

STATISTICS MAJOR

Students must also complete the Undergraduate Registration Requirement (<https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement/>) and the degree requirements of their home school.

NOTE: This Catalog describes Weinberg College BA requirements that pertain to students who matriculated at Northwestern after spring quarter 2023. Refer to the Archives (<https://catalogs.northwestern.edu/archives/>) if you are following BA requirements described in the 2018-2019 through 2022-2023 editions.

Requirements for the Statistics Major

Department courses (p. 1) (10 units); includes 3 electives (p. 1)

Related Courses (p. 1) (may be double-counted with another major, or with a minor). **Related courses in mathematics MUST be taken EARLY in the program of study**; includes prerequisites for required department courses.

For details see course lists, below.

Department Courses

Course	Title
Department Courses (see course descriptions for prerequisites in mathematics)	
<i>2 introductory courses:</i>	
STAT 201-0 or COMP_SCI 110-0	Introduction to Programming for Data Science Introduction to Computer Programming (students who do not take STAT 201-0 are responsible for independently learning content not covered in alternative course) ¹
STAT 202-0 or STAT 210-0 or STAT 232-0	Introduction to Statistics and Data Science Introduction to Probability and Statistics Applied Statistics
<i>5 core courses:</i>	
STAT 320-1 or STAT 383-0 or MATH 310-1 or MATH 311-1 or MATH 314-0 or MATH 385-0 or ELEC_ENG 302-0 or IEMS 302-0	Statistical Theory & Methods 1 Probability and Statistics for ISP Probability and Stochastic Processes MENU: Probability and Stochastic Processes Probability and Statistics for Econometrics Probability and Statistics for MMSS Probabilistic Systems Probability (students who do not take STAT 320-1 are responsible for independently learning content not covered in alternative course) ¹
STAT 320-2	Statistical Theory & Methods 2
STAT 320-3	Statistical Theory & Methods 3
STAT 348-0 or STAT 351-0 or STAT 354-0	Applied Multivariate Analysis Design and Analysis of Experiments Time Series Modeling
STAT 350-0 or ECON 381-2	Regression Analysis Econometrics

3 additional 300-level approved elective courses (see list below)

¹ Lists of topics not covered in substitute courses can be found on the department website (<https://statistics.northwestern.edu/undergraduate/>).

Electives

List of approved 300-level electives for the major (students choose 3). For updates please refer to department website list of Electives Approved for the Statistics Major (https://statistics.northwestern.edu/undergraduate/stat_major/electives_for_stat_major.html)

Course	Title
STAT 301-1	Data Science 1 with R ¹
STAT 301-2	Data Science 2 with R ¹
STAT 301-3	Data Science 3 with R ¹
STAT 303-1	Data Science 1 with Python ¹
STAT 303-2	Data Science 2 with Python ¹
STAT 303-3	Data Science 3 with Python ¹
STAT 302-0	Data Visualization
STAT 328-0	Causal Inference
STAT 344-0	Statistical Computing
STAT 348-0	Applied Multivariate Analysis ²
STAT 351-0	Design and Analysis of Experiments ²
STAT 354-0	Time Series Modeling ²
STAT 352-0	Nonparametric Statistical Methods
STAT 353-0	Advanced Regression
STAT 356-0	Hierarchical Linear Models
STAT 357-0	Introduction to Bayesian Statistics
STAT 359-0	Topics in Statistics
STAT 365-0	Introduction to the Analysis of Financial Data

No more than one of the following:

STAT 304-0	Data Structures and Algorithms for Data Science
STAT 305-0	Information Management for Data Science
STAT 362-0	Advanced Machine Learning for Data Science
STAT 390-0	Data Science Project

No more than one of the following courses from other departments may be substituted for a department elective:

IEMS 315-0	Stochastic Models
IEMS 351-0	Optimization Methods in Data Science
IEMS 365-0	Analytics for Social Good
IEMS 373-0	Intro to Financial Engineering
MATH 310-2	Probability and Stochastic Processes

¹ Students may receive credit for only one Data Science sequence: either Data Science with R (301 sequence), or Data Science with Python (303 sequence).

² Eligible as an elective if not being applied as one of the 5 core courses.

Related Course Requirement

In addition to the 10 department courses, students must complete related courses in mathematics; see list below. **Related courses in mathematics MUST be taken EARLY in the program of study**; these are prerequisite courses for required department courses.

Related courses required for the major

Course	Title
See course descriptions for prerequisite sequencing of mathematics related courses	
MATH 220-1 & MATH 220-2 or MATH 218-1 & MATH 218-2 & MATH 218-3	Single-Variable Differential Calculus and Single-Variable Integral Calculus Single-Variable Calculus with Precalculus and Single-Variable Calculus with Precalculus and Single-Variable Calculus with Precalculus
MATH 230-1	Multivariable Differential Calculus

or MATH 228-1	Multivariable Differential Calculus for Engineering
or MATH 281-1	Accelerated Mathematics for ISP: First Year
or MATH 285-2	Accelerated Mathematics for MMSS
or MATH 290-2	MENU: Linear Algebra and Multivariable Calculus
or MATH 291-2	MENU: Intensive Linear Algebra and Multivariable Calculus
or ES_APPM 252-1	Honors Calculus for Engineers
MATH 226-0 & MATH 230-2	Sequences and Series and Multivariable Integral Calculus
or STAT 228-0	Series and Multiple Integrals
or MATH 235-0	Series and Multiple Integrals
or MATH 226-0 & MATH 228-2	Sequences and Series and Multivariable Integral Calculus for Engineering
or MATH 226-0 & MATH 281-2	Sequences and Series and Accelerated Mathematics for ISP: First Year
or MATH 226-0 & MATH 285-3	Sequences and Series and Accelerated Mathematics for MMSS
or MATH 226-0 & MATH 290-3	Sequences and Series and MENU: Linear Algebra and Multivariable Calculus
or MATH 226-0 & MATH 291-3	Sequences and Series and MENU: Intensive Linear Algebra and Multivariable Calculus
or MATH 226-0 & ES_APPM 252-2	Sequences and Series and Honors Calculus for Engineers
MATH 240-0	Linear Algebra
or MATH 281-3	Accelerated Mathematics for ISP: First Year
or MATH 285-1	Accelerated Mathematics for MMSS
or MATH 290-1	MENU: Linear Algebra and Multivariable Calculus
or MATH 291-1	MENU: Intensive Linear Algebra and Multivariable Calculus
or GEN_ENG 205-1	Engineering Analysis I
or GEN_ENG 206-1	Honor Engineering Analysis

The Statistics Major with Additional Majors or Minors

The major in Statistics fulfills the Weinberg College requirement of completion of a major, but it also can be completed alongside another major, or with a minor. The general Weinberg College policies apply to such combinations. Below is clarifying text about how this works with certain combinations, and where particular exceptions to general rules are approved.

The Statistics Major for Students in the Integrated Science Program

Students complete all requirements for ISP major, and requirements for Statistics major are modified as follows:

- Introductory Statistics course requirement: STAT 202-0, STAT 210-0, STAT 232-0 or equivalent is **waived**
- MATH 226-0 is **waived**
- STAT 383-0 Probability and Statistics for ISP counts in place of STAT 320-1
- ISP students required to take either STAT 348-0 or STAT 354-0 (STAT 351-0 eligible to be applied as an elective only)

All other statistics major course requirements remain the same.

The Statistics Major for Students in the Mathematical Methods in the Social Sciences Program

Students complete all requirements for the MMSS adjunct major, and requirements for Statistics major are modified as follows:

- Introductory Statistics course requirement: STAT 202-0, STAT 210-0, STAT 232-0 or equivalent is **waived**
- MATH 226-0 is **waived**
- MATH 385-0 Probability and Statistics for MMSS counts in place of STAT 320-1
- STAT 350-0 is replaced by a combination of MATH 386-1 Econometrics for MMSS and MATH 386-2 Econometrics for MMSS
- MMSS students required to take either STAT 348-0 or STAT 354-0 (STAT 351-0 eligible to be applied as an elective only)

All other statistics major course requirements remain the same.

For triple major limitations see MMSS Adjunct Major (<https://catalogs.northwestern.edu/undergraduate/arts-sciences/mathematical-methods-social-sciences/mmss-adjunct-major/>)

Statistics Major with a Data Science Major

see Data Science Major (<https://catalogs.northwestern.edu/undergraduate/arts-sciences/statistics-data-science/data-science-major/>)

Statistics Major with a Data Science Minor

see Data Science Minor (<https://catalogs.northwestern.edu/undergraduate/arts-sciences/statistics-data-science/data-science-minor/>)

Honors in Statistics

Majors with strong academic records and an interest in pursuing honors should contact the Director of Undergraduate Studies no later than the start of senior year. Accepted students take 2 quarters of STAT 399-0 Independent Study, during which they develop and write a research paper; these enrollments do not count toward the major.

Students whose theses and grades meet department criteria are recommended to the college for graduation with honors. For more information consult the Director of Undergraduate studies and see Honors in the Major (<https://catalogs.northwestern.edu/undergraduate/arts-sciences/#academicoptionstext>).