## Dual-Master’s Degree Program

**Summary of Requirements for a Master of Science (Aquatic Sciences) and a Master of Science in Engineering (Civil Engineering)**

### Effective Fall 2018

<table>
<thead>
<tr>
<th>2 Year MS &amp; MSE Plan</th>
<th>Requirement*</th>
<th>Notes</th>
<th>Course #</th>
<th>Credits</th>
<th>Term</th>
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</thead>
<tbody>
<tr>
<td><strong>Engineering</strong></td>
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<tr>
<td>Civil Engineering</td>
<td>15CR from the Civil and Environmental Engineering Department</td>
<td>Required: CEE 520, CEE 521, CEE 522</td>
<td>CEE 520</td>
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<td>Core</td>
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<td></td>
<td>Minimum of 2 additional CEE courses in Environmental and Water Resource Engineering</td>
<td>See List A for sample of approved courses (next page)</td>
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<tr>
<td><strong>School for Environment and Sustainability</strong></td>
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<tr>
<td>AS CORE</td>
<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></td>
<td>EAS 509</td>
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<td>EAS 510</td>
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<tr>
<td>EAS Core</td>
<td>EAS 509</td>
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<td>EAS 510</td>
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<td>IAMS Requirement</td>
<td>Two courses; 3CR minimum</td>
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<td>Please reverse for approved courses.</td>
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<tr>
<td>Analytics</td>
<td>2 Analytics courses</td>
<td>EAS 538 or approved alternate and one additional Analytics course</td>
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<td>Students are <strong>not</strong> expected to complete an Opus, but could petition to do a thesis/practicum or project*</td>
<td>At most 6CR of EAS 700/701</td>
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<td>Opus*</td>
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<td>TOTALS</td>
<td>MINIMUM CREDIT HOURS BY SCHOOL</td>
<td>“EAS” — Minimum 25CR</td>
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<td></td>
<td>TOTALS</td>
<td>MINIMUM CREDIT HOURS BY SCHOOL</td>
<td>“CEE” — Minimum 15CR</td>
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<td>TOTALS</td>
<td>TOTAL CREDIT HOURS</td>
<td>54 credits total for both</td>
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*Any waiver or substitution of degree requirement must be approved by the appropriate faculty and submitted to OAP
A) Civil Engineering

Sample of Environmental and Water Resources courses (more available, see advisor):

- CEE 524 (3) Environmental Turbulence (W)
- CEE 527 (3) Coastal Hydraulics (F)
- CEE 580 (3) Physicochemical Processes in Environmental Engineering (W)
- CEE 581 (3) Aquatic Chemistry (W)
- CEE 582 (3) Environmental Microbiology (F)
- CEE 586/EAS 557 (3) Industrial Ecology (W)
- CEE 590 (3) Stream, Lake, and Estuary Analysis
- CEE 592 (3) Biological Processes in Environmental Engineering (W)
- CEE 624 (3) Restoration Fundamentals and Practice in Aquatic Systems (F)

Natural Resources and Environment Aquatic Sciences

1) Organismal Biology

Choose one:
- EAS 409 – Ecology of Fishes
- EEB 486 – Biology & Ecology of Fishes (UMBS)
- EAS 422 – Biology of Fishes
- EEB 457 – Algae in Freshwater Systems
- EAS 516 – Aquatic Entomology

2) Ecosystem Ecology

Choose one:
- EAS 476 – Ecosystem Ecology
- EEB 483 – Limnology
- EAS 520 – Fluvial Ecosystems

3) Ecosystem Modeling

Choose one:
- EAS 534 – GIS and Landscape Modeling
- EEB 401 – Interrogating Data with Models

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

- 447 – Forest Ecology Management
- 501 – Ecological Restoration Applications
- 523 – Ecological Risk Assessment
- 530 – Decision-Making for Sustainability
- 531 – Principles of GIS
- 533 – Negotiation Skills
- 536 – Mediation Skills
- 552 – Ecosystem Services
- 553 – Diverse Farming Systems
- 564 – Localization Seminar
- 567 – Social Vulnerability & Adaptation to Environ Change
- 572 – Environmental Impact Assessment
- 570 – Environmental Economics
- 576 – Sustainability Finance
- 578 – Urban Stormwater
- 597 – Environmental Systems Analysis
- 677 – Climate Adaptation Seminar
- 687 – Landscape Planning

Winter

- 501 – Science and Management of the Great Lakes
- 501 - The Hydrologic Cycle and Water Res Mgmt
501 – Climate Economics & Policy
541 – Remote Sensing
545 – Applied Ecosystem Modeling (Winter B)
549 – Analysis and Modeling of Ecological Data
550 – Systems Thinking for Sustainable Development
557 – Industrial Ecology
569 – Stakeholder Network Analysis
581 – Advanced Education for Environment and Sustainability
589 – Ecological Restoration
610 – Advanced LCA Methods and Software Tools
641 – Interdisciplinary Research Methods
787 – Metro Studio (MLA only)