BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN STATISTICS

Program Learning Outcomes for the BS Degree with a Major in Statistics

Upon completing the BS degree with a major in Statistics, students will be able to:

1. Apply advanced knowledge and theory in probability and statistical inference.
2. Apply and evaluate statistical models.
3. Apply statistical computing for data analysis and data science.
4. Demonstrate competency as a professional statistician.
5. Effectively communicate as a professional statistician.

Requirements for the BS Degree with a Major in Statistics

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BS degree with a major in Statistics must complete:

- A minimum of 19 courses (58-65 credit hours, depending on course selection) to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 14 courses (43 credit hours) taken at the 300-level or above.
- A maximum of 3 courses (9 credit hours) in departmental (STAT) coursework from study abroad or transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies (p. 3) tab.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major’s Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Statistics</td>
<td>58-65</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BS Degree with a Major in Statistics</td>
<td>120</td>
</tr>
</tbody>
</table>

Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
<td>Mathematics</td>
<td></td>
</tr>
</tbody>
</table>

### Mathematics

- MATH 101 SINGLE VARIABLE CALCULUS I or MATH 105 AP/OTH CREDIT IN CALCULUS I
- MATH 102 SINGLE VARIABLE CALCULUS II or MATH 106 AP/OTH CREDIT IN CALCULUS II
- Select 1 from the following: 3 or 6
  - MATH 212 MULTIVARIABLE CALCULUS
  - MATH 221 HONORS CALCULUS III & MATH 222 and HONORS CALCULUS IV
- Select 1 course from the following: 3
  - CAAM 335 MATRIX ANALYSIS
  - or CAAM 334 MATRIX ANALYSIS FOR DATA SCIENCE
  - or MATH 355 HONORS LINEAR ALGEBRA
  - or MATH 356 LINEAR ALGEBRA

#### Statistical Computation

- STAT 405 R FOR DATA SCIENCE

#### Basic Computing

- Select 1 course from the following: 3-4
  - CAAM 210 INTRODUCTION TO ENGINEERING COMPUTATION
  - or COMP 130 ELEMENTS OF ALGORITHMS AND COMPUTATION
  - or COMP 140 COMPUTATIONAL THINKING
  - or COMP 182 ALGORITHMIC THINKING

#### Advanced Computing

- Select 1 course from the following: 3-4
  - CAAM 378 INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION
  - or CAAM 440 APPLIED MATRIX ANALYSIS
  - or CAAM 453 NUMERICAL ANALYSIS I
  - or CAAM 471 LINEAR AND INTEGER PROGRAMMING
  - or CAAM 519 COMPUTATIONAL SCIENCE I
  - or COMP 215 INTRODUCTION TO PROGRAM DESIGN
  - or COMP 322 / ELEC 323 PRINCIPLES OF PARALLEL PROGRAMMING
  - or COMP 330 TOOLS AND MODELS FOR DATA SCIENCE
  - or COMP 382 REASONING ABOUT ALGORITHMS
  - or DSCI 302 INTRODUCTION TO DATA SCIENCE TOOLS AND MODELS

#### Probability and Statistics

- Select 1 from the following: 3-4
  - STAT 310 / ECON 307 PROBABILITY AND STATISTICS
  - or STAT 311 HONORS PROBABILITY AND MATHEMATICAL STATISTICS
  - or STAT 315 / DSCI 301 PROBABILITY AND STATISTICS FOR DATA SCIENCE

- STAT 410 LINEAR REGRESSION
- STAT 418 PROBABILITY
- STAT 419 STATISTICAL INFERENCE

Elective Requirements

### Probability and Statistics

- STAT 310 / ECON 307 PROBABILITY AND STATISTICS
- or STAT 311 HONORS PROBABILITY AND MATHEMATICAL STATISTICS
- or STAT 315 / DSCI 301 PROBABILITY AND STATISTICS FOR DATA SCIENCE

- STAT 410 LINEAR REGRESSION
- STAT 418 PROBABILITY
- STAT 419 STATISTICAL INFERENCE

- DSCI 302 INTRODUCTION TO DATA SCIENCE TOOLS AND MODELS
Bachelor of Science (BS) Degree with a Major in Statistics

Select 6 elective courses from departmental (STAT) course offerings at the 300-level or above, including at least 4 courses from the following Methodology/Theory courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 411</td>
<td>ADVANCED STATISTICAL METHODS</td>
</tr>
<tr>
<td>STAT 413</td>
<td>INTRODUCTION TO STATISTICAL MACHINE LEARNING</td>
</tr>
<tr>
<td>STAT 421</td>
<td>APPLIED TIME SERIES AND FORECASTING</td>
</tr>
<tr>
<td>STAT 425</td>
<td>INTRODUCTION TO BAYESIAN INference</td>
</tr>
<tr>
<td>STAT 453</td>
<td>BIOSTATISTICS</td>
</tr>
<tr>
<td>STAT 502 / COMP 502 / ELEC 502</td>
<td>NEURAL MACHINE LEARNING I</td>
</tr>
<tr>
<td>STAT 525</td>
<td>BAYESIAN STATISTICS</td>
</tr>
<tr>
<td>STAT 532</td>
<td>FOUNDATIONS OF STATISTICAL INFERENCE I</td>
</tr>
<tr>
<td>STAT 533</td>
<td>FOUNDATIONS OF STATISTICAL INFERENCE II</td>
</tr>
<tr>
<td>STAT 541</td>
<td>MULTIVARIATE ANALYSIS</td>
</tr>
<tr>
<td>STAT 545</td>
<td>GLM &amp; CATEGORICAL DATA ANALYSIS</td>
</tr>
<tr>
<td>STAT 550</td>
<td>NONPARAMETRIC FUNCTION ESTIMATION</td>
</tr>
<tr>
<td>STAT 552</td>
<td>APPLIED STOCHASTIC PROCESSES</td>
</tr>
<tr>
<td>STAT 581 / CAAM 581</td>
<td>MATHEMATICAL PROBABILITY I</td>
</tr>
<tr>
<td>STAT 582</td>
<td>MATHEMATICAL PROBABILITY II</td>
</tr>
<tr>
<td>STAT 650</td>
<td>STOCHASTIC CONTROL AND STOCHASTIC DIFFERENTIAL EQUATIONS</td>
</tr>
</tbody>
</table>

Senior Capstone

Select 1 course from the following:

- DSCI 435 / COMP 449
- STAT 450

3 DSCI 435 / COMP 449 is also listed in the Approved Elective category outside departmental (STAT) course offerings. If complete to fulfill the Senior Capstone requirement, this course may not be used as an Approved Elective.

Approved Electives

With advisor approval, up to 1 course (3-4 credit hours) from outside departmental (STAT) course offerings may be chosen to fulfill Elective Requirements. The following courses are a sample of approved electives outside Statistics (STAT), however, other courses may be approved by an advisor.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAM 378</td>
<td>INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION</td>
</tr>
<tr>
<td>CAAM 382</td>
<td>STOCHASTIC MODELS</td>
</tr>
<tr>
<td>COMP 322 / ELEC 323</td>
<td>PRINCIPLES OF PARALLEL PROGRAMMING</td>
</tr>
<tr>
<td>COMP 330</td>
<td>TOOLS AND MODELS FOR DATA SCIENCE 1</td>
</tr>
<tr>
<td>COMP 382</td>
<td>REASONING ABOUT ALGORITHMS 1</td>
</tr>
<tr>
<td>COMP 422</td>
<td>PARALLEL COMPUTING</td>
</tr>
<tr>
<td>COMP 430</td>
<td>INTRODUCTION TO DATABASE SYSTEMS</td>
</tr>
<tr>
<td>COMP 440 / ELEC 440</td>
<td>ARTIFICIAL INTELLIGENCE</td>
</tr>
<tr>
<td>COMP 441</td>
<td>LARGE-SCALE MACHINE LEARNING</td>
</tr>
<tr>
<td>COMP 485 / BIOE 485 / ELEC 485</td>
<td>FUNDAMENTALS OF MEDICAL IMAGING I</td>
</tr>
<tr>
<td>COMP 502 / ELEC 502 / STAT 502</td>
<td>NEURAL MACHINE LEARNING I</td>
</tr>
<tr>
<td>DSCI 304</td>
<td>INTRODUCTION TO EFFECTIVE DATA VISUALIZATION</td>
</tr>
<tr>
<td>DSCI 435 / COMP 449</td>
<td>APPLIED MACHINE LEARNING AND DATA SCIENCE 3</td>
</tr>
<tr>
<td>ECON 300</td>
<td>GAME THEORY AND OTHER MICRO TOPICS FOR ECON MAJORS</td>
</tr>
<tr>
<td>ECON 305</td>
<td>GAME THEORY AND OTHER MICRO TOPICS FOR MTEC MAJORS</td>
</tr>
<tr>
<td>ECON 308</td>
<td>MATHEMATICAL ECONOMICS</td>
</tr>
<tr>
<td>ECON 310 / STAT 376</td>
<td>ECONOMETRICS</td>
</tr>
<tr>
<td>ECON 418</td>
<td>ECONOMIC FORECASTING</td>
</tr>
<tr>
<td>ECON 419</td>
<td>ADVANCED TOPICS IN ECONOMETRICS</td>
</tr>
<tr>
<td>ECON 449</td>
<td>PRINCIPLES OF FINANCIAL ENGINEERING</td>
</tr>
</tbody>
</table>

Total Credit Hours Required for the Major in Statistics 58-65

Total Credit Hours 120

Footnotes and Additional Information

- With advisor approval, 1 course (3 credit hours) from departments other than Statistics (STAT) may be used as an elective. The substitution course may not be used as a replacement for 1 of the 4 required Methodology/Theory courses listed above. STAT 305, STAT 310, STAT 311, STAT 315, and STAT 385 will not count as an Elective Requirement. See below for typically approved coursework.

- Footnotes and Additional Information

1. With advisor approval, 1 course (3 credit hours) from departments other than Statistics (STAT) may be used as an elective. The substitution course may not be used as a replacement for 1 of the 4 required Methodology/Theory courses listed above. STAT 305, STAT 310, STAT 311, STAT 315, and STAT 385 will not count as an Elective Requirement. See below for typically approved coursework.

2. Footnotes and Additional Information

1. CAAM 378, COMP 322 / ELEC 323, COMP 330, and COMP 382 are also listed in the Approved Elective category. If completed to fulfill Advanced Computing, the course may not be used as an Approved Elective.

2. DSCI 435 / COMP 449 is also listed as a Senior Capstone. If completed to fulfill the Senior Capstone requirement, this course may not be used as an Approved Elective.
Policies for the BS Degree with a Major in Statistics

Program Restrictions and Exclusions
Students pursuing the BS Degree with a Major in Statistics should be aware of the following program restrictions:

• As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/) under Declaring Majors, Minors and Certificates, students may not obtain both a BA and a BS in the same major. Students pursuing the BS Degree with a Major in Statistics may not additionally pursue the BA Degree with a Major in Statistics.

• As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), students may not major and minor in the same subject.

• Students pursuing the minor in Data Science may fulfill its requirements according to the following guidelines: i.) DSCI 301 is fulfilled by STAT 310, STAT 311, or STAT 315; ii.) DSCI 302 may be used as the STAT major’s Advanced Computing elective; and iii.) DSCI 303 must be substituted with STAT 413.

Transfer Credit
For Rice University’s policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university’s official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines
Students pursuing the major in Statistics should be aware of the following departmental transfer credit guidelines:

• No more than 3 courses (9 credit hours) in departmental (STAT) coursework of transfer credit from U.S. or international universities of similar standing as Rice may apply towards the major.

• Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information
For additional information, please see the Statistics website: https://statistics.rice.edu/.

Opportunities for the BS Degree with a Major in Statistics

Academic Honors
The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

Fifth-Year Master's Degree Option for Rice Undergraduate Students
In certain situations and with some terminal master’s degree programs, Rice students have an option to pursue a master’s degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master’s degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master’s degree program. A plan of study will need to be approved by the student’s undergraduate major advisor and the master’s degree program director.

As part of this option and opportunity, Rice undergraduate students:

• must complete the requirements for a bachelor's degree and the master's degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).

• should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).

• more information on this Undergraduate - Graduate Concurrent Enrollment opportunity including specific information on the registration process can be found here (https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/).

Rice undergraduate students completing studies in science and engineering may have the option to pursue the Master of Statistics (MStat) degree. For additional information, students should contact their undergraduate major advisor and the MStat program director.

Internship and Research Opportunities
The Department of Statistics encourages its major and minors to participate in the practice of statistics through summer internships, employment and research. Information on current opportunities are posted here: https://statistics.rice.edu/academics/undergraduate (https://statistics.rice.edu/academics/undergraduate/). Students can also approach individual faculty about research opportunities in their group. An undergraduate advisor can talk with you about these and other possibilities.

Additional Information
For additional information, please see the Statistics website: https://statistics.rice.edu/