Statistics and Data Science, MA, Statistics Concentration

To earn a master's degree at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass certain examinations; fulfill all academic and residence requirements; and apply for program completion (graduation) via Workday Student.

For the details of master's degree general requirements in Arts & Sciences, including an explanation of Satisfactory Academic Progress, students should review the Master's Degree Academic Information page of the Arts & Sciences *Bulletin.*

Program Requirements

- **Total Units Required:** 30 units
- **Degree Length:** Three to four semesters
  - **Note:** Students must be enrolled in 9 graduate units each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Arts & Sciences graduate course that will show 0 units but does count as full-time status. Students should connect with their department to ensure proper enrollment prior to the Add/Drop deadline.

Master of Arts in Statistics and Data Science

The degree offers two concentrations: Statistics and Applied Data Science. The Statistics concentration is intended for students seeking deeper training in statistical theory, mathematical statistics, and advanced statistical methodology, including those preparing for PhD study or technically intensive statistical work. The Applied Data Science concentration is designed for students who want rigorous training in statistical modeling, computation, and data science, with greater flexibility to connect these tools to domain-specific applications in areas such as biology, economics, political science, psychology, and other data-driven fields.

There are 30 units of coursework. Students may also choose an optional thesis pathway, which requires 6 additional units of thesis research, bringing the total requirement to 36 units. The minimum residence requirement is one full academic year of graduate study. A GPA of B (3.0) or better must be maintained in graduate courses. To be eligible for the thesis option, a student must maintain a cumulative GPA of 3.5 or higher in the first 18 units of courses satisfying the program requirements.

Required Courses

Students must take the following required courses or their equivalents. The required courses differ slightly based on the student's concentration.

Required Courses for the Statistics Concentration

Code	Title	Units
SDS 5010 & SDS 5020	Probability and Mathematical Statistics	6
SDS 5130	Linear Statistical Models	3
or SDS 5521	Advanced Linear Models I	
SDS 5210	Statistical Computation	3
SDS 5910	Practical Training in Statistics	0
Total Units		**12**

SDS 5010 Probability may be replaced with SDS 5525 Theory of Statistics I. SDS 5020 Mathematical Statistics may be replaced with SDS 5526 Theory of Statistics II.

If an equivalent course has been taken and proficiency in the course material has been demonstrated, other 5000-level and above electives may be chosen by the student in consultation with their advisor to make up the 30 units. Typically, at most three electives shall be chosen from outside the Department of Statistics and Data Science.

Electives (18 units)

Students will select 5000-level electives primarily from SDS, with up to 9 units from other departments. Any SDS 5000+-level course can count toward the approved 18 units of electives, except for teaching seminars, research, or independent work. Approved outside elective courses are listed below:

Code	Title	Units
BBS 5483	Human Genetic Analysis	3
BIOL 5181	Population Genetics	3
BIOL 5220	Practical Bioinformatics	4
CSE 5100	Deep Reinforcement Learning	3
CSE 5104	Data Mining	3
CSE 5105	Bayesian Methods in Machine Learning	3
CSE 5107	Machine Learning	3
CSE 5109	Advanced Machine Learning	3
CSE 5270	Natural Language Processing	3
CSE 5610	Large Language Models	3
DAT 5550	Machine Learning Tools for Prediction of Business Outcomes	3
DAT 5561	Introduction to Python and Data Science	3
ECON 6110	Econometrics	3
ECON 6140	Machine Learning and Data Science in Economics	3
ECON 6840	Introduction to STATA	1.5

ECON 6850	A First Python Course for Economists	1.5
ECON 8111	Quantitative Methods in Economics II	3
ECON 8130	Structural Microeconometrics	3
ECON 8135	Advanced Microeconometrics	3
ESE 5450	Stochastic Control	3
FIN 5380	Stochastic Foundations for Finance	1.5
FIN 5390	Mathematical Finance	1.5
INFO 5558	Applications of Deep Neural Networks	3
MATH 5011	Introduction to Analysis	3
MATH 5012	Introduction to Lebesgue Integration	3
MATH 5031	Linear Algebra	3
MATH 5051	Numerical Applied Mathematics	3
MATH 5056	Topics in Financial Mathematics	3
MATH 5151	Measure Theory and Functional Analysis I	3
MATH 5152	Measure Theory and Functional Analysis II	3
POLSCI 5063	Causal Inference	3
POLSCI 5626	Applied Statistical Programming	3
POLSCI 5720	Topics in Quantitative Political Methodology: Computational Social Science	3
PSYCH 8068	Hierarchical Linear Models	3
PSYCH 8167	Applied Bayesian Statistics for Psychologists	3

Students may petition for the eligibility of courses outside this list after consultation with their advisor. A list of eligible electives is also available on the Master's Degree Program page on the Department of Statistics and Data Science website. The department's list may be more up to date as additional electives can be added after the update of the Bulletin.

Thesis

A student in the proposed concentration may choose a thesis option to gain data science research experience. To complete this option, each student needs to complete 6 additional units through independent work and research with a faculty advisor, typically during the final two semesters of the program, bringing the total degree requirement to 36 units. To be eligible for the thesis option, a student must maintain a cumulative grade point average of 3.5 or higher in the first 18 units of coursework satisfying the program requirements. It is the student's responsibility to find a thesis advisor who is willing to guide their research. During the student's last semester of studies, the student is required to defend their thesis through a presentation accompanied by a question-and-answer period. Students typically complete their thesis option in three or four semesters.