Statistics Major

Program Requirements

- **Total units required:** 42
  - 10 core requirement courses (30 credits)
  - Four elective courses (12 credits)

Required Courses

Code	Title	Units
CSE 131	Introduction to Computer Science	3
Math 131	Calculus I	3
Math 132	Calculus II	3
Math 233	Calculus III	3
Math 309	Matrix Algebra	3
SDS 3200	Elementary to Intermediate Statistics and Data Analysis	3
SDS 439	Linear Statistical Models	3
SDS 459	Bayesian Statistics	3
or SDS 475	Statistical Computation	
SDS 493	Probability	3
SDS 494	Mathematical Statistics	3
Total Units		**30**

Notes:

[1.] Each of these core courses must be passed with a grade of C- or better.

[2.] AP credit can be applied for Math 131 Calculus I , Math 132 Calculus II, and Math 233 Calculus III. Students who have completed Math 203 Honors Mathematics I and Math 204 Honors Mathematics II will have this requirement waived.

[3.] CSE 131 Introduction to Computer Science may be waived after consultation with the director of undergraduate studies of the Department of Computer Science and Engineering.

Elective Courses

Students complete four additional elective courses (12 units). At least two probability or statistics courses must be taken at the 400 level or above; the other courses may be chosen from an approved list of electives. For more information, visit the Department of Statistics and Data Science website.

Courses in Probability and Statistics

The major and minor in statistics require electives in probability and statistics. Below is the list of these allowed courses:

Code	Title	Units
SDS 3200	Elementary to Intermediate Statistics and Data Analysis [*]	3
SDS 3211	Statistics for Data Science I [*]	3
SDS 322	Biostatistics	3
SDS 420	Experimental Design	3
SDS 434	Survival Analysis	3
SDS 439	Linear Statistical Models	3
SDS 4392	Advanced Linear Statistical Models	3
SDS 459	Bayesian Statistics	3
SDS 460	Multivariate Statistical Analysis	3
SDS 461	Time Series Analysis	3
SDS 462	Mathematical Foundations of Big Data	3
SDS 475	Statistical Computation	3
SDS 493	Probability	3
SDS 494	Mathematical Statistics	3
SDS 495	Stochastic Processes	3
SDS 496	Topics in Statistics	3
SDS 5061	Theory of Statistics I	3
SDS 5062	Theory of Statistics II	3
SDS 5071	Advanced Linear Models I	3
SDS 5072	Advanced Linear Models II	3
SDS 5531	Advanced Statistical Computing I	3
SDS 5532	Advanced Statistical Computing II	3
SDS 5595	Topics in Statistics: Spatial Statistics	3
SDS 579	Topics in Statistics	3
SDS 586	Topics in Statistics	3

[*] SDS 3200 and SDS 3211 cannot both be counted toward a major or minor.

Notes to All Majors in Statistics and Data Science

1. Upper-level courses have course numbers that begin with a "3" or higher (e.g., SDS 3200 Elementary to Intermediate Statistics and Data Analysis). Lower-level courses do not count toward upper-level data science requirements, even if they are cross-listed as an upper-level course in another department or program. For example, if SDS 2200 Elementary Probability and Statistics was cross-listed by another department as 3XXX, registering for that 3XXX course would not satisfy an upper-level data science requirement.

2. Certain approved substitutions are found on the Department of Statistics and Data Science website.

Course Substitutions

At most, one approved substitution can be made using a course not based in the major's home departments. Please note the policy that, at most, one course from a different department at Washington University can count toward a major or minor.

- ESE 326 can be taken in place SDS 3200. ESE 326 Probability and Statistics for Engineering and SDS 3200 Elementary to Intermediate Statistics and Data Analysis cannot both count toward a major or minor.
- Any course from another department that is cross-listed as a Statistics and Data Science L87 course can count as an upper-level elective. Such L87 courses always end with a "C."
- The following courses can count as upper-level electives:
  - Econ 4151 (this course can count as a statistics elective)
  - ESE 319, ESE 403

Distinctions in Statistics
Distinction

- Complete at least 33 units of courses from the approved list of electives (besides Math 131, Math 132, Math 233, and CSE 131).
- The GPA for these 33 upper-level units must be at least 3.7. If more than 33 units are taken for a letter grade, the courses with the lowest grades can be omitted when computing the GPA for this purpose.
- Complete at least five courses, each with a B or better, at level 400+.
- All of these courses must be classroom courses (not independent study or study for honors), and they must all be taken for a letter grade.

High Distinction

- Complete all requirements for Distinction.
- Complete an honors thesis.

Highest Distinction

- Complete all requirements for High Distinction.
- Complete at least five courses, each with a grade of B+ or better, at the 400 level or higher. These courses can be the same five courses used for the Distinction requirement, but the grades must be B+ or better.
- Complete one of the two paths described below:
  - **Graduate Qualifier Path:**
    - Graduate qualifier courses* in Statistics and Data Science are two-semester sequences that start in the fall. The two-semester sequence has a qualifier exam only at the end of the sequence in spring.
    - Students must complete and pass one full-year qualifier course sequence and its corresponding exam in statistics.
  - **Course Work Path:**

- Complete at least 42 units of upper-level statistics and data science courses (besides Math 131, Math 132, Math 233, and CSE 131). The GPA for these 42 upper-level units must be at least 3.7. If more than 42 units are taken for a letter grade, the courses with the lowest grades can be omitted when computing the GPA for this purpose.
- Complete at least nine total courses at the 400 level or above, all with a B+ or better. These courses can include the five courses taken for distinction. All of these courses must be classroom courses (not independent study or study for honors), and they must all be taken for a letter grade.

* These qualifier courses can count toward the additional course requirements for Distinction.

Additional Information

Additional Requirements

- All Statistics and Data Science majors must take Math 131 Calculus I, Math 132 Calculus II, and Math 233 Calculus III. There are other ways to fulfill this requirement, including AP credit and Math 203 Honors Mathematics I or Math 204 Honors Mathematics II. Some students may obtain a waiver if they took similar courses before coming to Washington University.
- All required courses (both lower- and upper-level courses) must be completed with a letter grade of C- or better.
- Courses transferred from other accredited colleges and universities can be counted, with the following caveats, if they receive department approval:
  a. Courses transferred from a two-year college (e.g., a community college) cannot be used to satisfy upper-level requirements.
  b. At least half of the upper-level units required in a major or minor program must be fulfilled by courses taken in the major's home departments or by approved courses taken in Washington University-approved overseas study programs.
  c. Courses from the School of Continuing & Professional Studies cannot be used to fulfill major requirements.
- No **upper-level** course used to satisfy a major requirement can be counted toward the requirements of any other major or minor (i.e., no double-counting of courses).
- At most, 3 units of independent study or research work can count toward the major requirements.
- A student cannot declare more than one major or minor in the department.

Latin Honors

At the time of graduation, the Department of Statistics and Data Science will recommend that a candidate receive Latin Honors (cum laude, magna cum laude, or summa cum laude) if that student has completed the department's requirements for High Distinction or Highest Distinction in Mathematics, including an Honors Thesis. The actual award of Latin Honors is managed by the College of Arts & Sciences.

The Honors Thesis

Arts & Sciences majors who want to be candidates for Latin Honors, High Distinction, or Highest Distinction must complete an honors thesis. Writing an honors thesis involves a considerable amount of independent work, reading, creating mathematics, writing a paper that meets acceptable professional standards, and making an oral presentation of the results.

Types of Projects

An honors thesis can take three forms:

1. A thesis that presents significant work by the student on one or more nontrivial statistics or probability problems.
2. A project in applied statistics that involves an in-depth analysis of a large data set. To do an honors thesis involving data analysis, it is usually necessary to have completed SDS 3200, SDS 493, and SDS 494 (or SDS 3211 Statistics for Data Science I and SDS 4211 Statistics for Data Science II) by the end of the junior year and to have the ability to work with statistical software such as SAS, R, or Python.
3. A substantial expository paper that follows independent study on an advanced topic under the guidance of a department faculty member. Such a report would involve the careful presentation of ideas and the synthesis of materials from several sources.

Process and Suggested Timeline

Junior Year, Spring Semester:

1. Talk with a faculty advisor about possible projects.
2. Complete the Honors Proposal Form and submit it to Dr. Figueroa-López.

Senior Year:

1. By the end of January, provide the advisor with a draft abstract and outline of the paper.
2. By the end of February, submit a rough draft, including an abstract, to the advisor.
3. The student and the advisor should agree on a date that the writing will be complete and on a date and time for the oral presentation in mid-March (the deadline is March 31).

Departmental Prizes

Each year, the department considers graduating majors for several departmental prizes and also awards a prize to a junior. Recipients are recognized at an annual awards ceremony in April where graduating majors each receive a certificate and a set of honors cords to be worn as part of the academic dress at Commencement. Awards are noted on the student's permanent university record.

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