### Effective Winter 2020

<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><strong>Environmental Engineering Core</strong></td>
<td>18CR from the Civil and Environmental Engineering Department</td>
<td>Required:</td>
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<tr>
<td>CEE 581</td>
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<td>CEE 582</td>
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<td>CEE 591</td>
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<tr>
<td>CEE 881 (1st Fall in program)</td>
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<tr>
<td><strong>AS CORE</strong></td>
<td>12CR from within one of the following Environmental Engineering Majors: (courses on next page)</td>
<td>Choose one:</td>
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<tr>
<td>A) Ecohydrology</td>
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<td>B) Water Quality Process Engineering</td>
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<td>C) Water Quality and Resources Engineering</td>
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<tr>
<td><strong>3CR of approved Mathematics</strong></td>
<td>See Env. Eng. dept. requirements and Cognates (next page)</td>
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<tr>
<td><strong>EAS Core</strong></td>
<td>9-12CR in Aquatic Sciences (courses on next page)</td>
<td>One course each from:</td>
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<tr>
<td>1) Organismal Biology</td>
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<td>2) Ecosystem Ecology</td>
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<td>3) Ecosystem Modeling</td>
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<td>EAS 509</td>
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<td>EAS 510</td>
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<td><strong>IAMS Requirement</strong></td>
<td>Two courses; 3CR minimum</td>
<td>Please see page 3 for approved</td>
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<tr>
<td><strong>Analytics</strong></td>
<td>2 Analytics courses</td>
<td>EAS 538 or approved alternate and one additional Analytics course</td>
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<td><strong>Opus</strong>*</td>
<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 EAS 700/701</td>
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<td><strong>Cognates</strong></td>
<td>Please see next page for cognate requirement information</td>
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<td><strong>TOTALS</strong></td>
<td><strong>MINIMUM CREDIT HOURS BY SCHOOL</strong></td>
<td><strong>EAS</strong> – Minimum 25CR</td>
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<td><strong>CEE</strong> – Minimum 18CR</td>
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<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 501.041 – Decentralized Water Supply, Hygiene, and Sanitation
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 573 – Data Analysis
CEE 597 – Environmental Organic Chemistry
CEE 624 – Restoration Fundamentals & Practice in Aquatic Systems

Natural Resources and Environment Aquatic Sciences
1) Organismal Biology
Choose one:
EAS 409 – Ecology of Fishes OR
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

Cognates
SEAS – Minimum 4 credits outside SEAS. Can be fulfilled with CEE coursework.
CEE – 4 credits of non-CEE coursework. Can be fulfilled with one advanced Mathematics course (proper choice of SEAS analytical courses can also satisfy this requirement) and one SEAS 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 – Social Vulnerability & Adaptation to Environ Change
530 - Decision Making for Sustainability
578 – Urban Stormwater
552 – Ecosystem Services
572 – Environmental Impact Assessment
533 – Negotiation Skills (Fall A)
536 – Mediation Skills
547 – Forest Ecology
553 – Diverse Farming Systems
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
549 – Analysis and Modeling of Ecological Data
550 – Systems Thinking for Sustainable Development
557 – Industrial Ecology
581 – Advanced Education for Environment and Sustainability
589 – Ecological Restoration
610 – Advanced LCA Methods and Software Tools
641 – Social Research Methods in Environment and Sustainability
787 – Metro Studio (MLA only)