

## **Operations Research Ph.D. Concentration Proposal**

This program is offered by the Department of Management Science & Information Systems (MSIS). It is the continuation of the previous concentration in Management Science and the program in Operation Research offered by the Rutgers Center for Operations Research (RUTCOR).

Primary areas of interest are applied statistics, optimization, business analytics, operations management, inventory theory, scheduling, manufacturing under uncertainty, queuing theory, and risk theory.

Faculty research interests range from methodology research to quantitative modeling to empirical studies. The MSIS department includes a number of world-renowned scholars. Many faculty members serve on editorial boards of major academic journals, have chaired at premier conferences in operations and management science and have been members of NSF panels and other advisory boards. Research by the MSIS faculty is widely published in books and leading journals.

Graduates of the program have obtained academic positions at highly rated American universities including Case Western Reserve University, Georgetown University, United States Military Academy, New York University, Northwestern University, Princeton University, and others, as well as many top universities in other countries.

The students should have solid college-level knowledge of linear algebra, analysis, and probability, and good programming skills.

### **Requirements**

#### **Course work, the qualifying examination, and dissertation.**

A total of 72 credits are required for the doctoral degree. These must include:

- at least 18 credits in dissertation research.
- at least 36 credits in degree courses.
- 6 credits in the early research requirements

Additional enrollments may also be required:

- Students are sometimes required to enroll in non-degree courses to improve their English or their writing. They may also need to enroll in the non-degree course Teacher Training Seminar as part of their preparation for teaching. These enrollments require payment of tuition, but they do not count towards the 72 credits required for the degree.
- Students must enroll in 26:711:689 every semester until they have defended a dissertation proposal. This registration requires their attendance in [MSIS weekly seminar](#). A grade is given, but the enrollment is for zero credits and no tuition is charged.

Students take three courses for degree credit each semester during the first two years. They take the qualifying examination at the end of the second year. During their third and fourth year, they write a dissertation. Within a year after passing the qualifying examination, the student should defend a dissertation proposal.

**Foundation/Methodology (4 courses)**

- 26:960:575 Introduction to Probability
- 26:960:577 Introduction to Statistical Linear Models
- 26:711:651 Linear Programming
- 26:711:652 Nonlinear Optimization

**Major (seminar and 5 courses)**

- 26:711:689 Seminar in Operations Research
- 16:711:525 Stochastic Models of Operations Research
- 26:711:653 Discrete Optimization
- 16:711:548 Topics in Applied Operations Research

*and at least two courses out of the following list:*

- 26:198:644 Data Mining
- 26:711:563 Stochastic Calculus for Finance
- 26:960:576 Financial Time Series
- 26:711:557 Dynamic Programming
- 26:711:555 Stochastic Programming

**Electives (3 courses)**

- 26:223:655 Advanced Econometrics
- 26:198:645 Privacy, Security, and Data Analysis
- 26:711:685 Game Theory
- 26:799:675 Marketing Models
- 26:960:580 Stochastic Processes
- 26:711:530 Semidefinite and Second Order Cone Programming
- 26:799:660 Supply Chain Modeling and Algorithms
- 26:799:661 Stochastic Models for Supply Chain Management
- 26:799:685 Special Topics in Supply Chain and Marketing Science
- 26:711:685 Special Topics in OR/MS
  - Theory of Boolean Functions
  - Convex Analysis and Optimization

*or any other course approved by the doctoral coordinator*

**Teaching requirement:** Each student must teach at least one course at RBS in the area in which he or she is earning a doctoral degree. Before doing so, the student is expected to enroll in 26:620:701 Teacher Training Seminar, which is taught in the spring semester each year.

**First early research requirement (equivalent to one course):** Students write a paper with a faculty member, to be presented to the department during the fall semester.

**Second early research requirement (equivalent to one course):** Write a paper (ideally a dissertation proposal) with a faculty member, to be presented to the department during the fall semester. Part-time students may postpone participation to the summer after the third year.

**Other rules and requirements:** For details of rules and requirements that apply to all doctoral students in RBS, see [Policies and Procedures](#)