

University of Michigan
Engineering Sustainable Systems
Sustainable Energy Systems specialization

Dual-Master's Degree Program
 Summary of Requirements for a Master of Science
 (**Sustainable Systems**) and a Master of Science in
 Engineering (**Mechanical Engineering**)
 Effective Fall 2009

2-2.5 Year MS & MSE Plan		Requirement	Notes	Course #	Credits	Term
Engineering	Mechanical Engineering Core	12CR in ME courses at the 500 or 600 level	Required: ME 589 And one course from List A (next page)	ME 589		
		6CR in additional ME courses	* ME option: • Coursework Only	ME 433		
			Please see: http://me.engin.umich.edu/students/masters.shtml			
6CR in acceptable Mathematics or equivalent	Please see: http://me.engin.umich.edu/students/acceptable_math.shtml					
Natural Resources and Environment	SS Core <i>[SS-specific requirements]</i>	9CR total	Sustainable Design & Technology <i>Minimum. 3CR</i>	Required: NRE 557/CEE 586 And one course from List 1 (next page)	NRE 557	
				Required: NRE 574 See List 2 for other acceptable courses (next page)	NRE 574	
				See List 3 for acceptable courses (next page)		
	NRE Core <i>[School-wide requirement]</i>	NRE 509 NRE 510 NRE 580		10CR in total		
		Analytics <i>[School-wide requirement]</i>	One statistics course	NRE 538 or equivalent required: http://www.snre.umich.edu/sites/snre.umich.edu/files/Statistic%20Courses%201108.pdf		
	Opus <i>[School-wide requirement]</i>	Master's Project/Thesis/Practicum		At most 6CR of NRE 700/701		
Cognates <i>[Rackham requirement]</i>			Please see next page for cognate requirement information			
TOTALS	TOTAL CREDIT HOURS BY SCHOOL		"NRE" - Minimum 25CR			
			"ME"- Minimum 18CR			
	TOTAL CREDIT HOURS		Minimum 54 Credit Hours			

**Please see the Mechanical Engineering Student Services Office if you would prefer to complete their Research or Thesis in Engineering

A) Mechanical Engineering

ME 432 (3)	Combustion (F)
ME 438 (4)	Internal Combustion Engines (F)
ME 537 (3)	Advanced Combustion (W)
ESENG 501/CEE 565 (3)	Seminars on Energy Systems Technology and Policy (F)

Natural Resources and Environment

1) Systems Analysis for Sustainability (6 hrs)

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)	Tools and Topics in Environmental Economics (W TBD)
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 501.039 (3)	Land Use and Global Change (F)
NRE 501.036 (3)	Sustainable Systems in Developing Countries (W)
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
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 589 (3)	Sustainable Design of Technology Systems (F)
ME 599	Special Topics in Mech Engineering [TBD] (F & W)
EECS 498 (3)	Grid Integration of Alternative Energy Sources (TBD)

3) Sustainable Enterprise (3-9 hrs)

NRE 501.032 (3)	Transportation Energy and Climate (W)
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)
ES 520 (1.5)	CleanTech Venture Opportunities (F)
FIN 637 (2.25)	Finance and Sustainable Enterprises (F)
STRATEGY 735-739 (1.5)	Environmental Management Topics (F & W)

Cognates

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

ME – 3-6 credits outside ME at the 4xx level or above. Can be fulfilled by ME Mathematics requirement.