

University of Michigan
Engineering Sustainable Systems
Sustainable Water Systems specialization

Dual-Master's Degree Program
 Summary of Requirements for a Master of Science
(Sustainable Systems) and a Master of Science in
 Engineering **(Civil Engineering)**

Effective Fall 2010

2 Year MS & MSE Plan		Requirement*	Notes	Course #	Credits	Term
Engineering	Civil Engineering Core	15CR from the Civil and Environmental Engineering Department	Required: CEE 520 CEE 521 CEE 522	CEE 520		
				CEE 521		
				CEE 522		
		Minimum of 2 additional CEE courses in Environmental and Water Resource Engineering	See List A for sample of approved courses (next page)			
Natural Resources and Environment	SS CORE [SS-specific requirement]	6CR in Systems Analysis for Sustainability	Required: NRE 557/CEE 586 And one course from List 1 (next page)	NRE 557		
	9CR total	Sustainable Design & Technology Minimum 3CR	Required: NRE 574 See List 2 for other acceptable courses (next page)	NRE 574		
		Sustainable Enterprise Minimum 3CR	See List 3 for acceptable courses (next page)			
NRE Core [School-wide requirement]	NRE 509 NRE 510 NRE 580	10CR in total				
Analytics [School-wide requirement]	3CR in Analytics	NRE 538 or equivalent required: http://www.snre.umich.edu/sites/snre.umich.edu/files/Statistic%20Courses%201108.pdf				
Opus*	Students are not 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	TOTAL CREDIT HOURS BY SCHOOL		"NRE" – Minimum 25CR			
			"CEE" – Minimum 15CR			
	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

A) Civil Engineering

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

CEE 524 (3)	Environmental Turbulence (W)
CEE 580 (3)	Physicochemical Processes in Environmental Engineering (W)
CEE 581 (3)	Aquatic Chemistry (F&W)
CEE 582 (3)	Environmental Microbiology (F)
CEE 586/NRE 557 (3)	Industrial Ecology (W)
CEE 624 (3)	Restoration Fundamentals and Practice in Aquatic Systems (F)

Natural Resources and Environment

Sustainable Systems

1) Systems Analysis for Sustainability (6 hrs) fulfills Analytics requirement

NRE 531 (4)	Principles of GIS (W)
NRE 550/STRATEGY 566 (3)	Systems Thinking For Sustainable Development (W)
NRE 557/CEE 586 (3)	Industrial Ecology (W)
NRE 570 (3)	Microeconomics with Natural Resource Applications (W)
*NRE 501.086 (3)	Topics and Tools in Environmental Economics
NRE 501.092	Environmental Systems Analysis (F)

*Please note that only 1 (one) econ course can be counted under the Systems Analysis requirement

2) Sustainable Design and Technology (3-9hrs)

NRE 574/PUBPOL 519 (3)	Sustainable Energy Systems (F)
NRE 576/UP 576 (3)	Ecological Design Approaches to Brownfield Redevelopment (F)
NRE 605/BA 605 (3)	Green Development (W)
NRE 687 (4)	Landscape Analysis and Planning
NRE 501.036 (3)	Sustainable Systems in Developing Countries (W)
NRE 501.039 (3)	Land Use and Global Change (F)
Arch 575 (3)	Building Ecology (F)
CEE 460 (3)	Design of Environmental Engineering Systems (F)
CEE 582 (3)	Environmental Microbiology (F)
CEE 686/ChE 686 (2-3)	Case Studies in Environmental Sustainability (W)
ME 433 (3)	Advanced Energy Solutions (F,W)
ME 589 (3)	Sustainable Design of Technology Systems (F,W)
EECS 498 (3)	Grid Integration of Alternative Energy Sources (TBD)

3) Sustainable Enterprise (3-9 hrs)

NRE 512/BA 512 (1.5)	Ethics Corporate Management (F,W)
NRE 513/STRAT 564&565 (3)	Competitive Environmental Strategy (F)
NRE 527 (3)	Energy Markets and Energy Politics (F)
NRE 532 (3)	Natural Resources Conflict Management (F)
NRE 533 (3)	Negotiating Skills in Environmental Dispute Resolution (W)
BE 555 (1.5)	Non-Market Strategy (F)
NRE 560/UP 560/HB 710 (3)	Behavior and Environment: (F)
NRE 565 (3)	Principles of Sustainability (W)
NRE 605/BA 605 (3)	Green Development (W)
ENG 521 (3)	CleanTech Entrepreneurship (F)
FIN 637 (2.25)	Finance and Sustainable Enterprises (F)
ES 520 (1.5)	CleanTech Venture Opportunities (F)
NRE 501.032 (3)	Transportation Energy and Climate (W)
STRATEGY 735-739 (1.5)	Environmental Management Topics (F,W)

Cognates

SNRE – Minimum 4 credits outside SNRE. Can be fulfilled with CEE coursework.

CEE – 6 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.