

Effective Fall 2021

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			
		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	CEE 581			
		3CR of approved Mathematics	See Env. Eng. dept. requirements and Cognates (3 rd page)	CEE 582			
School for Environment and Sustainability	SS CORE	6CR in Systems Analysis for Sustainability	Required: EAS 557/CEE 586	EAS 557			
		9CR total	Sustainable Design & Technology Minimum 3CR	Required: See List A2 for acceptable courses			
			Sustainable Enterprise Minimum 3CR	See List A3 for acceptable courses			
			Additional 3CR minimum from list A1, 2, or 3	See attached list (A1-3) of acceptable courses in these specializations			
	EAS Core	EAS 509 (Natural Systems Core) EAS 510(Social Systems Core) or 3CR from the *Social Systems Distribution list .					
		*IAMS Requirement Two courses; 3CR minimum					
	Analytics	One statistics course	EAS 538 or equivalent required				
Capstone*	Students <u>are not</u> expected to complete a capstone, but could petition to do a thesis/practicum or project*	At most 6 credit hours of EAS 701 (Master's Project) or EAS 702 (Master's Practicum) or At most 12 credits of EAS 700 (Master's Thesis)					
TOTALS	Total "EAS" credits - 25						
TOTALS	Total "CEE" credits - 18						
	54 credits total for both						

*IAMS and Social Systems Distribution courses can double-count with Core requirements but we do not double-count the actual credits.

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 Bouyant Flows
 - CEE 526 – Design of Hydraulic Systems
 - CEE 573 Data Analysis
 - CEE 597 Environmental Organic Chemistry
 - CEE 624 – Restoration Fundamentals & Practice in Aquatic Systems

A) Sustainable Systems Core (1-3)

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

EAS 573 (3cr) (W)	Environ Footprinting and Environ Input-Output Analysis
EAS 610 (1.5cr)	Advanced LCA Methods & Software Tools (W)
EAS 597 (3cr)	Environmental Systems Analysis (F)
EAS 557/CEE 586 (3cr)	Industrial Ecology (W)
EAS 550/STRAT 566 (3cr)	Systems Thinking for Sustainable Development (W)
EAS 501.023 (3cr)	Tools for Policy and Environmental Analysis (F)
EAS 501.091 (3cr)	Climate Change Science and Solutions (F)

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

EAS 570 (3cr)	Environ Economics: Quantitative Methods & Tools (F)
EAS 531 (4cr)	Principles of GIS (F&W)
2) Sustainable Design & Technology (3CR)	
EAS 537 (3CR)	Urban Sustainability (F)
EAS 501.087 (3CR)	Tech and Community Sustainable Development (TBD)
EAS 501.091 (1.5CR)	Transport, Energy, & Environment (W)
EAS 579 (3CR)	The Hydrologic Cycle and Water Resource Management (W)
EAS 501.009 (1.5CR)	Principles of Infrastructure Sustainability (F)
EAS 501.209 (1.5CR)	Advanced Infrastructure Systems (F)
EAS 615 (3CR)	Renewable Electricity and the Grid (W)
EAS 574/PUBPOL 519 (3cr)	Sustainable Energy Systems (F)
EAS 605/BA 605 (3cr)	Green Development (W)
EAS 677.023 (2)	Deep Decarbonization (W)
EAS 687 (4cr)	Landscape Planning (F)
ARCH 575 (3cr)	Building Ecology (F)
CEE 480 (3cr)	Design of Environ Engineering Systems (F)
CEE 582 (3cr)	Environmental Microbiology (F)
MECHENG 589 (3cr)	Sustainable Design of Technology Systems (W)
3) Sustainable Enterprise (3CR)	
EAS 501.035	Michigan Venture Club (W)
EAS 501.102 (3cr)	Renewable Energy at the State and Local Level (F)
EAS 525 (3cr)	Energy Justice (F)
EAS 535/BL 536 (2.25cr)	Ethics Corporate Management (TBD)
EAS 512/Strategy 564	Strategies for Sustainable Development I (F)
EAS 513/Strategy 565	Strategies for Sustainable Development II (F)
EAS 527/BE 527 (3cr)	Energy Markets and Energy Politics (F)
EAS 533 (3cr)	Negotiation Skills (F)
EAS 595/TO 560 (1.5)	Sustainable Operations and Supply Chain Management (W)
BE 555 (1.5)	Non-Market Strategy (F)
EAS 560/URP 544 (3cr)	Behavior and Environment (F)
EAS 576/CEE 588/ChE 590 (3cr)	Sustainability Finance: Investment Model for Green Growth (F)
ENGR 521 (3cr)	CleanTech Entrepreneurship (W)
FIN 637 (2.25cr)	Finance and Sustainable Enterprises (F)
FIN 583 (1.5cr)	Energy Project Finance (W)

B) Sustainable Systems Electives

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

EAS 572(2cr)	Environmental Impact Assessment (F)
EAS 523(3cr)	Environmental Risk Assessment (W)
EAS 552 (3cr)	Ecosystem Services (F)
EHS 672 (3cr)	Life Cycle Assessment: Human Health & Environ Impacts (F)
EAS 686/HMP 686/PubPol 563 (3cr)	Environmental Policy (W)
BA 612 (2.25cr)	Strategies for the Base of the Pyramid (F)
ESENG 501 (3cr)	Seminars in Energy Science, Technology, and Policy (F)
Econ 437 (3cr)	Energy Economics & Policy (W)
URP 553	Sustainable Urbanism and Architecture (F)

B2) Sustainable Systems Themes:

- Energy Systems

- Mobility Systems
- 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.