Master of Engineering in
Industrial and Systems Engineering

Graduate Manual

Industrial and Systems Engineering Department
Kate Gleason College of Engineering
Rochester Institute of Technology

81 Lomb Memorial Drive
Rochester, NY  14623-5603

Phone: (585) 475-2598
Fax: (585) 475-2520
Web Address:  www.rit.edu/ise

Graduate Program Director: Dr. Marcos Esterman
mxeeie@rit.edu
(585) 475-6922

ISE Department Head: Dr. Scott Grasman
segeie@rit.edu
(585) 475-2598

(Revised July 26, 2016)
Effective fall semester 2161
1. Master of Engineering Degree in Industrial and Systems Engineering

The Industrial and Systems Engineering discipline centers on the design, improvement, and installation of integrated systems of people, material, information, equipment and energy. ISE uses the specialized knowledge and skills in the mathematical, physical, computer and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems. The overarching goal of ISE is the efficiency and optimization of the enterprise, regardless of whether the activity engaged in is a manufacturing or a service-related industry. Industrial and systems engineers draw on a variety of skills in the academic study areas of applied statistics/quality, ergonomics/human factors, operations research/simulation, manufacturing, and systems engineering.

The Master of Engineering in Industrial and Systems Engineering provides an applied, practical degree and allows students to gain breadth across several different areas in ISE or focus in one area. The purpose of this degree is to provide students with more in-depth knowledge of industrial and systems engineering concepts and methods that will culminate in a capstone project. This degree is intended for students interested in advancing their industrial career and is usually considered a terminal degree. For students with aspirations of obtaining additional advanced degrees such as a Ph.D. degree, the Master of Science degree should be pursued.

2. Admission Requirements

Admission to the ISE Graduate Program is determined based on the full evaluation of the application and accompanying material including undergraduate degree program, transcript, and GPA, GRE scores (if required), TOEFL scores (if required), letters of recommendation, and 1-page statement of purpose. The GRE is required for students without a degree from an ABET accredited institution. The GRE is optional (but recommended) for all other applicants.

Although applications may be submitted at any time, to be sure that your application will receive full consideration for admission to RIT in the fall semester of the next academic year, the following deadlines should be observed:

**Application Timeline for Fall Semester:**
- January 15: All application materials must be received
- March 31: Notification of admission decision

The general entrance requirements consist of a BS degree in engineering, mathematics or science, and a minimum equivalent cumulative undergraduate GPA of 3.00/4.00. Minimum TOEFL scores of 580 (paper-based) or 90 (Internet-based) are required for students that do not have English as their first language. For students with a BS in Math or Science (Physics, etc.) but without an engineering degree, some bridge coursework in the basic engineering sciences may be necessary prior to full admission into one of the programs. Students with a Bachelor’s degree from a Technology program, with a very high GPA, may be permitted to pursue a degree in Industrial and Systems Engineering at RIT under the following conditions:
a. They will be required to have completed the RIT undergraduate courses below (or equivalent) with an overall grade point average of 3.00 or higher.
b. These courses do not carry any graduate credit and are in addition to the credits needed for the ME degree. Equivalent courses at other schools may be substituted. There may be other undergraduate courses that are needed in order to prepare the student for specialization in specific areas.
c. A student is expected to complete a substantial portion of the set of courses below before submitting an application for admission to the ME program in ISE.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 181</td>
<td>Project-Based Calculus I</td>
<td>STAT 251</td>
<td>Probability &amp; Statistics I</td>
</tr>
<tr>
<td>MATH 182</td>
<td>Project-Based Calculus II</td>
<td>STAT 252</td>
<td>Probability &amp; Statistics II</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Multivariate Calculus</td>
<td>ISEE 200</td>
<td>Computing for Engineers</td>
</tr>
<tr>
<td>MATH 233</td>
<td>Linear System and Differential Equations</td>
<td>ISEE XXX+</td>
<td>At least 3 upper division ISE courses to be selected as appropriate</td>
</tr>
</tbody>
</table>

3. Graduate Assistantships

In general, graduate assistantships from the ISE Department are not available for Master of Engineering students.

4. Graduation Requirements

The ME degree will be awarded upon successful completion of a minimum of 30 units that is equivalent to 10 courses including a 3 unit capstone project course.

In accordance with Institute policy, all graduate programs must be completed within seven years after taking the first graduate course(s) that applies to the program. Exceptions to the seven year rule require a petition to the Dean of Graduate Studies with an explanation as to why the student will be unable to complete the program within seven years. This request must be accompanied by a letter of from the Director of ISE Graduate Programs. The request must be make prior the reaching the seven year limit. Approval is not automatic.

4.1 Academic Advisor

A designated member of the ISE faculty will serve as the academic advisor for students enrolled in the Master of Engineering programs. It is the responsibility of the student to meet with the academic advisor on a regular basis to ensure the requirements of the degree are being met. The student should work with the academic advisor to establish a plan of study (described in the next section) for their degree program.
4.2 Plan of Study

The ISE Master of Engineering Academic Advisor serves as a student's advisor to select courses. Prior to the completion of the first semester, the students Plan of Study must be mapped out with and approved by the student's advisor using the appropriate plan of study form in the Appendix. An approved plan of study must be submitted to the ISE office to be placed in the student’s department file.

The ME Industrial and Systems Engineering degree requires that students complete 30 units consisting of 10 three-unit courses including the capstone course. The coursework must meet the following requirements:

- A minimum of seven courses in Industrial and Systems Engineering
- The following ISE core courses:
  - ISEE-601 Systems Modeling and Optimization
  - ISEE-760 Design of Experiments
  - ISEE-771 Engineering of Systems I
- ISE Capstone Project Course
  - ISEE-792 Engineering Capstone

A list of potential graduate courses for meeting these degree requirements appears in the Appendix. Please note that not all courses may be appropriate for all students/plans of study and must be approved by the ME advisor through the plan of study approval process. In addition, if appropriate, equivalent or more advanced courses in the list of core ISE course areas may be substituted with the approval of the advisor.

4.3 Capstone Requirement for Master of Engineering Degrees

The Master of Engineering degree in Industrial and System Engineering requires the successful completion of the following three-unit capstone course:

**ISEE-792 Engineering Capstone**

**Catalog Description:** For the Master of Engineering programs in Industrial and Systems Engineering and Engineering Management. Students must investigate a discipline-related topic in a field related to industrial and systems engineering or engineering management. The general intent of the engineering capstone is to demonstrate the students' knowledge of the integrative aspects of a particular area. The capstone should draw upon skills and knowledge acquired in the program.
5. **Cooperative Education (Co-op)**

Cooperative education (Co-op) has become an integral part of RIT’s undergraduate programs in the KGCOE. However, co-op is not a required part of the graduate programs offered in the ISE Department. To be eligible for co-op, students must complete the following process:

- Meet with the student’s academic advisor to assess how co-op will affect the student’s plan of study.
- If approved, register for Co-op (ISEE-499) in the ISE Office.
- Report the co-op on the Co-op office’s website.
- After completing the co-op assignment and evaluations, meet with the ISE academic advisor to discuss and approve co-op evaluations. Approved and signed evaluations should be returned to the ISE office so a grade may be recorded.

Note that all co-op opportunities may not be appropriate for every student or their plan of study.

For international students, additional co-op rules and guidelines are available through the International Student Services Office. In particular, please be aware that co-op should be done during (not after) a student’s degree program, and that extensions of program forms such as I-20 will not approved for the purposes of co-op.
Appendix

Potential Graduate Courses

The list of potential courses below represents courses that will earn credit as valid graduate courses. **The ISE Department requires that you complete a plan of study approved by your academic advisor even if the courses you plan to select appear on the approved list.** To assist in planning, unless otherwise noted, most ISE courses are taught once per year.

The ISE faculty will continue to entertain other courses on a case-by-case basis and courses will only be accepted if the student has discussed the choice with his/her advisor and received permission from the advisor in writing. Students should not assume that a graduate course deemed appropriate for one will be appropriate for all.

**ISE Department (ISEE)**

- ISEE-610 Systems Simulation
- ISEE-640 Computer-Aided Design & Manufacturing
- ISEE-626 Contemporary Production Systems
- ISEE-660 Applied Statistical Quality Control
- ISEE-661 Linear Regression Analysis
- ISEE-682 Lean Six Sigma Fundamentals
- ISEE-684 Engineering and the Developing World
- ISEE-701 Linear Programming
- ISEE-702 Integer and Nonlinear Programming
- ISEE-704 Logistics Management
- ISEE-710 Systems Simulation
- ISEE-711 Advanced Simulation
- ISEE-720 Production Control
- ISEE-728 Production Systems Management
- ISEE-730 Biomechanics
- ISEE-731 Advanced Topics in Human Factors and Ergonomics
- ISEE-732 Systems Safety Engineering
- ISEE-740 Design for Manufacture and Assembly
- ISEE-741 Rapid Prototyping and Manufacturing
- ISEE-750 Systems and Project Management
- ISEE-752 Decision Analysis
- ISEE-772 Engineering of Systems II
- ISEE-785 Fundamentals of Sustainable Engineering
- ISEE-786 Lifecycle Assessment
- ISEE-787 Design for the Environment
- ISEE-789 Special Topics
- ISEE-799 Independent Study

**Masters in Manufacturing Leadership/Master in Product Development**

*MML and MPD courses have limited availability to ISE students. Prior to registering ISE students must obtain approval from their advisor and the Director of the MML/MPD programs, Mark Smith.*

- ISEE-703 Supply Chain Management
- ISEE-723 Global Facilities Planning
- ISEE-745 Manufacturing Systems
- ISEE-751 Decision and Risk Benefit Analysis

**Mechanical Engineering Department**

- MECE-629 Renewable Energy Systems

**Microelectronic Engineering Department**

- MCEE-601 Microelectronic Fabrication

**GCCIS - Information Science and Technology**

- ISTE-608 Database Design and Implementation
SCOB - Accounting

- ACCT-603 Accounting for Decision Makers
- ACCT-706 Cost Management
- ACCT-794 Cost Management in Technical Organizations

SCOB - Management

- MGMT-710 Managing for Environmental Sustainability
- MGMT-720 Entrepreneurship and New Venture Creation
- MGMT-740 Organizational Behavior and Leadership
- MGMT-741 Managing Organizational Change
- MGMT-742 Technology Management

SCOB Finance

- FINC-721 Financial Analysis for Managers

SCOB - Marketing

- MKTG-761 Marketing Concepts and Commercialization
- MKTG-771 Marketing Research Methods

SCOB - Management Information Systems

- MGIS-755 Information Technology Strategy and Management
- MGIS-760 Integrated Business Systems

SCOB – International Business

- INTB-730 Cross-Cultural Management
**Master of Engineering in Industrial and Systems Engineering (ISEE-ME)**

**Graduate Student Plan of Study**

<table>
<thead>
<tr>
<th>Name: ___________________________</th>
<th>RIT ID: ___________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address: ___________________________</td>
<td>Ph(w): ___________________________</td>
</tr>
<tr>
<td></td>
<td>Ph(h): ___________________________</td>
</tr>
<tr>
<td></td>
<td>Email: ___________________________</td>
</tr>
<tr>
<td>Entry Term: ___________________________</td>
<td>7-Year Limit: ___________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Course</strong></th>
<th><strong>Semester</strong></th>
<th><strong>Grade</strong></th>
<th><strong>Hrs.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ISEE-601 Systems Modeling and Optimization</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2. ISEE-760 Design of Experiments</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3. ISEE-771 Engineering of Systems I</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4. ISEE-</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5. ISEE-</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>6. ISEE-</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>10. ISEE-792 Engineering Capstone</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>*11.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*12.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*13.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Advisor: ___________________________ Signature: ___________________________ Date: ________

* Course not required to fulfill degree requirements

Ending GPA: ________