M | DATA SCIENCE

Master of Science in Data Science
Effective 07/26/2022

mdsprogram@umich.edu

Pre-Core (17- 19 Credits)

Course #	Course Title	Cr	Term	Notes
MATH 403	Introduction to Discrete Mathematics	3		Requirement can be waived with course equivalent to EECS 203.
EECS 402	Programming for Scientists and Engineers	4		Requirement can be waived with course equivalent to EECS 280.
EECS 403	Data Structures for Scientists and Engineers	4		Requirement can be waived with course equivalent to EECS 281.
BIOSTATS 601 *or*	Probability and Distribution Theory	4		
STATS 425 *or*	Introduction to Probability	3		
STATS 510	Probability and Distribution	3		Requirement can be waived with course equivalent to MATH/STATS 425.
BIOSTATS 602 *or*	Biostatistical Inference	4		
STATS 426 *or*	Introduction to Theoretical Statistics	3		
STATS 511	Statistical Inference	3		Requirement can be waived with course equivalent to STATS 426.

Colloquium (1 Credit)

Course #	Course Title	Cr	Term	Notes
EECS 409	Colloquium	1	First Fall	

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

Course #	Course Title	Cr	Term	Notes
EECS 484 *or*	Database Management Systems	4		
EECS 584	Advanced Database Systems	4		
EECS 485 *or*	Web Systems	4		
EECS 486 *or*	Information Retrieval and Web Search	4		
EECS 549/SI 650 *or*	Information Retrieval	3		
SI 618 *or*	Data Manipulation and Analysis	3		
STATS 507	Data Science and Analytics using Python	3		

Expertise in Data Science Techniques (6-8 Credits)

Course #	Course Title	Cr	Term	Notes
BIOSTAT 650 *or*	Applied Statistics I: Linear Regression	4		
STATS 513 *or*	Regression and Data Analysis	3		
STATS 500 *or*	Statistical Learning I: Regression	3		Can be fulfilled by STATS 413 if taken before program start.
BIOSTAT 626 *or*	Machine Learning for Health Sciences	3		
EECS 505 *or*	Computational Data Science and ML	4		
EECS 545 *or*	Machine Learning			
EECS 476 *or*	Data Mining	4		
EECS 576 *or*	Advanced Data Mining	4		
SI 670 *or*	Applied Machine Learning	3		
SI 671 *or*	Data Mining: Methods and Applications	3		
STATS 415 *or*	Data Mining and Statistical Learning	4		
STATS 503	Stat Learning II: Multivariate Analysis	4		Can be fulfilled by EECS 445 if taken before program start.

Capstone (3-4 Credit)

Please refer to separate document on this requirement for details.

Course #	Course Title	Cr	Term	Notes
BIOSTAT 610 *or*	Reading in Biostatistics	*		
BIOSTAT 698 *or*	Modern Stat Methods in Epidemiologic	4		
BIOSTAT 699 *or*	Analysis of Biostatical Investigations	4		
EECS 598 *or*	Special Topics (Specific sections approved on a semesterly basis)	*		
EECS 599 *or*	Directed Study	*		
SI 691 *or*	Independent Study	*		
SI 699-004 *or*	Big Data Analytics	3		
STATS 504 *or*	Practice and Communication in Applied Statistics	3		
STATS 750	Directed Reading	*		

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

Electives must include at least two advanced graduate courses (500 level or above in LSA, UMSI, and CoE, or 600 level or above in SPH).

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 645 (Time series) | 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) | EECS 659 (Adaptive Signal Processing) | STATS 414 (Topics in Applied Data Analysis) | STATS 501 (Statistical Analysis of Correlated Data) | 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 572 (Randomness and Computation) | 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 586 (Design and Analysis of Algorithms) | EECS 587 (Parallel Computing) | EECS 592 (Artificial Intelligence) | EECS 595/SI 561 (Natural Language) | 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) | STATS 608 (Monte Carlo Methods and Optimization Methods in Statistics)

Program Notes:

- The main changes for previous version: 1. EECS 505 now fulfilled the second category of Expertise in Data Science Techniques but not as a Principles of Data Science elective. 2. BIOSTAT 607 is removed as a Computation elective. 3. At least one course of 3 credits or more must be taken from each category of electives. These changes do not affect those who matriculated before F21.
- Main changes for this 2022 version: 1. Added EECS 572 as Computation elective. Removed EECS 490 and EECS 493 as electives per recommendation from CSE Department.
- Each course cannot satisfy more than one 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, UMSI, and CoE, and 600 level or above in SPH).
- The cumulative GPA must be B (3.0) or better as required by Rackham.
- Program requirements on page 1 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.