**Master of Engineering in Sustainable 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

Web Address: www.rit.edu/ise

Graduate Program Director: Dr. Brian Thorn

 bkteie@rit.edu

 (585) 475-6166

ISE Department Head: Dr. Iris Rivero

 ivreie@rit.edu

 (585) 475-2598

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# 1. Master of Engineering Degree in Sustainable Engineering

Sustainable Engineering refers to the integration of social, environmental, and economic considerations into product, process, and energy system design methods. Additionally, sustainable engineering encourages the consideration of the complete product and process lifecycle during the design effort. The intent is to minimize environmental impacts across the entire lifecycle while simultaneously maximizing the benefits to social and economic stakeholders. The MS in Sustainable Engineering is multidisciplinary and managed by the Industrial and Systems Engineering (ISE) Department.

The Master of Science program in Sustainable Engineering builds on RIT’s work in sustainability research and education, and offers students the flexibility to develop tracks in areas such as renewable energy systems, systems modeling and analysis, product design, and engineering policy and management. Coursework is offered on campus and is available on a full-time or part-time basis.

# 2. Admission Requirements

Admission to the ME Sustainable Engineering graduate program is determined based on the full evaluation of the application and accompanying material including undergraduate degree program, transcript, and GPA, GRE scores, TOEFL scores (if required), letters of recommendation, and statement of purpose. The GRE is required for students applying to the ME Sustainable Engineering program.

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, technology, 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 without an engineering degree, some bridge coursework in the basic engineering sciences may be necessary prior to full admission.

3. Graduate Assistantships

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

4. Advisor

The Sustainable Engineering Graduate Program Director 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 advisor on a regular basis to ensure the requirements of the degree are being met. The student should work with the advisor to establish a plan of study for their degree program. (See section 5.1)

5. Graduation Requirements

The ME degree will be awarded upon successful completion of a minimum of 30 credits that is equivalent to 10 courses including a 3 credit 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 Sustainable Engineering Graduate Programs. The request must be make prior the reaching the seven year limit. Approval is not automatic.

5.1 Plan of Study

The Sustainable Engineering Graduate Program Director serves as a student's advisor to select courses. Prior to the completion of the first semester, the student’s 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. Any updates to the plan of study in future terms require a new plan of study form to be completed and submitted to the ISE office.

The ME Sustainable Engineering degree requires that students complete 30 credits consisting of 10 three-credit courses including the capstone course. The coursework must meet the following requirements:

The coursework must meet the following requirements:

* The following required courses:

ISEE-771 Engineering of Systems I

ISEE-785 Fundamentals of Sustainable Engineering

ISEE-786 Lifecycle Assessment

MECE-629 Renewable Energy Systems

* 1 Social Context elective
* 1 Technology elective
* 3 Engineering electives
* 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 Sustainable Engineering Graduate Program Director through the plan of study approval process. Equivalent or more advanced courses in the list of core course areas may be substituted with the approval of the advisor. In addition, special topics or independent study courses can be used to satisfy program requirements. This requires the consent of the Sustainable Engineering program director.

**5.2 Capstone Requirement for Master of Engineering Degrees**

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

ISEE-792 Engineering Capstone

Catalog Description: Students must investigate a discipline-related topic in a field related to sustainable engineering. 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.

# 6. Cooperative Education (Co-op)

Co-operative education (Co-op) is an optional part of the ISE graduate programs. Co-op is a paid work experience at a company designed to help educate students through the application of academic course material in a work environment. If a graduate student elects to pursue a co-op position, the co-op must be done as an integral part of the plan of study for the graduate degree program.

Communication with the faculty advisor about your intent to co-op is extremely important. You should have a discussion with your faculty advisor to determine how the co-op will be integrated into the degree program to ensure continued progress toward your degree and the effect on your expected graduation date (if any).

The RIT Office of Career Service and Cooperative Education has a process that students must follow to enroll in co-op. This includes attending a Co-op Prep Session before using their services. This Co-op Prep Session is typically held a group session for ISE Department degree programs (date and time will be announced).

For international students, additional co-op rules and guidelines may apply and are available through the International Student Services Office.

Appendix

**Potential Graduate Courses**

The list of potential courses below represents courses that will earn credit as valid graduate courses. It is required that you complete a plan of study approved by your advisor even if the courses you plan to select appear on the approved list. The Sustainable Engineering Graduate Program Director will continue to entertain other courses on a case-by-case basis. 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.

Engineering Electives

* ISEE-601 Systems Modeling and Optimization
* ISEE-610 Systems Simulation
* ISEE-626 Contemporary Production Systems
* ISEE-640 Computer-Aided Design and Manufacturing
* 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-703 Supply Chain Management
* ISEE-704 Logistics Management
* ISEE-711 Advanced Simulation
* ISEE-720 Production Control
* ISEE-723 Global Facilities Planning
* ISEE-728 Production Systems Management
* ISEE-730 Biomechanics
* ISEE-731 Adv.Topics in Human Factors & Ergonomics
* ISEE-732 Systems Safety Engineering
* ISEE-740 Design for Manufacture and Assembly
* ISEE-741 Rapid Prototyping and Manufacturing
* ISEE-745 Manufacturing Systems
* ISEE-750 Systems and Project Management
* ISEE-752 Decision Analysis
* ISEE-760 Design of Experiments
* ISEE-772 Engineering of Systems II
* ISEE-787 Design for Environment
* ISEE-789 Special Topics
* ISEE-799 Independent Study
* MCEE-620 Photovoltaic Science and Engineering
* MECE-606 Systems Modeling
* MECE-731 Computational Fluid Dynamics
* MECE-733 Sustainable Energy Management
* MECE-738 Ideal Flows
* MECE-739 Alternative Fuels and Energy Efficiency
* MECE-744 Nonlinear Control Systems
* MECE-751 Convective Phenomena
* MECE-754 Fund. of Fatigue and Fracture Mechanics

Social Context Electives

* ECON-620 Environmental Economics
* ECON-810 Economics of Sustainability
* ENVS-631 Climate Change: Science, Technology & Policy
* INTB-730 Cross-Cultural Management
* MGMT-710 Managing for Environmental Sustainability
* PUBL-610 Technological Innovation & Public Policy
* PUBL-630 Energy Policy
* PUBL-631 Climate Change: Science, Technology & Policy
* PUBL-789 Special Topics (requires prior approval)
* PUBL-810 Technology, Policy, and Sustainability
* STSO-750 Graduate Sustainable Communities

Technology Electives

* ESHS-613 Solid & Hazardous Waste Management
* ESHS-614 Industrial Wastewater Management
* ESHS-615 Air Emissions Management
* ESHS-720 Environmental Health & Safety Management
* ESHS-725 EHS Accounting & Finance
* ESHS-755 Corporate Social Responsibility
* ESHS-765 Product Stewardship
* PACK-730 Packaging and the Environment

Master of Engineering in Sustainable Engineering (SUSTAIN-ME)

Plan of Study

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RIT ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ph(w): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ph(h): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Email: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Entry Term: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 7-Year Limit: \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| Course | Semester | Grade | Credits |
| 1. ISEE-771 Engineering of Systems I |  |  | 3 |
| 2. ISEE-785 Fundamentals of Sustainable Engineering |  |  | 3 |
| 3. ISEE-786 Lifecycle Assessment |  |  | 3 |
| 4. MECE-629 Renewable Energy Systems |  |  | 3 |
| 5. |  |  | 3 |
| 6.  |  |  | 3 |
| 7.  |  |  | 3 |
| 8.  |  |  | 3 |
| 9.  |  |  | 3 |
| 10. ISEE-792 Engineering Capstone |  |  | 3 |
| \*11.  |  |  |  |
| .  |  |  |  |
|  |  |  |  |
| Total | 30 |

Advisor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_

\* Course not required to fulfill degree requirements Ending GPA: \_\_\_\_\_\_\_\_\_\_\_