# UNDERGRADUATE L&S MAJOR IN OPERATIONS RESEARCH AND MANAGEMENT SCIENCE

In the ORMS major, students will develop solid quantitative, model building, and problem solving skills through core courses in mathematics, statistics, and operations research, and will learn how to apply these skills these skills in solving problems in an area of their choice. We outline four possible concentrations below, but many other areas can also benefit from applying an OR perspective. Students may design their own concentrations according to their interests, with guidance from their faculty advisor in IEOR.

**Curriculum**

**Lower-Division Required Courses**

| | |
|---|---|
| Math 1A | Calculus (4 units) |
| Math 1B | Calculus (4) |
| Math 53 | Multivariable Calculus (4) |
| Math 54 | Linear Algebra and Diff'l Eqns (4) |
| Engin. 7 | Intro. to Computer Programming (4) |
| or CS61A | Computer Programming (4) |
| Bus. Admin. 10 | Principles of Business (3) |
| Econ 1, 2, or 3 | Intro. To Economics (4) |

**Upper-Division Required Courses**

| | |
|---|---|
| Statistics 134 | Concepts of Probability (3) |
| or IEOR 172 | Prob. and Risk Analysis (3) |
| Economics 101A | Economic Theory Micro (4) |
| IEOR 131 | Simulation (3) |
| IEOR 160 | Nonlinear and Discrete Optimization (3) |
| or IEOR 162 | Linear Programming & Network Flows (3) |
| IEOR 173 (*) | Intro to Stochastic Processes (3) |
| Four clustered electives | See below (12 units) |

**A Concentration of Four Clustered Electives:**

ORMS majors, with the signed advance approval of their faculty advisors, select a minimum of four upper division elective courses to form a coherent cluster, or concentration, in an area where Operations Research is applied. Courses in other departments may count toward this requirement if they have substantial relevant content at an appropriately advanced level. The following are some suggestions for concentration areas.

**1. Decision Making in Economic Systems**

| | | | |
|---|---|---|---|
| Econ 101B | Economic Theory Macro (4) | Econ C142 | Appl. Econometrics and Pub. Pol. (3) |
| Econ 104 | Advanced Microeconomic Theory (4) | Econ C110 | Game Th. in the Soc. Sci. (4) |
| Econ 141 | Economic Statistics and Econometrics (4) | UGBA 143 | Game Theory and Bus. Decisions (3) |
| IEOR 165 | Eng. Stats, Quality Control, Forecasting (3) | Math 104 | Introduction to Analysis (4) |

**2. Decision Making in Industrial and Service Systems**

| | | | |
|---|---|---|---|
| IEOR 150 | Production Systems Analysis (3) | IEOR 166 | Decision Analysis (3) |
| or UGBA 141 | Prod. and Opns. Mgt. (3) | IEOR 170 | Human Factors (3) |
| IEOR 160 | Nonlinearand Discrete Optimization (3) | IEOR 151 | Service Opns Design and Analysis (3) |
| or IEOR 162 | Linear Programming & Network Flows (3) | | |
| IEOR 153 | Logistics and Supply Chain Mgt. (3) | UGBA 102B | Managerial Accounting (3) |
| IEOR 165 | Eng. Stats, Quality Control, Forecasting (3) | UGBA 143 | Game Theory and Bus. Decisions (3) |
| IEOR 130 | Methods of Manuf. Improvement (3) | IEOR 115 | Indust. and Comm'l. Data Syst. (3) |

**3. Decision Making in Societal Systems**

| | | | |
|---|---|---|---|
| Soc 101A | Sociological Theory (5) | Soc 119 | Society and Info. Theory (4) |
| Soc 105 | Introduction to Sociological Methods (5) | Soc 106 | Intermed. Sociolog. Methods (4) |
| IEOR 165 | Eng. Stats, Quality Control, Forecasting (3) | UGBA 143 | Game Theory and Bus. Decisions (3) |
| Econ C110 | Game Th. in the Soc. Sci. (4) | | |

**4. Algorithmic Decision Making**

| | | | |
|---|---|---|---|
| CS 61B | Data Structures (4) (prereq, not counted) | IEOR 115 | Indust. and Comm'l. Data Syst. (3) |
| CS 170 | Efficient Alg. and Intractable Prob. (4) | IEOR 160 | Nonlinear Discrete Optimization (3) |
| | | or IEOR 162 | Linear Programming & Network Flows (3) |
| CS 172 | Computability and Complexity (4) | IEOR 166 | Decision Analysis (3) |
| CS 174 | Combinatorics and Discrete Probability (4) | Math 110 | Linear Algebra (4) |

(*) Students will receive no credit for Ind Eng 173 after taking Ind Eng 161.

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