<table>
<thead>
<tr>
<th>Requirement*</th>
<th>Notes</th>
<th>Course #</th>
<th>Credits</th>
<th>Term</th>
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<tbody>
<tr>
<td>18CR from the Civil and Environmental Engineering Department</td>
<td>Required: CEE 881</td>
<td>CEE 581</td>
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<tr>
<td></td>
<td>CEE 582</td>
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<td></td>
<td>CEE 591</td>
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<tr>
<td></td>
<td>CEE 881 (1st Fall in program)</td>
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<tr>
<td>12CR from within one of the following Environmental Engineering Majors: (courses on next page)</td>
<td>Choose one: A) Ecohydrology B) Water Quality Process Engineering C) Water Quality and Resources Engineering</td>
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<tr>
<td>3CR of approved Mathematics</td>
<td>See Env. Eng. dept. requirements and Cognates (next page)</td>
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<tr>
<td>9-12CR in Aquatic Sciences (courses on next page)</td>
<td>One course each from: 1) Organismal Biology 2) Ecosystem Ecology 3) Ecosystem Modeling</td>
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<tr>
<td>NRE 509 NRE 510</td>
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<tr>
<td>IAMS Requirement Two courses; 3CR minimum</td>
<td>Please see page 3 for approved courses.</td>
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<tr>
<td>2 Analytics courses</td>
<td>NRE 538 or approved alternate and one additional Analytics course</td>
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<td>Students are not expected to complete an Opus, but could petition to do a thesis/practicum or project*</td>
<td>At most 6CR of NRE 700/701</td>
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<tr>
<td>Please see next page for cognate requirement information</td>
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<tbody>
<tr>
<td>MINIMUM CREDIT HOURS BY SCHOOL</td>
<td>“NRE” – Minimum 25CR</td>
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<tr>
<td>“CEE” – Minimum 18CR</td>
<td>TOTAL CREDIT HOURS</td>
<td>Minimum 54 Credit Hours</td>
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*Any waiver or substitution of degree requirement must be approved by the appropriate faculty and submitted to OAP
Environmental Engineering

A) Ecohydrology
Choose four:
- CEE 428 – Introduction to Groundwater Hydrology
- CEE 520 – Deterministic & Stochastic Models in Hydrology
- CEE 521 – Open Channel Flow
- CEE 522 – Sediment Transport
- CEE 524 – Environmental Turbulence
or
- CEE 525 – Turbulent Mixing in Buoyant Flows
- CEE 527 – Coastal Hydraulics
- CEE 590 – Stream, Lake, and Estuary Analysis
- CEE 593 – Environmental Soil Physics
- CEE 624 – Restoration Fundamentals & Practice in Aquatic Systems

B) Water Quality Process Engineering
Required:
- CEE 580 – Physical Chemical Processes in Environmental Engineering
- CEE 592 – Biological Processes in Environmental Engineering
Choose two:
- CEE 428 – Introduction to Groundwater Hydrology
- CEE 583 – Surface & Interfaces in Aquatic Systems
- CEE 593 – Environmental Soil Physics
- CEE 594 – Environmental Soil Chemistry
- CEE 693 – Environmental Molecular Biology
Approved CHEM or BIOLCHEM or ChE or AOSS elective

C) Water Quality and Resources Engineering
Choose at least one:
- CEE 521 – Open Channel Flow
- CEE 522 – Sediment Transport
Choose at least one:
- CEE 580 – Physical Chemical Processes in Environmental Engineering
- CEE 592 – Biological Processes in Environmental Engineering
Choose up to two (only one of CEE 524 or CEE 525 may be taken):
- CEE 428 – Introduction to Groundwater Hydrology
- CEE 520 – Deterministic and Stochastic Models in Hydrology
- CEE 524 – Environmental Turbulence
or
- CEE 525 – Turbulent Mixing in Buoyant Flows
- CEE 526 – Design of Hydraulic Systems
- CEE 624 – Restoration Fundamentals & Practice in Aquatic Systems

Natural Resources and Environment Aquatic Sciences
1) Organismal Biology
Choose one:
- NRE 409 – Ecology of Fishes OR
- EEB 486 – Biology & Ecology of Fishes (UMBS)
- NRE 422 – Biology of Fishes
- EEB 457 – Algae in Freshwater Systems
- NRE 516 – Aquatic Entomology
2) Ecosystem Ecology
Choose one:
- NRE 476 – Ecosystem Ecology
- EEB 483 – Limnology
- NRE 520 – Fluvial Ecosystems
3) Ecosystem Modeling
Choose one:
- NRE 534 – GIS and Landscape Modeling
- EEB 401 – Interrogating Data with Models

Last Revised 07/14/2014
Cognates
SNRE – Minimum 4 credits outside SNRE. Can be fulfilled with CEE coursework.
CEE – 4 credits of non-CEE coursework. Can be fulfilled with one advanced Mathematics course (proper choice of SNRE analytical courses can also satisfy this requirement) and one SNRE course.

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 – Land Use and Global Change
- 501 – Urban Stormwater
- 501 – Ecosystem Services
- 514 – Environmental Impact Assessment
- 533 – Negotiation Skills
- 536 – Mediation Skills
- 597 – Environmental Systems Analysis
- 662 – Localization Seminar
- 677 – Climate Adaptation Seminar (2nd 7 week)

**Winter**
- 501 – Science and Management of the Great Lakes
- 501 – Biofuels and Sustainability
- 501 – Advanced LCA Methods and Software Tools (W14 – 2nd 7 weeks)
- 501 – Applied Ecosystem Modeling (W14 – 2nd 7 weeks)
- 550 – Systems Thinking for Sustainable Development
- 557 – Industrial Ecology
- 570 – Environmental Economics
- 581 – Advanced Environmental Education
- 589 – Ecological Restoration
- 641 – Interdisciplinary Research Methods
- 687 – Landscape Planning
- 787 – Metro Studio (MLA only)