

2 Year MS & MSE Plan		Requirement*	Notes	Course #	Credits	Term
Engineering	Environmental Engineering Core	18CR from the Civil and Environmental Engineering Department	Required: CEE 581 CEE 582 CEE 591 CEE 881 (1 st Fall in program)	CEE 881		
				CEE 581		
				CEE 582		
				CEE 591		
		12CR from within one of the following Environmental Engineering Majors: (courses on next page)	Choose one: A) Ecohydrology B) Water Quality Process Engineering C) Water Quality and Resources Engineering			
3CR of approved Mathematics	See Env. Eng. dept. requirements and Cognates (next page)					
Natural Resources and Environment	AS CORE	9-12CR in Aquatic Sciences (courses on next page)	One course each from: 1) Organismal Biology 2) Ecosystem Ecology 3) Ecosystem Modeling			
	NRE Core [NRE 509 NRE 510				
		IAMS Requirement Two courses; 3CR minimum Please see page 3 for approved courses.				
	Analytics	2 Analytics courses	NRE 538 or approved alternate and one additional Analytics course			
	Opus*	Students are <u>not</u> expected to complete an Opus, but could petition to do a thesis/practicum or project*	At most 6CR of NRE 700/701			
Cognates [Rackham requirement]		Please see next page for cognate requirement information				
TOTALS	MINIMUM CREDIT HOURS BY SCHOOL	"NRE" – Minimum 25CR				
		"CEE" – Minimum 18CR				
	TOTAL CREDIT HOURS	Minimum 54 Credit Hours				

*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 Bouyant 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

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 – Social Vulnerability & Adaptation to Environ Change
- 578 – Urban Stormwater
- 552 – Ecosystem Services
- 514 – Environmental Impact Assessment
- 533 – Negotiation Skills (Fall A)
- 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
- 501 - Decision Aiding for Risk & Environmental Management
- 532 – Natural Resource Conflict Management
- 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)