SI 671 (Data Mining: Methods and Applications) | STATS 406 (Computational Methods in Statistics and Data Science) | STATS 506 (Computational Methods and Tools in Statistics) | STATS 507 (Data Science and Analytics using Python) | STATS 606 (Computation and Optimization Methods in Statistics)

Program Notes:

- Changes for this 2023 version: 1. Addition of notes for EECS 402 and EECS 403; 2. Update of EECS 409 as Colloquium to Data Science Seminar: Mini-Symposium Series to match new format; 3. Addition of note regarding EECS 485 availability for MDS students; 4. Removal of EECS 598 and SI 699-004 as courses for Capstone, though some sections can serve as capstone if approved; 5. Addition of note under Electives of EECS 598 Special Topics, as sections are approved by category on a semesterly basis. 6. Removal of EECS 505 as an option for Expertise in Data Science Techniques; 7. Removal of electives that will no longer be offered: BIOSTAT 645, EECS 659, STATS 608
- Each course cannot satisfy more than 1 requirement.
- The cumulative GPA must be a B (3.0) or better, as required by Rackham Graduate School.
- 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, UMSI, and CoE; 600 level or above in SPH).
- Program requirements on page 1 (except for EECS 409) may be fulfilled by having taken approved equivalent classes in prior education with grades B- or better. The waiver applications are typically considered before the start of the program.