INTRODUCTION

This handbook is intended to be a focal point of information for data science graduate students and their advisors. Its users are expected to be familiar with the contents of the Class Schedule, Handbook for Graduate Assistants and Graduate School catalog, including both the general material and that specifically pertaining to the Data Science Program. Graduate School required forms* are referred to throughout this document as well as our departmental forms. Valuable information about the graduate faculty, their research interests, and current research facilities is available on the data science website.

This document is addressed to students already admitted to the Graduate Program in Data Science. While information in it may interest those applying for admission, it is not intended to present any information directly pertinent to the admissions process. Every effort has been made to present this material in a straightforward and accurate manner. Any minor errors or ambiguities will not affect the actual rules and processes of the Graduate School and the Program.

*Forms will be added to the data science website. Until then, please check with the program coordinator on any forms (Katie Keyser - loas0001@umn.edu)

DATA SCIENCE OVERVIEW

The M.S. in Data Science program provides a strong foundation in the science of Big Data and its analysis by gathering in a single program the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods.

Students who graduate from this regular 2 year master’s program will learn the state-of-the-art methods for treating Big Data, be exposed to the cutting edge methods and theory forming the basis for the next generation of Big Data technology, and will complete a project demonstrating that they can use the fundamental concepts to design innovative methods for new application areas arising from business, government, security, medicine, biology, physical sciences, and the environment.

DIRECTOR OF GRADUATE STUDIES (DGS)

The Director of Graduate Studies, referred to as the DGS, oversees all aspects of graduate studies. Professor Daniel Boley will be the DGS for this academic year. Katie Keyser is the coordinator for graduate student services and most questions can be directed to her: loas0001@umn.edu

The Data Science Program is housed in the Department of Computer Science and Engineering’s (CS&E) office, located in 4-196 Keller Hall. All forms that are to be signed by the DGS should be given to Katie Keyser via the receptionist in the CS&E office. The DGS will send the forms to the Graduate Student Services and Progress Office (GSSP) on the student’s behalf. All forms mentioned in this handbook can be obtained by contacting Katie Keyser.

The Program Coordinator (Katie Keyser) is available to answer questions during stated office hours [on Data Science Website] or by appointment via 612-625-8020 or “loas0001@umn.edu”. For questions that cannot be answered there, the DGS (Dan Boley) is available during stated office hours [on the Data Science Website], or by appointment via e-mail to “dgs@datascience.umn.edu”

ADVISING

The DGS is the official advisor of all students unless an advisor was assigned at the time of admission. After students take some courses in their area of interest, attend seminars, and individual discussion, students will become acquainted with some of the faculty. Then students will be able to choose an advisor for their capstone project. Only faculty with graduate education responsibilities are eligible to serve as advisors for graduate students (faculty not listed on the Data Science website may be eligible, please inquire). A supervisor from outside the University with sufficient academic credentials may also be eligible to be an advisor for a Capstone project, but a faculty co-advisor may be required as well. The advisor-advisee relationship is a mutual one and an advisor must also agree to advise any student. If
the faculty member of the student’s choice agrees, then the student will inform the DGS of this with the departmental form (Declaration of Advisor) signed by the new advisor. A student can change advisors again if desired or needed, and this must be indicated to the DGS using the same form. However in this case both the new and the previous advisor must sign to acknowledge the change. All students should have a research advisor chosen by the beginning of their second year.

**REGISTRATION**

The details of registering for classes can be found on the website for One Stop under Registration.

Graduate student registration occurs at the beginning of the registration period for each semester. The day that a student registers will change each semester, please check the university academic calendar. Students can check their registration queue by going to onestop.umn.edu and clicking on “When to register” which is located on the right hand side. If the class is closed students may sign up on the waiting list as long as the waitlist remains open.

If a class is closed and the waitlist is closed and a student still wishes to take the class, then the student must show up for the first day of class. The instructor will then be able to tell how many people are actually intending to take the class and how many additional students will be allowed into the class. Many times we are limited to the classroom size and so students should always have an alternative in case they are not able to register for a particular class. If a student is able to get into a closed class, a permission number will be needed. Upon approval of the instructor, the front desk receptionist will issue a permission number to the student. Students are strongly discouraged from registering for more courses than they intend to take as this takes a seat from another student who may wish to take the class.

Students are required to register no later than the end of the second week of the semester. Deadlines to Cancel/Add, change of grading options and refunds are all available at onestop.umn.edu. No registration changes are permitted after the last day of instruction.

Graduate students must register each fall and spring semester to maintain their active status. Those students who have not registered in each semester but wish to return must apply for readmission. Prior admission is not a guarantee for readmission.

**DEGREE REQUIREMENTS**

The Data Science MS is a plan B track program with a final oral exam and capstone project. The program requires a total of 31 credits consisting of 6 credits each from the three emphasis areas: statistics, algorithms, and infrastructure/large scale computing; 6 credits in approved electives; 1 credit of research colloquium; and 6 credits for the capstone project.

Students take two courses from each of three tracks for a total of 18 credits:

- Statistics Track (6 cr).
- Algorithmic Track (6 cr).
- Infrastructure Track (6 cr).

Students must take the remaining 13 credits from the following areas:

- Electives (6 cr) 2 courses from any track or any other course related to Data Science with advisor & DGS approval (6 cr). Normally these courses would be related to the topic of the student’s Capstone project.
- Capstone Project (6 cr) This year-long project would be supervised by a faculty member, with approval by a faculty committee.
- Colloquium (1cr) Research Colloquium (1 cr). This seminar would have a mix of outside speakers and capstone project presentations.

**TOTAL CREDITS:** 31 credits

Of the required classes, all credits must be 5000 level or above.

Minor
Requirements for a minor are established by each program so if a student desires to declare a minor, those requirements must be met along with the consent of the DGS of the appropriate graduate program. However, it is no longer required that students take related field courses or minor courses although it is still an option if a student desires. The Minor Field is defined as a minimum of 6 semester credits of coursework outside the Data Science Program in a single department of the College of Science and Engineering (e.g., EE, Math, Stat, IEOR, etc.), Management, Cognitive Science and/or other related fields for a designated minor. The minor is awarded by that department and their requirements for a minor must be met in order to qualify for a minor in that field.

**GPA**

M.S. students are expected to maintain a GPA of at least 3.25 for all courses listed on their graduate degree plan and a GPA of 3.0 for all courses taken while in the Program. No course for which the student has received a grade below a C- can count towards the degree. There is no foreign language requirement for this degree.

All requirements for the master’s degree must be completed and the degree awarded within 5 calendar years after initial enrollment in the graduate program. Students who are unable to complete the degree within the time limits described due to extraordinary circumstances may submit a time extension request to the DGS and the college for an extension of up to 12 months.

**M.S. Committee**

An M.S. degree committee consists of three faculty members who have formal graduate education responsibilities. Two will be from the Data Science Program (which includes a student’s advisor who serves as the chair) and one from an outside program. The outside person usually represents the related or minor field if declared. The advisor and student should discuss appropriate members and these individuals should be contacted for preliminary approval. All members must have graduate education responsibilities in order to serve on an MS committee. Once members have agreed to serve, the student must submit their names on the Examining Committee site. This form is routed for DGS and collegiate approval and then sent to graduate school to enter the information. Committee members cannot be appointed until after the graduate degree plan has been approved and entered into the student’s record. For Plan B programs, the committee serves as the committee for the final examination.

If it becomes necessary to make changes to any committee, the DGS must be notified by email, outlining the change, the reason for it, and any suggestions for revised membership along with the written consent of the new committee member. The advisor should concur with the change. The student must then update this information on the same Examining Committee site before the final exam takes place. If the Final Exam Report form has already been received by the student and/or advisor, the unavailable committee member’s name can be crossed off and the new committee member’s name can be written in.

**Capstone Project and Final Examination**

Students complete a capstone project supervised by a faculty member. One of the key features of the MS in Data Science curriculum is a capstone project that makes the theoretical knowledge gained in the program operational in realistic settings. During the project, you will go through the entire process of solving a real-world problem: from collecting and processing real-world data, to designing the best method to solve the problem, and finally, to implementing a solution. The problems and datasets you’ll engage with will come from real-world settings identical to what you might encounter in industry, academia, or government. Examples of projects and the wide variety of topics they cover can be found on the Research page.

Students will choose a project in consultation with their advisor. This project can be part of a larger research program as described on the Research page, or a project supervised by another professor at the University, or may be a project associated with the student’s ongoing degree program or employment. In any case, the Capstone must be a self-contained project which can be presented orally and in writing to the public. The project is completed by a written report of approximately at least 20 to 30 pages and may also be presented orally. The project will be approved by a committee of three faculty members which include the academic advisor, the project supervisor (if different from the advisor), and one other faculty member. A project supervisor who is not a member of the graduate faculty, but has the necessary qualifications (such as a PhD in a field related to Data Science), may be appointed to the graduate faculty on a temporary basis and serve on the committee. The student in consultation with the advisor will assemble the committee, register for the 3-credit Capstone course twice in two different semesters (6cr total), and complete and defend the project during those two semesters.

To sign up for the Plan B Capstone course (DSCI 8760), students must first find a faculty advisor and agree on a title for the Plan B project. Once this is agreed upon, student will submit the “Declaration of Advisor and
Capstone Project Title From”. This form can be found on the data science website at: http://datascience.umn.edu/current-students/docs under “Degree Progress”. Once submitted, the advisor will be contacted to confirm the selection and the DGS will review and approve the project and student will be emailed a permission number for the course. The listed advisor becomes the advisor of record for the student.

The Graduate Degree Plan must be submitted at least one semester before the capstone project defense. The student and advisor should discuss appropriate members for the committee; verify that they have graduate education responsibilities and that they are willing to serve. The student should then go online to appoint them to the committee after the graduate degree plan has been approved. This is the committee that will serve as the final exam and Final Project committee. The exam will consist of the final written report. The student may also be asked to present their project to the committee, other students as part of a seminar, or another forum open to the University community. The Final Examination Report form should be obtained and circulated to the faculty committee members. This form is included in the Graduation Packet which can be requested any time after the graduate degree plan has been approved by the advisor, DGS and college and entered into a student’s record by the GSSP office. The committee members will indicate their satisfaction or dissatisfaction with the defense by signing the form. The signed form should then be returned to the GSSP office, 160 Williamson Hall.

GRADUATE DEGREE PLAN

Graduate education policy requires every graduate student to file a graduate degree plan for each degree for which he/she is a candidate. On the graduate degree plan the student will list the courses that have been taken and those that are planned to take to complete the degree. For Master’s degree candidates, this plan should be filed during the student’s third semester or before the beginning of the last semester. The graduate degree plan is filled out in consultation with the advisor, who then must approve it. If a minor is stated on the graduate degree plan, the DGS of the minor graduate program must also approve it. The graduate degree plan then is approved by the DGS in Data Science and the graduate education dean of the College of Science and Engineering. The student will then appoint the committee members by submitting their names to the online form for assigning and updating the prelim oral committee.

The courses listed on the graduate degree plan must only be those that qualify towards degree completion, as explained below. In addition, these courses must generally be relevant to the subject area of the capstone project and provide the background and depth normally expected of a student receiving the degree for which the student is a candidate. Only 5000 level and higher courses will be accepted on the degree plan. No courses for which a student has received a grade below a C- are allowed to count towards the degree. All courses must be regular courses, as opposed to independent study or project-only courses. All courses must be taken A-F. Courses cannot be taken S-N.

Any credits that qualify to be transferred to a student’s plan will be approved at the time of graduate degree plan submittal. Only the credits transfer, grades do not and do not count towards the student’s GPA. Generally, only credits from accredited schools with comparable graduate degree programs will be approved for transfer. Credits from outside data science may be approved. Approval must be obtained from the advisor and the DGS. Credits transferred from other institutions must be graduate level (post baccalaureate), have been taken as graduate level work and have been taught by faculty authorized to teach graduate courses. For Master’s degree programs, at least 60 percent of the coursework must be completed while registered as an enrolled graduate student at Minnesota; therefore no more than 40 percent of Master’s degree program credits can be transferred. Part of the transferred credits can be from courses taken while a student had non-degree seeking status at the University of Minnesota. However, registration for those courses must have been done by using the form 99PRD, Request for Graduate Credit for a non-degree seeking student. No more than 12 of these non-degree credits can be transferred to the MS program.
DEGREE PROGRESS

Please review the Degree Completion Procedure document. We believe that a Master's degree can be completed in two years. While we do not hold students precisely to these time periods, students who exceed them by substantial amounts of time without completing their degrees will be asked to explain their lack of progress. Graduate Education policy has also set time limits. According to the policy on “Master's Degree: Performance Standards and Progress”, all requirements for the master's degree must be completed and the degree awarded within five calendar years after initial enrollment in the graduate program.

It is Graduate School policy that programs annually review the progress of all MS students. MS students will not be required to complete a review form but the DGS will review progress and GPA of each master's student and contact any student who appears to be having difficulty.

Students and advisors should select coursework so as to best make orderly and timely progress, always keeping the student’s interests and the requirements of their areas of specialization in mind.

PETITIONS AND TIME EXTENSIONS

Once it has been submitted, a student must strictly conform to the graduate degree plan. If there is need to deviate from it, the graduate degree plan can be changed by petition. The petition is a special form available online. The petition should list the courses to be added and/or removed and must again be approved by the advisor, the DGS, the DGS of the minor field (if a minor has been formally declared) and then submitted to the GSSP office.

There is also a form to be used to apply for a time extension. A student desiring a time extension should complete the form stating a cogent reason why the extension should be granted. Any request for a time extension should be filed before the time limit has expired and is to be signed by the advisor, the DGS of the minor field if a minor is declared and the DGS before being sent to the GSSP office for entry.

For more information on completion procedures, please see the following web Master’s Plan B instructions.

COMMENCEMENT ATTENDANCE

Commencement is held once a year at the end of spring semester and is hosted by the College of Science and Engineering in cooperation with several other colleges. The announcement of the commencement date and time as well as the procedure to sign up to attend will be sent to the student’s x.500 account.

MS students are required to be in the process of completing their last semester of coursework of their approved graduate degree plan if they wish to attend commencement ceremonies.

FINANCIAL ASSISTANCE

Teaching and Research Assistantships

Because of their special skills, data science students may be able to obtain appointments from other departments. If a computer science graduate student receives an appointment from another department he/she is subject to the salary rates of that department. The Data Science Program is not directly involved with such appointments, so students should deal directly with the department or program concerned. However, students with appointments in other departments must inform the DGS of this in a timely manner.

The CSE Career Center for Science and Engineering also has an Employment Opportunities Program for graduate students. Although this program is open to all DSci graduate students, the primary purpose is to help those students who are not financially supported by the department to make themselves known to outside companies that have need for their skills. We hope this coordination/matching service will benefit both our students and potential employers. Details are handled directly by the CSE Career Center for Science and Engineering, Room 105 Lind Hall. The office will compile a student’s data and send it out to companies that indicate a need for a student’s particular skills. All negotiations after that would be between the student and the company. The CSE Career Center also offers services for alumni.
GENERAL DATA SCIENCE INFORMATION

Mailboxes and Bulletin Boards

Mailboxes and a copy machine are located in room 4-201 Keller Hall. Access to this room is gained through the use of a student’s U card. Mailboxes are available to DS graduate students who wish to have one. These mailboxes are for University use only and no personal mail should be sent to the departmental address. Since most University business is directed to a student’s x.500 account, most students have no need for a mailbox. However, if one is desired, an email should be sent to cse-desk@cs.umn.edu. All mailboxes will be set up by the 2nd week of the semester.

A good deal of information is posted on the bulletin boards outside of the Department office, 4-192 Keller Hall, and in the mailroom 4-201 Keller Hall.

Keys and Space

All Data Science graduate students have access to the graduate students' computer lab (2-216 Keller Hall) and the William Munro Graduate Student Lounge (2-212 Keller Hall). These facilities are available to graduate students for their research and study. Access is available through use of the student’s U card.

Systems Information

All Data Science graduate students are entitled to accounts on the departmental machines in the graduate computer labs. Data Science graduate students should apply for a CS computer and email account. New students should complete the application form upon arrival.

Information about the departmental computing systems and staff is available online. All graduate students should subscribe to the grads email alias for departmental announcements.

The Computer Science graduate computer lab is located in room 2-216. For information about what equipment is located in that room, please see http://www.cs.umn.edu/resources/facilities/labs.php. All the other laboratories in Keller Hall are under the direction of various faculty members. Accounts on equipment in these laboratories must be arranged through the respective professors in charge of each of them.

Useful locations, hours, and phone numbers

Data Science Program

Department of Computer Science and Engineering Office
4-192 Keller Hall
200 Union St SE
Minneapolis, MN 55455

Department of Electrical and Computer Engineering
4-174 Keller Hall
200 Union St SE
Minneapolis, MN 55455

Division of Biostatistics
A460 Mayo Bldg.
420 Delaware St SE
Minneapolis, MN 55455
**Graduate Admissions**  
309 Johnston Hall  
101 Pleasant St SE  
Minneapolis, MN 55455  
8:00 - 4:30- M-F  
(612) 625-3014  
[http://www.grad.umn.edu/admissions/index.html](http://www.grad.umn.edu/admissions/index.html)

**Graduate Student Services and Progress Office**  
160 Williamson Hall  
231 Pillsbury Dr.  
Minneapolis, MN 55455  
8:00 – 4:00 – M-F  
(612) 625-3490  
[www.grad.umn.edu/students/index/html](http://www.grad.umn.edu/students/index/html)

**Graduate Assistant Office**  
200 Donhowe  
319 15th Ave SE  
Minneapolis MN 55455  
8:00-4:30 M-F  
(612) 624-7070  
[http://www1.umn.edu/ohr/gae/](http://www1.umn.edu/ohr/gae/)

**School of Statistics**  
313 Ford Hall  
224 Church St SE  
Minneapolis MN 55455  
8:00-4:30 M-F  
(612) 625-8046  
[http://www.stat.umn.edu/grad/ms.html](http://www.stat.umn.edu/grad/ms.html)

*Hours subject to change*

## APPENDIX B - Lists of Associated Data Science Faculty

A list of current Data Science associated faculty can be found at [http://datascience.umn.edu/people/faculty](http://datascience.umn.edu/people/faculty).

### Staff

- **Director of Graduate Studies**  
  [Professor Daniel Boley](http://datascience.umn.edu/people/faculty)

- **Program Coordinator**  
  [Sara Howard](http://datascience.umn.edu/people/faculty)