

# MINOR IN OPERATIONS RESEARCH

## Program Learning Outcomes for the Minor in Operations Research

Upon completing the minor in Operations Research, students will be able to:

1. Formulate appropriate mathematical programs and stochastic processes that model real-world situations. *(Critical Thinking)*
2. Calibrate models with appropriate real-world data, using statistical and data science tools. *(Critical Thinking)*
3. Use commercial and open-source software to solve operations research models. *(Design)*

## Requirements for the Minor in Operations Research

Students pursuing the minor in Operations Research must complete:

- A minimum of 6 courses (19-20 credit hours, depending on course selection) to satisfy minor requirements.
- A minimum of 6 courses (19-20 credit hours, depending on course selection) taken at the 300-level or above.
- A maximum of 2 courses (6 credit hours) from study abroad or transfer credit. For additional departmental guidelines regarding transfer credit, see the [Policies](#) (p. 2) tab.

The courses listed below satisfy the requirements for this minor. In certain instances, courses not on this official list may be substituted upon approval of the minor's academic advisor, or where applicable, the Program Director. (Course substitutions must be formally applied and entered into Degree Works by the minor's [Official Certifier](https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/) (<https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/>)). 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 Minor in Operations Research		19-20

### Minor Requirements

Code	Title	Credit Hours
<b>Core Requirements</b>		
CMOR 350	STOCHASTIC MODELS	3
CMOR 360	INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION	3
CMOR 461	LOGISTICS AND SUPPLY CHAIN MANAGEMENT	3
or CMOR 462	OPTIMIZATION METHODS IN FINANCE	
STAT 315 / DSCI 301	PROBABILITY AND STATISTICS FOR DATA SCIENCE	4
<b>Elective Requirements</b>		

Select 2 elective courses (see course list below)	6-7
<b>Total Credit Hours</b>	<b>19-20</b>

### Course List to Satisfy Requirements

To fulfill Elective Requirements, students must complete a total of 2 courses (6-7 credit hours, depending on course selection) from the following department approved electives.

#### Elective Requirements

Code	Title	Credit Hours
CMOR 404	GRAPH THEORY	3
CMOR 442	LARGE-SCALE OPTIMIZATION	3
CMOR 451	SIMULATION MODELING AND ANALYSIS	3
CMOR 452		3
CMOR 455	STOCHASTIC CONTROL AND APPLICATIONS	3
CMOR 461	LOGISTICS AND SUPPLY CHAIN MANAGEMENT	3
or CMOR 462	OPTIMIZATION METHODS IN FINANCE	
CMOR 531	CONVEX OPTIMIZATION	3
CMOR 533	NUMERICAL OPTIMIZATION	3
CMOR 543	COMBINATORIAL OPTIMIZATION	3
CMOR 544	STOCHASTIC OPTIMIZATION	3
COMP 341	PRACTICAL MACHINE LEARNING FOR REAL WORLD APPLICATIONS	3
or COMP 441	LARGE-SCALE MACHINE LEARNING	
or DSCI 303	MACHINE LEARNING FOR DATA SCIENCE	
or ELEC 378	MACHINE LEARNING: CONCEPTS AND TECHNIQUES	
or ELEC 478	INTRODUCTION TO MACHINE LEARNING	
or INDE 577	DATA SCIENCE AND MACHINE LEARNING	
or STAT 413	INTRODUCTION TO STATISTICAL MACHINE LEARNING	
CMOR 459		3
ECON 343	CORPORATE FINANCE	3
ECON 437 / ENST 437	ENERGY ECONOMICS	3
ECON 443	FINANCIAL ECONOMICS	3
ECON 445	MANAGERIAL ECONOMICS	3
ECON 449	PRINCIPLES OF FINANCIAL ENGINEERING	3
ECON 456	TOPICS IN BUSINESS ECONOMICS: FINANCIAL MARKET AND INVESTMENTS	3
ECON 470	MARKET DESIGN	3
ECON 481	HEALTH ECONOMICS	3
ELEC 475	LEARNING FROM SENSOR DATA	3
ELEC 533 / CMOR 553 / STAT 583	INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS	3
INDE 511	GRAPH ALGORITHMS	3
INDE 513	OPERATIONS RESEARCH IN HEALTHCARE	3
INDE 543	MANUFACTURING PROCESSES AND SYSTEMS	3
INDE 597	TOPICS IN INDUSTRIAL ENGINEERING	3
STAT 313 / CEVE 313	UNCERTAINTY AND RISK IN URBAN INFRASTRUCTURES	3

STAT 410	LINEAR REGRESSION	4
STAT 418	PROBABILITY	3
STAT 419	STATISTICAL INFERENCE	3
STAT 421	APPLIED TIME SERIES AND FORECASTING	3
STAT 449	QUANTITATIVE FINANCIAL RISK MANAGEMENT	3
STAT 482	QUANTITATIVE FINANCIAL ANALYTICS	3
STAT 486	MARKET MODELS	3
STAT 581 / CMOR 552	MATHEMATICAL PROBABILITY I	3
STAT 582	MATHEMATICAL PROBABILITY II	3

## Policies for the Minor in Operations Research

### Program Restrictions and Exclusions

Students pursuing the minor in Operations Research 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/) (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), i.) students may declare their intent to pursue a minor only after they have first declared a major, and ii.) students may not major and minor in the same subject.
- Students pursuing the major in Computational and Applied Mathematics may not additionally declare the minor in Operations Research.
- Students pursuing the minor in Computational and Applied Mathematics may not additionally declare the minor in Operations Research.

### Transfer Credit

For Rice University's policy regarding transfer credit, see [Transfer Credit](https://ga.rice.edu/undergraduate-students/academic-policies-procedures/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](https://oaa.rice.edu/advising-network/transfer-credit-advisors/) (https://oaa.rice.edu/advising-network/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 minor in Operations Research 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 minor.
- 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 Computational Applied Mathematics and Operations Research website: <https://cmor.rice.edu/>.

## Opportunities for the Minor in Operations Research

### 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/) (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/) (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

### Additional Information

For additional information, please visit the Computational Applied Mathematics and Operations Research website: <https://cmor.rice.edu/>.