

# MASTER OF STATISTICS (MSTAT) DEGREE

## Program Learning Outcomes for the MStat Degree

Upon completing the MStat degree, students will be able to:

1. Master fundamental theory in probability and statistics.
2. Become familiar with a broad range of statistical methods for applications.
3. Become proficient at statistical computing.
4. Develop effective communication skills as a professional statistician.

## Requirements for the MStat Degree

The MStat degree is a non-thesis master's degree. For general university requirements, please see [Non-Thesis Master's Degrees \(https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/\)](https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see [All Graduate Students \(https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/\)](https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). Students pursuing the MStat degree must complete:

- A minimum of 30 credit hours to satisfy degree requirements.
- A minimum of 30 credit hours of graduate-level study (graduate semester credit hours, coursework at the 500-level or above).
- A minimum of 24 graduate semester credit hours must be taken at Rice University.
- A minimum of 24 graduate semester credit hours must be taken in standard or traditional courses (with a course type of lecture, seminar, laboratory, lecture/laboratory).
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A maximum of 2 courses (6 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the [Policies](#) (p. 3) tab.
- The requirements of one area of specialization (see below for areas of specialization). The MStat degree program offers five areas of specialization:
  - Applied Statistics for Industry, **or**
  - Bioinformatics, Statistical Genetics, and Biostatistics, **or**
  - Financial Statistics and the Statistics of Risk, **or**
  - Statistical Computing and Data Mining, **or**
  - Preparation for PhD Studies (in Statistics, Mathematical Economics, Economics, and Finance).
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum program GPA of 2.67 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree.

The courses listed below satisfy the requirements for this degree program. In certain instances, courses not on this official list may be substituted upon approval of the program's academic advisor, or where applicable, the department or program's Director of Graduate Studies. Course substitutions must be formally applied and entered into Degree Works by the department or program's [Official Certifier \(https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/\)](https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/). Additionally,

these must be approved by the Office of Graduate and Postdoctoral Studies. Students and their academic advisors should identify and clearly document the courses to be taken.

## Summary

Code	Title	Credit Hours
Total Credit Hours Required for the MStat Degree		30

## Degree Requirements

Code	Title	Credit Hours
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### Core Requirements <sup>1</sup>

STAT 518	PROBABILITY	3
STAT 519	STATISTICAL INFERENCE	3
STAT 605	R FOR DATA SCIENCE	3
STAT 615	REGRESSION AND LINEAR MODELS	3
STAT 616	ADVANCED STATISTICAL METHODS	3

### Area of Specialization <sup>2</sup>

Select a minimum of 2 courses (or up to 5 courses) from any of the following Areas of Specialization: 6-15

#### Applied Statistics for Industry

STAT 525	BAYESIAN STATISTICS	
STAT 541	MULTIVARIATE ANALYSIS	
STAT 545	GLM & CATEGORICAL DATA ANALYSIS	
STAT 616	ADVANCED STATISTICAL METHODS	
STAT 685	ENVIRONMENTAL STATISTICS AND DECISION MAKING	
STAT 687	COFES BLOCKCHAIN AND CRYPTOCURRENCIES	

#### Bioinformatics, Statistical Genetics, and Biostatistics

STAT 545	GLM & CATEGORICAL DATA ANALYSIS	
STAT 547	SURVIVAL ANALYSIS	
STAT 553	BIOSTATISTICS	
STAT 623	PROBABILITY IN BIOINFORMATICS AND GENETICS	

#### Financial Statistics and the Statistics of Risk

STAT 621	APPLIED TIME SERIES AND FORECASTING	
STAT 649	QUANTITATIVE FINANCIAL RISK MANAGEMENT	
STAT 682	QUANTITATIVE FINANCIAL ANALYTICS	
STAT 686	MARKET MODELS	

#### Statistical Computing and Data Mining

STAT 525	BAYESIAN STATISTICS	
STAT 541	MULTIVARIATE ANALYSIS	
STAT 542	SIMULATION	
STAT 613	STATISTICAL MACHINE LEARNING	

#### Preparation for PhD Studies (in Statistics, Mathematical Economics, Economics, and Finance)

STAT 525	BAYESIAN STATISTICS	
STAT 530	CAUSAL ANALYSIS	
STAT 532	FOUNDATIONS OF STATISTICAL INFERENCE I	
STAT 541	MULTIVARIATE ANALYSIS	

STAT 545	GLM & CATEGORICAL DATA ANALYSIS
STAT 552	APPLIED STOCHASTIC PROCESSES
STAT 553	BIOSTATISTICS
STAT 581 / CMOR 552	MATHEMATICAL PROBABILITY I
STAT 613	STATISTICAL MACHINE LEARNING
<b>Elective Requirements</b>	
<i>Select up to 9 credit hours of remaining coursework from approved electives in a targeted area of interest to reach 30 total credit hours.<sup>3,4</sup></i>	
<b>Total Credit Hours</b>	<b>30</b>

**Footnotes and Additional Information**

- <sup>1</sup> These courses are normally completed by the end of the first 2 semesters.
- <sup>2</sup> Students are allowed to choose either a broad-based or specialized program of study. Depending on the student's selected specialization, the mix of required, specialization-specific and elective courses will be jointly determined by the student and the graduate advisor. Students will meet with their advisor during the first year of the program to select an individualized plan of study, with periodic tune-ups as the program progresses.
- <sup>3</sup> Students may be asked to take specific courses outside the department, depending on the incoming background of the student, and career objectives. Area of specialization and elective coursework will be chosen between the MStat student and the advisor. See below for typically approved coursework.
- <sup>4</sup> Credit hours earned for engineering practicum, thesis, seminar, independent study courses, or similar variable credit hour courses may not be applied toward MStat degree requirements.

**Approved Electives**

Depending on the student's interest, up to 15 credit hours of area of specialization and elective requirements may be chosen from the following typically approved coursework, in conjunction with the MStat advisor.

Code	Title	Credit Hours
<b>Approved Departmental (STAT) Electives</b>		
DSCI 515	DATA SCIENCE CONSULTING	<b>0-15</b>
DSCI 535 / COMP 549	APPLIED MACHINE LEARNING AND DATA SCIENCE PROJECTS	
STAT 502 / COMP 502 / ELEC 502	NEURAL MACHINE LEARNING I	
STAT 503 / POLI 503	TOPICS IN METHODS AND DATA ANALYSIS	
STAT 509 / PSYC 502	ADVANCED PSYCHOLOGICAL STATISTICS I	
STAT 510 / PSYC 503	ADVANCED PSYCHOLOGICAL STATISTICS II	
STAT 514 / BIOE 514	INTRODUCTION TO BIOSTATISTICS	
STAT 532 & STAT 533	FOUNDATIONS OF STATISTICAL INFERENCE I and FOUNDATIONS OF STATISTICAL INFERENCE II	

STAT 549	FUNCTIONAL DATA ANALYSIS
STAT 550	NONPARAMETRIC FUNCTION ESTIMATION
STAT 551	ADVANCED TOPICS IN TIME SERIES
STAT 552	APPLIED STOCHASTIC PROCESSES
STAT 553	BIOSTATISTICS
STAT 581 / CMOR 552	MATHEMATICAL PROBABILITY I
STAT 582	MATHEMATICAL PROBABILITY II
STAT 583 / CMOR 553 / ELEC 533	INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS
STAT 602 / COMP 602 / ELEC 602	NEURAL MACHINE LEARNING AND DATA MINING II
STAT 604 / ECON 504	COMPUTATIONAL ECONOMICS
STAT 606	SAS STATISTICAL PROGRAMMING
STAT 610 / ECON 510	ECONOMETRICS I
STAT 611 / ECON 511	ECONOMETRICS II
STAT 613	STATISTICAL MACHINE LEARNING
STAT 623	PROBABILITY IN BIOINFORMATICS AND GENETICS
STAT 630	TOPICS IN CLINICAL TRIALS
STAT 648	GRAPHICAL MODELS AND NETWORKS
STAT 649	QUANTITATIVE FINANCIAL RISK MANAGEMENT
STAT 650	STOCHASTIC CONTROL AND STOCHASTIC DIFFERENTIAL EQUATIONS
STAT 682	QUANTITATIVE FINANCIAL ANALYTICS
STAT 687	COFES BLOCKCHAIN AND CRYPTOCURRENCIES
STAT 699	TOPICS IN STATISTICAL SCIENCES

**Approved Electives outside Statistics**

BIOE 539	APPLIED STATISTICS FOR BIOENGINEERING AND BIOTECHNOLOGY
BUSI 521 / ECON 505	FINANCIAL ECONOMICS I
BUSI 522	CORPORATE FINANCE
BUSI 523	EMPIRICAL METHODS IN FINANCE
CEVE 678 / MECH 678	APPLIED STOCHASTIC MECHANICS
CEVE 679 / MECH 679	APPLIED MONTE CARLO ANALYSIS
CHBE 615	APPLICATION OF MOLECULAR SIMULATION AND STATISTICAL MECHANICS
CHBE 682 / BIOE 682	SYSTEMS BIOLOGY OF HUMAN DISEASES
CMOR 520	COMPUTATIONAL SCIENCE
CMOR 523	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS
CMOR 530	ITERATIVE METHODS FOR SYSTEMS OF EQUATIONS AND UNCONSTRAINED OPTIMIZATION

CMOR 532	OPTIMIZATION THEORY
CMOR 533	NUMERICAL OPTIMIZATION
CMOR 541	LINEAR AND INTEGER PROGRAMMING
COMP 504	GRADUATE OBJECT-ORIENTED PROGRAMMING AND DESIGN
COMP 506	COMPILER CONSTRUCTION FOR GRADUATE STUDENTS
COMP 522	MULTI-CORE COMPUTING
COMP 530	DATABASE SYSTEM IMPLEMENTATION
COMP 533	INTRODUCTION TO DATABASE SYSTEMS
COMP 536 / ELEC 510	SECURE AND CLOUD COMPUTING
COMP 540	STATISTICAL MACHINE LEARNING
COMP 543	GRADUATE TOOLS AND MODELS - DATA SCIENCE
COMP 544	FUNCTIONAL PROGRAMMING
COMP 546 / ELEC 546	INTRODUCTION TO COMPUTER VISION
COMP 554 / ELEC 554	COMPUTER SYSTEMS ARCHITECTURE
COMP 557 / ELEC 557	ARTIFICIAL INTELLIGENCE
COMP 571	BIOINFORMATICS: SEQUENCE ANALYSIS
COMP 573	PROFESSIONAL DEVELOPMENT FOR BIOMEDICAL INFORMATICS
COMP 582 / ELEC 512	GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS
COMP 614	COMPUTER PROGRAMMING FOR DATA SCIENCE
ECON 523	DYNAMIC OPTIMIZATION
ECON 547	ADVANCED TOPICS IN ENERGY ECONOMICS
ECON 579	TOPICS IN ECONOMETRICS II
EEPS 651	GEOPHYSICAL DATA ANALYSIS: INVERSE METHODS
ELEC 513 / COMP 513	COMPLEXITY IN MODERN SYSTEMS
ELEC 515	MACHINE LEARNING FOR RESOURCE-CONSTRAINED PLATFORMS
ELEC 531	STATISTICAL SIGNAL PROCESSING
ELEC 535	INFORMATION THEORY
ELEC 571	IMAGING AT THE NANOSCALE
ELEC 575	LEARNING FROM SENSOR DATA
ELEC 578	INTRODUCTION TO MACHINE LEARNING
ELEC 591	GRADUATE ELECTRICAL ENGINEERING RESEARCH PROJECTS-VERTICALLY INTEGRATED PROJECTS
ELEC 677	SPECIAL TOPICS
ENGI 501	WORKPLACE COMMUNICATION FOR PROFESSIONAL MASTER'S STUDENTS IN ENGINEERING
ENGI 610 / NSCI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING
INDE 571	PROBABILITY AND STATISTICAL INFERENCE

INDE 577	DATA SCIENCE AND MACHINE LEARNING
INDE 597	TOPICS IN INDUSTRIAL ENGINEERING
MATH 517	COMPLEX ANALYSIS
MGMT 595	DATA ANALYSIS
MGMT 597	DATA ANALYSIS II
MGMT 616	ENERGY MARKET ORGANIZATION
MGMT 621	NEW ENTERPRISES
MGMT 638	DATA-DRIVEN INVESTMENTS: EQUITY
MGMT 642	FUTURES AND OPTIONS I
MGMT 645	PORTFOLIO MANAGEMENT
MGMT 648	APPLIED FINANCE
MGMT 650	FUTURES AND OPTIONS II
MGMT 652	MERGERS AND ACQUISITIONS
MGMT 656	ENERGY DERIVATIVES
MGMT 689	DECISION MODELS
MGMT 779	FINANCIAL INCLUSION LAB
PHYS 521	QUANTUM MECHANICS I
PHYS 526	STATISTICAL PHYSICS
PHYS 551	BIOLOGICAL PHYSICS
PHYS 572	FUNDAMENTALS OF QUANTUM OPTICS
PHYS 600	ADVANCED TOPICS IN PHYSICS
PSYC 637	META-ANALYSIS IN PSYCHOLOGICAL RESEARCH

## Policies for the MStat Degree

### Department of Statistics Graduate Program Handbook

For more detailed information regarding the MStat degree program policies, please see Statistics department's Graduate Handbook, which can be found here: [https://gradhandbooks.rice.edu/2023\\_24/Statistics\\_Graduate\\_Handbook.pdf](https://gradhandbooks.rice.edu/2023_24/Statistics_Graduate_Handbook.pdf)

### Program Restrictions and Exclusions

Students pursuing this degree should be aware of the following program restriction:

- Courses comprising the 30-credit hour requirement shall not be taken or completed on a pass/fail grading basis.
- Credit hours earned for engineering practicum, thesis, seminar, independent study courses, or similar variable credit hour courses may not be applied toward MStat degree requirements.

### Transfer Credit

For Rice University's policy regarding transfer credit, see [Transfer Credit](https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer) (<https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer>). Some departments and programs have additional restrictions on transfer credit. Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

### Departmental Transfer Credit Guidelines

Students pursuing the MStat degree should be aware of the following departmental transfer credit guidelines:

- No more than 2 courses (6 credit hours) of transfer credit from U.S. or international universities of similar standing as Rice may apply towards the degree.

- Requests for transfer credit will be considered by the program director on an individual case-by-case basis.

### **Additional Information**

For additional information, please see the Statistics website: <https://statistics.rice.edu/academics/graduate/master-statistics> (<https://statistics.rice.edu/academics/graduate/master-statistics/>)

## **Opportunities for the MStat Degree**

### **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/) (<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.

### **Additional Information**

For additional information, please see the Statistics website: <https://statistics.rice.edu/academics/graduate/master-statistics> (<https://statistics.rice.edu/academics/graduate/master-statistics/>)