

## Data Science Program Guide

Data Science is a rapidly growing field providing students with exciting career paths, and opportunities for advanced study. The Data Science major gives students a foundation in those aspects of computer science, statistics, and mathematics that are relevant for analyzing and manipulating voluminous and/or complex data. Students majoring in Data Science will learn computer programming, data analysis, and database systems, and will learn to think critically about the process of understanding data. The Data Science major is a rigorous program that covers the practical use of Data Science methods as well as the theoretical properties underpinning the performance of the methods and algorithms.

### 1. Declaring

Students will need to follow the Statistics Department's Declaration Process, which includes logging on to the Canvas site and following the directions there.

*\*To declare the major, students must have completed the introductory data science, introductory programming, calculus I and calculus II prerequisites, with a grade of C or better. The remaining prerequisites (linear algebra and calculus III) can be taken after declaration.*

### 2. Grade Requirements

A grade of C or higher is required in the prerequisite courses, Data Science program core, required courses, advanced technical electives, and capstone.

### 3. Minor and Double Major Regulations

Students in LSA may double major in Computer Science and Data Science. Students majoring in Data Science are not eligible to minor in Data Science, Statistics, or Computer Science.

### 4. Program Requirements:

#### Prerequisites

Introductory data science: DATASCI 101 / STATS 206 (recommended) or STATS 250 or STATS 280 or IOE 265 or ECON 451.

Introductory programming: EECS 180 or 183.

Calculus I: MATH 115 or 120 or 185 or 275 or 295.

Calculus II: MATH 116 or 121 or 186 or 276 or 296.

Calculus III: MATH 205 or 215 or 285 or 296.

Linear algebra: MATH 214 or 217.

## Program Core

- (4) EECS 203 Discrete Math (Math 465 also accepted)
- (4) EECS 280 Programming and Introductory Data Structures
- (4) EECS 281 Data Structures and Algorithms
- (4) STATS/DATASCI 413: Applied Regression Analysis

Statistical Theory | Choose **one** of the following:

- (3) STATS 412: Introduction to Probability and Statistics
- (3) STATS/MATH 425: Introduction to Probability
- (3) STATS 426: Introduction to Theoretical Statistics

## Additional Required Courses

- (4) STATS 415 Data Mining **/or/** (4) EECS 445 Machine Learning
  
- (4) EECS 484 Database Management Systems **/or/** (4) EECS 485 Web Database and Information Systems

At least one course in each of the following categories (The same course cannot count in more than one category).

One course from the **Applications Electives** list. A list of approved courses is available [here](#).

One course from the **Advanced Technical Electives** list. A list of approved courses is available [here](#).

One course in **Advanced Statistical Analysis**. A list of approved courses is available [here](#).

Additional **application electives, advanced technical electives, or advanced statistical analysis** electives, as needed, to satisfy the **42 credits** for the major.

## Capstone experience (4 credits)

Any path to meeting the capstone requirement other than pre-approved regular courses (see below) must be pre approved by a Data Science advisor.

## 5. Honors Program

Any LSA Data Science student with a current grade point average of at least 3.4 may apply for admission to the LSA Data Science Honors major program. The application is made through a Statistics Department

undergraduate advisor. Students in the Honors program must complete the regular major program with an overall GPA of at least 3.5. In addition, LSA Data Science Honors majors must elect the Senior Honors Seminar (STATS 499) and complete a project or thesis under the direction of a member of the Statistics Department or EECS faculty.

## 6. [Approved DS Capstone Courses](#)

### **Capstone Alternative - Multidisciplinary Design Project (MDP)**

Students may use a [Multidisciplinary Design Project \(MDP\)](#) to fulfill the capstone requirement in the Data Science major.

Due the last day of class in the second MDP term, students taking an MDP project for DS capstone must upload materials and fill out the [Google Form](#).

- Design Review 3 Report
- Design Review 3 Presentation
- The 3 in 3 slides or poster the team produced for the MDP Design Expo.
- A 500-word summary of the major components of the project the student was a major contributor on and how those components related to data science.
- Students can make an advising appointment with the DS-LSA advising chair or DS-ENG CPA for questions about this summary.

### **Capstone Alternative - Internship as Capstone**

Students completing a summer internship, could take STATS 489 either over spring or fall term.

- 1) Submit a proposal for the capstone project to the program coordinators ([statsugradprogram@umich.edu](mailto:statsugradprogram@umich.edu)). Once this is approved, a section of STATS 489 will be set up for your capstone report.
- 2) You will need to work with a UM faculty member, usually in Stats or CSE, who will be the instructor of record for STATS 489, and you should keep in touch with them about your progress. Ideally, this is a faculty member whose research area is similar to that of the internship. A faculty DS advisor can also take on this role. Make an advising appointment with a faculty advisor if you want to pursue this route.
- 3) You will submit a final report on your internship project for STATS 489. It might also be helpful to look at previous honors theses at <https://lsa.umich.edu/stats/undergraduate-students/undergraduate-research-opportunities-.html>. An honors thesis has different expectations to an internship capstone report, but both are academic writing describing a sustained project.

## 7. EECS Repeat Policy

The EECS Department has a repeat policy for EECS 203, EECS 280 and EECS 281. The information below is directly from the [EECS Department website](#).

**Students are limited to attempting each of the three 200-level courses (EECS 203, EECS 280, EECS 281) at most twice.** An attempt includes, but is not limited to, a notation of any letter grade (“A-F”), withdrawal (“W”), Pass/Fail (“P”/” F”), Transfer (“T”), or Incomplete (“I”) posted on your U-M transcript. Any attempts from WN20 through SS21 terms are not counted in this limit. If you are seeking a third (or higher) attempt in EECS 203, EECS 280, or EECS 281, please submit a petition and include the following information: why your prior attempts were unsuccessful, and concrete steps you will take and changes you will make to succeed in your potential next attempt at the course. **Please note:** an advising appointment to discuss your plan is required in addition to submitting a petition.

If you currently have an Incomplete grade due to an Honor Code violation, you may proceed with the EECS coursework via override. Please contact the EECS Department to request to enroll in courses that your Incomplete grade serves as a prerequisite to. If you receive a final grade below a C after an Honor Code violation, you are required to retake the course for a C or higher letter grade. This retake can be done alongside later EECS coursework, even if your failed class typically serves as a prerequisite. If an override is needed, please contact the EECS Department. **Please note:** Incompletes and grades below a C will not fulfill CSE pre-declaration requirements.

## 8. Advising

Students may make an appointment with a faculty advisor or an undergraduate program coordinator during the academic year. Students may also attend open advising with an undergraduate program coordinator. Open advising is intended to answer quick questions and be at most a 10-minute conversation. Information about making appointments and open advising can be found on the Statistics Department's website [Advising Page](#).

## 9. EECS Workload Survey

The Computer Science Department conducts a student survey every other year to find the opinions of the students who took the course and what they perceived the workload to be. These surveys can be found at this [link](#). These are for EECS classes only.

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