<table>
<thead>
<tr>
<th>Requirements</th>
<th>Notes</th>
<th>Course</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SS Core</strong></td>
<td></td>
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<tr>
<td>6CR in Systems Analysis for Sustainability</td>
<td>See attached list (A1) of acceptable courses in this specialization</td>
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<tr>
<td>Sustainable Design &amp; Technology Minimum 3CR</td>
<td>See attached list (A2) of acceptable courses in this specialization</td>
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<tr>
<td>Sustainable Enterprise Minimum 3CR</td>
<td>See attached list (A3) of acceptable courses in this specialization</td>
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<tr>
<td>Additional 3CR minimum from list A1, 2, or 3</td>
<td>See attached list (A1-3) of acceptable courses in these specializations</td>
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<tr>
<td><strong>SEAS Core</strong></td>
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<tr>
<td>NRE 509 (Natural Systems Core) NRE 510 (Social Systems Core)</td>
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<td>IAMS Requirement Two courses; 3CR minimum Please see page 3 for approved courses.</td>
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<td><strong>Analytics</strong></td>
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<tr>
<td>One statistics course. <em>Field of Study-specific requirement</em></td>
<td>See online list of acceptable statistics courses</td>
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<tr>
<td><strong>Electives</strong></td>
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<tr>
<td>Electives</td>
<td>Graduate level course at 400-level or above. See attached list of recommended courses.</td>
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<td><strong>Opus or Non-Opus</strong></td>
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<tr>
<td>Option 1: Master’s Project, Thesis or Practicum</td>
<td>At most, 6 credits of NRE 700/701</td>
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<tr>
<td>Option 2: Additional coursework</td>
<td>3CR from list A1, A2, or A3 or B1 and additional 3CR from approved sustainability course (eg B2). Needs to have a theme in the area you wish to gain additional knowledge. Needs advisor approval.</td>
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<tr>
<td><strong>Cognates [Rackham requirement]</strong></td>
<td>Minimum 4 credit hours outside of degree program (likely fulfilled by other cross-listed courses)</td>
<td>Can be satisfied by courses meeting other degree requirements; cannot double-count credits</td>
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<td><strong>TOTALS</strong></td>
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<tr>
<td>TOTAL “NRE” CREDIT HOURS</td>
<td>Minimum 25 of 42 credit hours</td>
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<td>TOTAL CREDIT HOURS</td>
<td>Minimum of 42 credit hours</td>
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</table>

*Any waiver or substitution of degree requirement must be approved by the appropriate faculty and submitted to OAP.*
A. Sustainable Systems Core (1-3)

1) Systems Analysis for Sustainability (at least 6CR*)

- NRE 573 (3cr)
- NRE 610 (1.5cr)
- NRE 597 (3cr)
- NRE 557/CEE 586 (3cr)
- NRE 550/STRAT 566 (3cr)
- Environmental Footprinting and Environmental Input-Output Analysis (W)
- Advanced LCA Methods & Software Tools (W)
- Environmental Systems Analysis (F)
- Industrial Ecology (W)
- Systems Thinking for Sustainable Development (W)

*At least two courses need to be from the courses listed above

- NRE 570 (3cr)
- NRE 501 (1.5cr)
- NRE 531 (4cr)
- Environ Economics: Quantitative Methods & Tools (F)
- Five courses on selected topics in Env. Economics (FA B & WN A&B)
- Principles of GIS (F&W)

2) Sustainable Design & Technology (3CR)

- NRE 537 (3CR)
- NRE 501.087 (3CR)
- NRE 615 (3CR)
- NRE 574/PUBPOL 519 (3cr)
- NRE 548 (3cr)
- NRE 605/BA 605 (3cr)
- NRE 687 (4cr)
- ARCH 575 (3cr)
- CEE 480 (3cr)
- CEE 582 (3cr)
- MECHENG 589 (3cr)
- Urban Sustainability (F)
- Technology and Community Sustainable Development (F)
- Renewable Electricity and the Grid (W)
- Sustainable Energy Systems (F)
- Land Use and Global Change (F – every other year)
- Green Development (W)
- Landscape Planning (F)
- Building Ecology (F)
- Design of Environ Engineering Systems (F)
- Environmental Microbiology (F)
- Sustainable Design of Technology Systems (W)

3) Sustainable Enterprise (3CR)

- NRE 501.018 (3cr)
- NRE 530 (3cr)
- NRE 512/BL 536 (2.25cr)
- NRE 513/STRAT 564&565 (3cr)
- NRE 527/BE 527 (3cr)
- NRE 533 (3cr)
- BE 555 (1.5)
- NRE 560/URP 544 (3cr)
- NRE 501.014/CEE 686/ChE 686 (3cr)
- ENGR 521 (3cr)
- FIN 637 (2.25cr)
- STRAT 735-739 (1.5cr)
- Energy Justice (F)
- Decision-Making for Sustainability (F)
- Ethics Corporate Management (F or W)
- Strategies for Sustainable Development (F)
- Energy Markets and Energy Politics (F)
- Negotiation Skills (F)
- Non Market Strategy (F)
- Behavior and Environment (F)
- Environmental Finance (F)
- CleanTech Entrepreneurship (W)
- Finance and Sustainable Enterprises (F)
- Topics in Global Sustainable Enterprise (F)
- Energy Project Finance (W)

B. Sustainable Systems Electives

B1) Additional SS courses (can count towards Non-Opus option)

- NRE 514 (2cr)
- NRE 523(3cr)
- NRE 552 (3cr)
- EHS 672 (3cr)
- NRE 686/HMP 686/PubPol 563 (3cr)
- NRE 686/HMP 686/PubPol 563 (3cr)
- BA 612 (2.25cr)
- ESENG 501 (3cr)
- Econ 437 (3cr)
- URP 553
- Environmental Impact Assessment (F)
- Environmental Risk Assessment (W)
- Ecosystem Services (F)
- Life Cycle Assessment: Human Health & Environ Impacts (F)
- Environmental Policy (W)
- Strategies for the Base of the Pyramid (F)
- Seminars in Energy Science, Technology, and Policy (F)
- Energy Economics & Policy (W)
- Sustainable Urbanism and Architecture (F)

B2) Sustainable Systems Themes:

- Energy Systems
- Mobility Systems

Summary of Requirements for a Master of Science (MS) Degree Effective Fall 2017

Last Revised 08/03/2017
• Water Systems
• Food Systems
• Built Environment
• Climate Change

Integrated Analytic Methods and Skills Requirement
Students are required, at some point during their time enrolled in the program, to take 2 courses composing at least 3 credits from a faculty-approved list of courses that focus on integrative analytic methods and skills. The faculty-approved existing courses that satisfy this requirement are listed below:

**Fall**
501 – Social Vulnerability & Adaptation to Environ Change
578 – Urban Stormwater
552 – Ecosystem Services
514 – Environmental Impact Assessment
530 - Decision-Making for Sustainability
533 – Negotiation Skills
536 – Mediation Skills
548 – Land Use and Global Change
570 – Environmental Economics
597 – Environmental Systems Analysis
564 – Localization Seminar
677 – Climate Adaptation Seminar
687 – Landscape Planning

**Winter**
501 – Stakeholder Network Analysis
501 – Science and Management of the Great Lakes
545- Applied Ecosystem Modeling
550 – Systems Thinking for Sustainable Development
557 – Industrial Ecology
581 – Advanced Environmental Education
589 – Ecological Restoration
610 – Advanced LCA Methods and Software Tools
641 – Interdisciplinary Research Methods
787 – Metro Studio (MLA only)