DATA SCIENCE, MS

The MS Data Science is a joint professional program between the Statistics and Computer Sciences Departments and is administered by the Statistics Department. The program provides students with abilities in computational and statistical thinking and skills, which may be combined with domain knowledge to address data-rich problems from diverse fields and various industries. Graduates will acquire data science competencies to think critically about data, and to manage, process, model, and analyze data to obtain meaning and knowledge, and further to use data in responsible, ethical ways. The curriculum addresses emerging and rapidly growing areas of applied statistical and computing research and practice. Graduates seek employment as data analysts and data scientists or pursue further education in data science, statistics, computer science, or related quantitative and computational fields.

ADMISSIONS

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet* the minimum requirements *(https://grad.wisc.edu/apply/requirements/) of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	February 15
Spring Deadline	The program does not admit in the spring.
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	2

REQUISITES FOR ADMISSION

Applicants to the MS Data Science program should have completed the following courses equivalent to the UW-Madison courses listed below:

Code	Title	Credits
Calculus and Mathematical Foundation, complete all below		
MATH 221	Calculus and Analytic Geometry 1	5
MATH 222	Calculus and Analytic Geometry 2	4
MATH 340	Elementary Matrix and Linear Algebra	3
or MATH 345	Linear Algebra and Optimization	
Programming Foundation, select one from the list below		
COMP SCI 220	Data Science Programming I	4
COMP SCI 300	Programming II	3
COMP SCI 320	Data Science Programming II	4
Recommended previous coursework of significant experience in R		
STAT 303 & STAT 304 & STAT 305	R for Statistics I and R for Statistics II and R for Statistics III	3
STAT 433	Data Science with R	3

FUNDING

FUNDING

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM INFORMATION

Students enrolled in this program are not eligible to receive tuition remission from graduate assistantship appointments at this institution.

Additional information about funding for MS Data Science is available on the program website (https://stat.wisc.edu/graduate-admissions/ms-datascience/#funding-and-cost-of-attendance).

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum degree requirements (https://guide.wisc.edu/graduate/#requirementstext) and policies (https://guide.wisc.edu/graduate/#policiestext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	Yes

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business

schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	None.
Assessments and Examinations	None.
Language Requirements	No language requirements.

REQUIRED COURSES

Code	Title	Credits
Statistics Core		
STAT 611	Statistical Models for Data Science	3
STAT 612	Statistical Inference for Data Science	3
STAT 613	Statistical Methods for Data Science	3
Computer Sciences Core		
Complete 1 course from each category for a total of 9 credits		9
Algorithms		
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI 577	Introduction to Algorithms	
COMP SCI/I SY E/ MATH/STAT 726	Nonlinear Optimization I	
Systems		
COMP SCI 537	Introduction to Operating Systems	
COMP SCI 544	Introduction to Big Data Systems	
COMP SCI 564	Database Management Systems: Design and Implementation	
COMP SCI 640	Introduction to Computer Networks	
COMP SCI 642	Introduction to Information Security	
COMP SCI 739	Distributed Systems	
COMP SCI 744	Big Data Systems	
COMP SCI 764	Topics in Database Management Systems	
Humans and Data		
COMP SCI 765	Data Visualization	
COMP SCI/ ED PSYCH/ PSYCH 770	Human-Computer Interaction	
Machine Learning Core		
Complete 2 courses from the list below for a total of 6 credits		6
COMP SCI 540	Introduction to Artificial Intelligence	
COMP SCI/ E C E 760	Machine Learning	
COMP SCI/ E C E 761	Mathematical Foundations of Machine Learning	
COMP SCI 762	Advanced Deep Learning	
STAT 451	Introduction to Machine Learning and Statistical Pattern Classification	
STAT 453	Introduction to Deep Learning and Generative Models	
STAT 615	Statistical Learning	
Data Science Electives		
Complete 6 credits from the courses below [1]		6
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI 537	Introduction to Operating Systems	
COMP SCI 544	Introduction to Big Data Systems	
COMP SCI 564	Database Management Systems: Design and Implementation	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
COMP SCI 577	Introduction to Algorithms	
COMP SCI 640	Introduction to Computer Networks	
COMP SCI 642	Introduction to Information Security	
COMP SCI 702	Graduate Cooperative Education	
COMP SCI/I SY E/ MATH/STAT 726	Nonlinear Optimization I	
COMP SCI 736	Advanced Operating Systems	
COMP SCI 739	Distributed Systems	
COMP SCI 744	Big Data Systems	
COMP SCI/ E C E 763	Trustworthy Artificial Intelligence	
COMP SCI 764	Topics in Database Management Systems	
COMP SCI 765	Data Visualization	
COMP SCI/ E C E 766	Computer Vision	
COMP SCI 769	Advanced Natural Language Processing	

COMP SCI/ ED PSYCH/ PSYCH 770	Human-Computer Interaction
COMP SCI 774	Data Exploration, Cleaning, and Integration for Data Science
COMP SCI 784	Foundations of Data Management
COMP SCI 799	Master's Research (3 credits maximum of COMP SCI 799 and/or STAT 699 allowed)
COMP SCI/E C E/ STAT 861	Theoretical Foundations of Machine Learning
L I S 461	Data and Algorithms: Ethics and Policy
STAT 303 & STAT 304 & STAT 305	R for Statistics I and R for Statistics II and R for Statistics III
STAT 349	Introduction to Time Series
STAT 351	Introductory Nonparametric Statistics
STAT/ COMP SCI 403	Internship Course in Comp Sci and Data Science
STAT 411	An Introduction to Sample Survey Theory and Methods
STAT 421	Applied Categorical Data Analysis
STAT 433	Data Science with R
STAT 443	Classification and Regression Trees
STAT 456	Applied Multivariate Analysis
STAT 461	Financial Statistics
STAT/ COMP SCI 471	Introduction to Computational Statistics
STAT 575	Statistical Methods for Spatial Data
STAT/B M I 620	Statistics in Human Genetics
STAT 699	Directed Study (3 credits maximum of STAT 699 and/or COMP SCI 799 allowed)
STAT 701	Applied Time Series Analysis, Forecasting and Control I
STAT 760	Multivariate Analysis I
STAT 761	Decision Trees for Multivariate Analysis
STAT 771	Computational Statistics
STAT/ECON/ GEN BUS 775	Bayesian Statistics
I SY E 620	Simulation Modeling and Analysis
I SY E 624	Stochastic Modeling Techniques
I SY E/ COMP SCI 719	Stochastic Programming
I SY E/ COMP SCI 723	Dynamic Programming and Associated Topics
I SY E/COMP SCI/ MATH 728	Integer Optimization
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction
Total Credits	**30**

[1] Courses listed both as core course and as an elective may satisfy either requirement, but not both.

Students in this program may not take courses outside the prescribed curriculum without faculty advisor and program director approval. Students in this program cannot enroll concurrently in other undergraduate or graduate degree programs.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) serve as the official document of record for Graduate School academic and administrative policies and procedures and are updated continuously. Note some policies redirect to entries in the official UW-Madison Policy Library (https://policy.wisc.edu/). Programs may set more stringent policies than the Graduate School. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

With program approval, students are allowed to transfer no more than 9 credits of graduate coursework from other institutions toward the graduate degree credit and graduate coursework (50%) requirements. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

Undergraduate Credits Earned at Other Institutions or UW-Madison

With program approval, up to 7 credits from a UW–Madison undergraduate degree are allowed to transfer toward minimum graduate degree credits. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements. This program does not accept undergraduate credits from other institutions.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a University Special Student at UW–Madison

With program approval, up to 14 credits completed at UW–Madison while a University Special student numbered 300 or above are allowed to transfer toward minimum graduate degree requirements. Of these credits, those numbered 700 or above may also transfer to fulfill the minimum graduate coursework (50%) requirement. Coursework earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

ADVISOR / COMMITTEE

Students are required to communicate with their advisor near the beginning of each semester to discuss course selection and progress.

CREDITS PER TERM ALLOWED

15 credit maximum. Refer to the Graduate School: Maximum Credit Loads and Overload Requests (https://policy.wisc.edu/library/UW-1228/) policy.

TIME LIMITS

Students are expected to complete the program in 3-4 semesters. Students who wish to pursue the program part time must receive permission from the program chair.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

L&S POLICY FOR GRADUATE STUDENT ACADEMIC APPEALS

Graduate students have the right to appeal an academic decision related to an L&S graduate program if the student believes that the decision is inconsistent with published policy.

Academic decisions that may be appealed include:

- Dismissal from the graduate program
- Failure to pass a qualifying or preliminary examination
- Failure to achieve satisfactory academic progress
- Academic disciplinary action related to failure to meet professional conduct standards

Issues such as the following cannot be appealed using this process:

- A faculty member declining to serve as a graduate student's advisor.
- Decisions regarding the student's disciplinary knowledge, evaluation of the quality of work, or similar judgements. These are the domain of the department faculty.
- Course grades. These can be appealed instead using the L&S Policy for Grade Appeal (https://kb.wisc.edu/ls/22258/).
- Incidents of bias or hate, hostile and intimidating behavior (https://hr.wisc.edu/hib/), or discrimination (Title IX (https://compliance.wisc.edu/titleix/), Office of Compliance (https://compliance.wisc.edu/eo-complaint/formal-investigations/)). Direct these to the linked campus offices appropriate for the incident(s).

Appeal Process for Graduate Students

A graduate student wishing to appeal an academic decision must follow the process in the order listed below. Note time limits within each step.

1. The student should first seek informal resolution, if possible, by discussing the concern with their academic advisor, the department's Director of Graduate Studies, and/or the department chair.
2. If the program has an appeal policy listed in their graduate program handbook, the student should follow the policy as written, including adhering to any indicated deadlines. In the absence of a specific departmental process, the chair or designee will be the reviewer and decision maker, and the student should submit a written appeal to the chair within 15 business days of the academic decision. The chair or designee will notify the student in writing of their decision.
3. If the departmental process upholds the original decision, the graduate student may next initiate an appeal to L&S. To do so, the student must submit a written appeal to the L&S Assistant Dean for Graduate Student Academic Affairs within 15 business days of notification of the department's decision.
   a. To the fullest extent possible, the written appeal should include, in a single document: a clear and concise statement of the academic decision being appealed, any relevant background on what led to the decision, the specific policies involved, the relief sought, any relevant documentation related to the departmental appeal, and the names and titles of any individuals contributing to or involved in the decision.
   b. The Assistant Dean will work with the Academic Associate Dean of the appropriate division to consider the appeal. They may seek additional information and/or meetings related to the case.
   c. The Assistant Dean and Academic Associate Dean will provide a written decision within 20 business days.
4. If L&S upholds the original decision, the graduate student may appeal to the Graduate School. More information can be found on their website: Grievances and Appeals (https://grad.wisc.edu/documents/grievances-and-appeals/) (see: Graduate School Appeal Process).

OTHER

Not applicable.

PROFESSIONAL DEVELOPMENT

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

PROGRAM RESOURCES

Students in the Data Science, MS program are encouraged to participate in program-specific professional development events and work directly, one-on-one, with advisors as well. Information about events and resources will be made available to currently enrolled students via email.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Demonstrates understanding of theories, methodologies, and computation as tools to solve complex problems in data science.
2. Selects or adapts appropriate data science approaches and uses or develops best practices in data-driven applications.
3. Synthesizes information, organizes insights, and evaluates impact pertaining to questions for studies involving empirical data.
4. Communicates data science concepts and results clearly.
5. Adheres to principles of ethical and professional conduct in data science.