

Effective Fall 2021

2-2.5 Year MS & MSE Plan		Requirement	Notes	Course #	Credits	Term		
Engineering	Environmental Engineering Core	18CR in CEE courses at the 500 or 600 level 6CR in additional CEE courses	Required:	CEE 581				
			CEE 581	CEE 582				
			CEE 591	CEE 591				
CEE 881 (1 st Fall in program)			CEE 881					
And one course from List A (next page) *			CEE 880					
Sustainable Energy Systems Major	12CR from, the "Sustainable Energy Systems" Major	CEE 567 and 9CR from List A (see next page)	CEE 567					
Advanced Math Requirement	3CR in approved Mathematics or equivalent	See Env. Eng dept. requirements and Cognates (next page)						
School for Environment and Sustainability	SS Core]	6CR in Systems Analysis for Sustainability	Required:	CEE 586				
			EAS 557/CEE 586					
			9CR total	Sustainable Design & Technology Minimum. 3CR	Required: EAS 574 See List 2 for other acceptable courses	EAS 574		
				Sustainable Enterprise Minimum 3CR	See List 3 for acceptable courses			
	Additional 3CR minimum from list	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 <u>*Social Systems Distribution list</u> . <u>*IAMS Requirement</u> Two courses; 3CR minimum						
Analytics	One statistics course	EAS 538 or equivalent required						
Capstone	Master's Project/Thesis/Practicum	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.

A) Sustainable Energy Systems

Required:

CEE 567 Energy Infrastructure Systems

Choose at least two of the following:

CEE 526 Design of Hydraulic Systems
CEE 549 Geoenvironmental Engineering
CEE 555 Sustainability of Civil Infrastructure Systems
CEE 563 Air Quality Engineering Fundamentals
CEE 564 Greenhouse Gas Control
CEE 592 Biological Processes in Environmental Engineering

Choose one of the following, or a third course from the list above:

CEE 501 Environmental Finance
CEE 586 (EAS 557) Industrial Ecology
CEE 686 Case Studies in Environmental Sustainability
CHE 548 Electrochemical Engineering
CHE 568 Fuel Cells and Fuel Processors
EAS 527 (BE 527) Energy Markets and Energy Politics
EAS 573 Environmental Footprinting and Input-Output Analysis
EAS 574 (ESENG 599) Sustainable Energy Systems
EAS 597 Environmental Systems Analysis
EECS 418 Power Electronics
EECS 419 Electric Machinery and Drives
EECS 463 Power System Design and Operation
EECS 498 Grid Integration of Alternative Energy Sources
EECS 598 Infrastructure for Vehicle Electrification
EHS 540 Sustainability and Environmental Health
MECHENG 433 Advanced Energy Solutions
MECHENG 571 Energy Generation and Storage Using Modern Materials
MECHENG 589 Sustainable Design of Technology Systems
NERS 531 Nuclear Waste Management

#CEE 480 must be completed if an equivalent course has not been taken.

A) Sustainable Systems Core (1-3)

1) Systems Analysis for Sustainability (at least 6CR*) EAS 573 (3cr) Environmental

Footprinting and Environmental Input-Output Analysis (W)

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)

1) Sustainable Design & Technology (3CR)

EAS 537 (3CR) Urban Sustainability (F)
EAS 501.087 (3CR) Technology 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)

2) Sustainable Enterprise (3CR)

EAS 525 (3cr)	Energy Justice (F)
EAS 501.035	Michigan Venture Club (W)
EAS 501.102 (3cr)	Renewable Energy at the State and Local Level (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)

A) Sustainable Systems Electives

B1) Additional SS courses (can count towards Non-Opus 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.

