STATISTICS: STATISTICS AND DATA SCIENCE, M.S.

This is a named option (formally documented sub-major) professional program in the Statistics M.S (http://guide.wisc.edu/graduate/statistics/data-science-ms/). Data science is the study of extracting knowledge from data. Our MS Statistics: Statistics and Data Science option combines a background in statistical theory, methods and practice related to data science with communication skills to train a new generation of leaders who will use data effectively for planning and decision making.

Data science concepts enable students to translate vague questions about complex data into pragmatic analysis steps using statistical thinking. We build from basic methods that compare groups and relate measurements, to more complicated models that depend on the way data are gathered. In practice, planning and decision making involve choices about how to analyze data and communicate findings. These concepts will be grounded at key points with projects that involve real data and/or realistic simulated data.

Students may also be interested in the MS Data Science (https://guide.wisc.edu/graduate/statistics/data-science-ms/#text) professional program, offered by the Department of Statistics in cooperation with Department of Computer Sciences. The MS Data Science program is designed for students who are primarily interested in entering the data science profession, and teaches key computational and statistical skills that may be applied to a variety of industries.

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/).

REQUISITES FOR ADMISSION

Course Requirements - Prerequisite Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td></td>
</tr>
<tr>
<td>MATH 234</td>
<td>Calculus--Functions of Several Variables</td>
<td></td>
</tr>
<tr>
<td>MATH 421</td>
<td>The Theory of Single Variable Calculus (or another advanced analysis course)</td>
<td></td>
</tr>
<tr>
<td>MATH 340</td>
<td>Elementary Matrix and Linear Algebra</td>
<td></td>
</tr>
</tbody>
</table>

4 semesters of calculus:

If it is highly recommended that students also have:

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 303</td>
<td>R for Statistics I</td>
<td></td>
</tr>
<tr>
<td>STAT 304</td>
<td>R for Statistics II</td>
<td></td>
</tr>
<tr>
<td>STAT/MATH 309</td>
<td>Introduction to Probability and Mathematical Statistics I</td>
<td></td>
</tr>
<tr>
<td>STAT/MATH 310</td>
<td>Introduction to Probability and Mathematical Statistics II</td>
<td></td>
</tr>
</tbody>
</table>

Other Test(s) (e.g., GMAT, MCAT) n/a

Letters of Recommendation Required 3

Students with questions regarding the programs admission rules and standards should visit our application website (https://stat.wisc.edu/graduate-studies/data-science-option/).

The MS Statistics: Statistics and Data Science program is intended for three types of students:

• MS Statistics: Statistics and Data Science for VISP students: Students from the Visiting International Student Program (Stat VISP or Math VISP) who have completed some degree requirements at UW-Madison as VISP undergraduates. They may request transfer of up to 15 credits from their VISP coursework.

• MS Statistics: Statistics and Data Science for workforce students: Students coming with 5 or more years in the workforce who have worked extensively with data and are seeking a well-rounded training. Some students may be part-time students (6-8 credits per semester) if they remain in the workforce.

• MS Statistics: Statistics and Data Science for other general students: Students who have BS degrees or expected to obtain BS degrees prior to the first semester as MS Statistics: Statistics and Data Science students.
FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding/) 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.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

NAMED OPTION REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Mode of Instruction Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accelerated</strong>: 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.</td>
</tr>
<tr>
<td><strong>Evening/Weekend</strong>: 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.</td>
</tr>
<tr>
<td><strong>Face-to-Face</strong>: Courses typically meet during weekdays on the UW-Madison Campus.</td>
</tr>
<tr>
<td><strong>Hybrid</strong>: These programs combine face-to-face and online learning formats. Contact the program for more specific information.</td>
</tr>
<tr>
<td><strong>Online</strong>: 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.</td>
</tr>
</tbody>
</table>

CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>30 credits</td>
</tr>
<tr>
<td>Grad Credit</td>
<td>Requirement</td>
</tr>
<tr>
<td>Minimum</td>
<td>16 credits</td>
</tr>
<tr>
<td>Residence</td>
<td>Credit Requirement</td>
</tr>
</tbody>
</table>

REQUIRED COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 601</td>
<td>Statistical Methods I</td>
<td>4</td>
</tr>
<tr>
<td>STAT 610</td>
<td>Introduction to Statistical Inference</td>
<td>4</td>
</tr>
<tr>
<td>STAT 615</td>
<td>Statistical Learning</td>
<td>3</td>
</tr>
</tbody>
</table>

Professional Skills Courses: 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 605</td>
<td>Data Science Computing Project</td>
<td>3</td>
</tr>
<tr>
<td>STAT 628 or STAT 678</td>
<td>Data Science Practicum</td>
<td>3</td>
</tr>
<tr>
<td>STAT 628 or STAT 678</td>
<td>Introduction to Statistical Consulting</td>
<td>3</td>
</tr>
</tbody>
</table>

Students who are able to demonstrate equivalent prior coursework and/or experience may request to substitute a required course (STAT 601, STAT 605, STAT 610, STAT 615, STAT 628) with a Statistics-taught course numbered 600 or above with advisor approval. Substitutions are not guaranteed and will be reviewed on a case-by-case basis.

13 elective credits:

Students may count up to 3 credits of Statistics undergraduate electives including:

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<td>STAT 304</td>
<td>R for Statistics II</td>
<td></td>
</tr>
<tr>
<td>STAT 305</td>
<td>R for Statistics III</td>
<td></td>
</tr>
<tr>
<td>STAT 349</td>
<td>Introduction to Time Series</td>
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<tr>
<td>STAT 351</td>
<td>Introductory Nonparametric Statistics</td>
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<tr>
<td>STAT 405</td>
<td>Data Science Computing Project</td>
<td></td>
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<tr>
<td>STAT 411</td>
<td>An Introduction to Sample Survey Theory and Methods</td>
<td></td>
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<tr>
<td>STAT 421</td>
<td>Applied Categorical Data Analysis</td>
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<tr>
<td>STAT 433</td>
<td>Data Science with R</td>
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<tr>
<td>STAT 436</td>
<td>Statistical Data Visualization</td>
<td></td>
</tr>
<tr>
<td>STAT 443</td>
<td>Classification and Regression Trees</td>
<td></td>
</tr>
<tr>
<td>STAT 451</td>
<td>Introduction to Machine Learning and Statistical Pattern Classification</td>
<td></td>
</tr>
<tr>
<td>STAT 453</td>
<td>Introduction to Deep Learning and Generative Models</td>
<td></td>
</tr>
<tr>
<td>STAT 456</td>
<td>Applied Multivariate Analysis</td>
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</tr>
<tr>
<td>STAT 461</td>
<td>Financial Statistics</td>
<td></td>
</tr>
</tbody>
</table>
Students must have at least 3 credits of coursework numbered 600 or above taught within Statistics including those numbered 600 or above taught within Statistics with advisor approval from the following courses:

- STAT 606: Computing in Data Science and Statistics
- STAT 609: Mathematical Statistics I
- STAT 615: Statistical Methods for Clinical Trials
- STAT 640: Statistical Methods for Epidemiology
- STAT 679: Special Topics in Statistics (may be repeated with different topic titles)
- STAT 701: Applied Time Series Analysis, Forecasting and Control I
- STAT/MATH 709: Mathematical Statistics
- STAT/MATH 710: Mathematical Statistics
- STAT 732: Large Sample Theory of Statistical Inference
- STAT/B M I 741: Survival Analysis Theory and Methods
- STAT 760: Multivariate Analysis I
- STAT 761: Decision Trees for Multivariate Analysis
- STAT/B M I 768: Statistical Methods for Medical Image Analysis
- STAT 771: Statistical Computing
- STAT 772: Linear Randomized Algorithms for Data Science
- STAT/ECON/GEN BUS 775: Introduction to Bayesian Decision and Control I
- STAT/MATH 803: Experimental Design I
- STAT 809: Non Parametric Statistics
- STAT 811: Sample Survey Theory and Method
- STAT 834: Empirical Processes and Semiparametric Inference
- STAT 840: Statistical Model Building and Learning
- STAT 841: Nonparametric Statistics and Machine Learning Methods
- STAT 849: Theory and Application of Regression and Analysis of Variance I
- STAT 850: Theory and Application of Regression and Analysis of Variance II
- STAT 860: Estimation of Functions from Data

To reach the minimum of 13 credits for electives, students may also count the following courses:

- STAT 303: R for Statistics I
- STAT 304: R for Statistics II
- STAT 305: R for Statistics III
- STAT/B M I 403: Internship Course in Comp Sci and Data Science (1 credit maximum allowed)
- STAT 627: Professional Skills in Data Science
- STAT 699: Directed Study (2 credits maximum allowed)

**GRADUATE AND UNDERGRADUATE COURSES WITH SIMILAR TOPICS**

Courses that cover the same or similar topic at the undergraduate- and graduate-level may both be used towards the MSDS requirements, but if both courses are to be used, the undergraduate level course must be completed first. Please note that this policy does not preclude students from taking just the undergraduate or just the graduate version of a topic. These combinations would include STAT 349 and STAT 701, STAT 351 and STAT 809, STAT 405 and STAT 605, STAT 411 and STAT 732, STAT 456 and STAT 760, STAT 443 and STAT 761, STAT 451 and STAT 615, and STAT/COMP SCI 471 and STAT 771. This will also apply to special topics courses that have similar topics between the undergraduate and graduate level.

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, graduate or certificate programs.

**POLICIES**

**GRADUATE SCHOOL POLICIES**

The Graduate School’s Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**NAMED OPTION-SPECIFIC POLICIES**

**PRIOR COURSEWORK**

**Graduate Work from Other Institutions**

With program approval, students are allowed to count 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.

**UW–Madison Undergraduate**

With program approval, up to 7 credits from a UW–Madison undergraduate degree are allowed to count toward minimum graduate degree credits.
These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting ([https://doso.students.wisc.edu/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](https://hr.wisc.edu/policies/gapp/#grievance-procedure))
- Hostile and Intimidating Behavior Policies and Procedures ([https://hr.wisc.edu/hib/](https://hr.wisc.edu/hib/))
  - Office of the Provost for Faculty and Staff Affairs ([https://facstaff.provost.wisc.edu/](https://facstaff.provost.wisc.edu/))
- Dean of Students Office ([https://doso.students.wisc.edu/](https://doso.students.wisc.edu/)) (for all students to seek grievance assistance and support)
- Employee Assistance ([http://www.eao.wisc.edu/](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/](https://employeedisabilities.wisc.edu/)) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School ([https://grad.wisc.edu/](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/](https://compliance.wisc.edu/)) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards ([https://conduct.students.wisc.edu/](https://conduct.students.wisc.edu/)) (for conflicts involving students)
- Ombuds Office for Faculty and Staff ([http://www.ombuds.wisc.edu/](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/](https://compliance.wisc.edu/titleix/)) (for concerns about discrimination)

Students should contact the department chair or program director with questions about grievances. They may also contact the L&S Academic Divisional Associate Deans, the L&S Associate Dean for Teaching and Learning Administration, or the L&S Director of Human Resources.

OTHER
n/a

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

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

PROGRAM RESOURCES

Students in the Statistics: Statistics and Data Science, M.S. 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.

PEOPLE

Faculty:
Cecile Ane ([https://stat.wisc.edu/staff/ane-cecile/](https://stat.wisc.edu/staff/ane-cecile/)), Professor
Joshua Cape ([https://stat.wisc.edu/staff/cape-joshua/](https://stat.wisc.edu/staff/cape-joshua/)), Assistant Professor
Richard Chappell ([https://stat.wisc.edu/staff/chappell-rick/](https://stat.wisc.edu/staff/chappell-rick/)), Professor
Peter Chien ([https://stat.wisc.edu/staff/chien-peter/](https://stat.wisc.edu/staff/chien-peter/)), Professor
Jessi Cisewski-Kehe ([https://stat.wisc.edu/staff/cisewski-kehe-jessi/](https://stat.wisc.edu/staff/cisewski-kehe-jessi/)), Assistant Professor
Deshpande, Sameer ([https://skdeshpande91.github.io/](https://skdeshpande91.github.io/)), Assistant Professor
Nicolas Garcia Trillos ([https://stat.wisc.edu/staff/trillos-nicolas-garcia/](https://stat.wisc.edu/staff/trillos-nicolas-garcia/)), Assistant Professor
Yinqiu He ([https://stat.wisc.edu/staff/he-yinqiu/](https://stat.wisc.edu/staff/he-yinqiu/)), Assistant Professor
Hyunseung Kang ([https://stat.wisc.edu/staff/kang-hyunseung/](https://stat.wisc.edu/staff/kang-hyunseung/)), Associate Professor
Sunduz Keles ([https://stat.wisc.edu/staff/keles-sunduz/](https://stat.wisc.edu/staff/keles-sunduz/)), Professor
Bret Larget ([https://stat.wisc.edu/staff/larget-bret/](https://stat.wisc.edu/staff/larget-bret/)), Professor
Keith Levin ([https://stat.wisc.edu/staff/levin-keith/](https://stat.wisc.edu/staff/levin-keith/)), Assistant Professor
Wei-Yin Loh (https://stat.wisc.edu/staff/loh-wei-yin/), Professor

Michael Newton (https://stat.wisc.edu/staff/newton-michael/), Professor

Vivak Patel (https://stat.wisc.edu/staff/patel-vivak/), Assistant Professor

Alejandra Quintos (https://stat.wisc.edu/staff/quintos-alejandra/), Assistant Professor

Garvesh Raskutti (https://stat.wisc.edu/staff/raskutti-garvesh/), Associate Professor

Karl Rohe (https://stat.wisc.edu/staff/rohe-karl/), Professor

Kris Sankaran (https://stat.wisc.edu/staff/sankaran-kris/), Assistant Professor

Jun Shao (https://stat.wisc.edu/staff/shao-jun/), Professor

Miaoyan Wang (https://stat.wisc.edu/staff/wang-miaoyan/), Assistant Professor

Yahzen Wang (https://stat.wisc.edu/staff/wang-yazhen/) (chair), Professor

Brian Yandell (https://stat.wisc.edu/staff/yandell-brian/), Professor

Chunming Zhang (https://stat.wisc.edu/staff/zhang-chunming/), Professor

Yiqiao Zhong (https://stat.wisc.edu/staff/zhong-yiqiao/), Assistant Professor

Jun Zhu (https://stat.wisc.edu/staff/zhu-jun/), Professor