

**UNIVERSITY OF NEW HAMPSHIRE, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
 MASTER OF SCIENCE: THESIS OPTION *WATER RESOURCES ENGINEERING***

Student Name _____ Advisor _____

Date of Entry _____ Thesis _____ Paper _____

<u>Major Categories</u>	<u>Course</u>	<u>CR</u>	<u>Date</u>	<u>Grade</u>
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Hydrodynamics	_____	_____	_____	_____
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Quantitative Reasoning/ Computer Simulation	_____	_____	_____	_____
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Water Quality	_____	_____	_____	_____
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Seminar	CEE 897 Graduate Seminar	_____	_____	_____
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<u>Electives</u>	_____	_____	_____	_____
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Thesis Credits	CEE 899	_____	_____	IA
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_____	CEE 899	_____	_____	_____
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900-level course credits (excluding CEE 897) _____ \geq 8

Total CEE course credits _____ \geq 14

Total Credits _____ \geq 31

Date of Qualifying Exam (Project Paper Only) _____

Date of Research Proposal (Thesis Only) _____

Date of Presentation/Defense _____

Date of Paper/Thesis Submission _____

Requirements

CEE 897	Seminar	
Hydrodynamics Category	3 courses	
Quantitative Reasoning/ Computer Simulation Category	2 courses	
Water Quality Category	1 course	
One more course from either Hydrodynamics, Water Quality, or Quantitative Reasoning/Computer Simulation categories		
Electives	3 courses (minimum)	
CEE 899	Master's Thesis (6 credits)	
Minimum number of total credits		31
Total minimum number of 900-level coursework credits (not including CEE 897)		8
Total minimum number of Civil Engineering coursework credits (not including CEE 897 or CEE 899)		14

Prerequisites

BS in Civil, Geological, or Environmental Engineering from an ABET-accredited (or equivalent internationally accredited), undergraduate degree program, including an introductory hydrology class and an introductory statistics course OR the following courses:

Prerequisite Courses

Mechanics I
Calculus - 3 semesters
Fluid Mechanics
Chemistry - 1 semester
Physics (calculus-based)
Statistics

UNH Equivalent

CEE 500, ME 525
MATH 425, MATH 426, MATH 527
CEE 650
CHEM 405
PHYS 407
MATH 644

Some of these prerequisite courses may be waived upon attainment of the EIT certificate before graduation.

MASTER OF SCIENCE: THESIS OPTION *WATER RESOURCES ENGINEERING*
Major Categories

Hydrodynamics (at least three)

ChE 913	Advanced Fluid Mechanics
CEE 851	Open Channel Flow
CEE 854	Engineering Hydrology
CEE 855	Design of Water Transmission Systems
CEE 857	Coastal Engineering and Processes
CEE 858	Stormwater Management
CEE 859	Stream Restoration
CiE 940	Hydrologic Monitoring
CiE 942	River Mechanics
CEE 954	Advanced Groundwater Topics
CEE 959	Adv Stream Restoration
ESCI 810	Groundwater Hydrology
ESCI 858	Intro. to Physical Oceanography
ESCI 860	Intro. Dynamic Oceanography
ME 807	Analytical Fluid Dynamics
OE 854	Ocean Waves and Tides
OE 860	Introductory Dynamic Oceanography

Water Quality (at least one)

ChE 861	Biochemical Engineering
ChE 872	Physicochemical Processes for Water and Air Quality Control
ChE 916	Diffusive Mass Transfer
CEE 833	Public Infrastructure Asset Mgmt
CEE 830	Public Health Engineering
CEE 820	Solid and Hazardous Waste Engineering
CEE 822	Intro. to Marine Pollution and Control
CEE 832	Solid and Hazardous Waste Design
CEE 823	Water Chemistry
CEE 850	Ecohydrology
CEE 824	Environmental Eng. Microbiology
CEE 920	Advanced Hazardous Waste & Environmental Sampling and Analysis
CEE 931	Adv. Physicochemical Treatment Design
CEE 934	Advanced Bioenvironmental Engineering
ESCI 847	Aqueous Geochemistry
ESCI 852	Chemical Oceanography
ESCI 855	Analytical Techniques for Sediments

ESCI 895 Advanced Fate and Transport
 MICRO 813 Microbes and the Environment

Water Quality (continued)

MICRO 814	Public Health and Waterborne Diseases
NR 801	Ecological Values and Ethics
NR 803	Watershed Water Quality Management
NR 811	Wetland Ecology and Management
NR 816	Wetland Delineation
NR 818	Law of Natural Resources and Environment
NR 819	Wetlands Mitigation and Restoration
NR 821	Ecology of Polluted Waters
NR 905	Contaminant Fate and Transport in the Subsurface
PHP 903	Environmental Health

Quantitative Reasoning/Comp. Simul. (at least two)

ADMN 842	Time Series Analysis
ChE 854	Graphical, Numerical and Finite Element Applications in Chemical Engineering
CHEM 932	Statistics and Experimental Design
CiE 834	Project Analysis
CEE 850	Ecohydrology
CiE 886	Intro to Finite Element Analysis
CEE 896	Special Topics
CEE 951	Statistical Hydrology
ESCI 896	Time Series Analysis
ESCI 903	Adv. Hydrology
ESCI 904	Contaminant Hydrology
ESCI 906	Statistical Hydrology
ESCI 907	Geostatistics
MATH 835	Statistical Methods for Researchers
MATH 839	Applied Regression Analysis
MATH 840	Design of Experiments I
MATH 842	Multivariate Statistics and Regression
MATH 843	Time Series Analysis
MATH 844	Design of Experiments II
MATH 845	Foundations of Applied Math

MATH 853 Intro. to Numerical Methods
MATH 855 Probability and Stochastic
Processes
MATH 931 Mathematical Physics
ME 886 Finite Element Analysis
ME 809 Computational Fluid Dynamics

**Quantitative Reasoning/Comp. Simul. (at
least two) (continued)**

NR 857 Photo Interpretation and
Photogrammetry
NR 859 Digital Image Processing for
Natural Resources
NR 860 Geographic Information
Systems in Natural Resources
PHP 903 Biostatistics

APPROVED ELECTIVES FOR WATER RESOURCES PROGRAM

<u>Department</u>	<u>Course Number</u>	<u>Course Title</u>
Chemical Engineering	ChE 844	Corrosion
	ChE 913	Advanced Fluid Mechanics
Civil Engineering	CEE 851	Open Channel Flow
	CEE 820	Hazardous Waste Management
	CEE 854	Engineering Hydrology
	CEE 822	Intro. Marine Pollution & Control
	CEE 832	Solid and Hazardous Waste Design
	CEE 823	Water Chemistry
	CEE 850	Ecohydrology
	CEE 805	Sustainable Engineering
	CEE 855	Design of Water Trans. Systems
	CiE 8XX	GIS in Water Resources
	CEE 824	Environmental Eng. Microbiology
	CEE 857	Coastal Engineering and Processes
	CEE 858	Stormwater Management
	CEE 859	Stream Restoration
	CEE 867	Geological Engineering
	CEE 868	Geo-Environmental Engineering
	CiE 797 CEE 707?	Climate Change Adaptation Planning
	CiE 797 CEE 806?	Environmental Life Cycle Analysis
	CEE 896	Land development and municipal design
	CiE 940	Hydrologic Monitoring
	CiE 942	River Mechanics
	CEE 920	Adv. Hazardous Waste and Environ. Sampling and Analysis
	CEE 931	Advanced Physiochemical Treatment Design
	CEE 954	Advanced Groundwater Topics
	CEE 934	Advanced Bioenvironmental Eng. Design
	CEE 951	Statistical Hydrology
CEE 955	Advanced Surface Water Hydrology	
CEE 959	Advanced Stream Restoration Topics	
CiE 994	Hydrology and Water Resources Readings	
Earth, Oceans and Space	EOS 807	Environmental Modeling
	EOS 813	Terrestrial Ecosystems
Earth Science	ESci 810	Ground Water Hydrology
	ESci 834	Applied Geophysics
	ESci 847	Aqueous Geochemistry
	ESci 850	Biological Oceanography
	ESci 852	Chemical Oceanography
	ESci 854	Sedimentology
	ESci 858	Intro. Physical Oceanography
	ESci 862	Glacial Geology
	ESci 896	Nearshore Processes

ESci 903 Groundwater Modeling
 ESCI 906 Advanced Fate and Transport

Mechanical Engineering	ME 807	Analytical Fluid Dynamics
	ME 809	Computational Fluid Dynamics
	ME 812	Waves in Fluids
	ME 886	Intro. to Finite Element Analysis
	ME 909	Viscous Flow
	ME 910	Turbulence
Natural Resources for the 21st Century	NR 801	Ecological Sustainability and Values
	NR 803	Watershed Water Quality Management
	NR 811	Wetland Ecology and Management
	NR 816	Wetland Delineation
	NR 818	Law of Natural Resources and Environment
	NR 819	Wetlands Mitigation and Restoration
	NR 820	International Environmental Politics and Policies
	NR 824	Resolving Environmental Conflicts
	NR 830	Terrestrial Ecosystems
	NR 851	Aquatic Ecosystems
	NR 857	Remote Sensing of the Environment
	NR 859	Digital Image Processing for Natural Resources
	NR 860	Geographic Information Systems in Natural Resources
NR 902	Ecological Ethics and Values	
Ocean Engineering	OE 810	Ocean Measurements Laboratory
	OE 853	Ocean Hydrodynamics
	OE 854	Ocean Waves and Tides
	OE 857	Coastal Engineering and Processes
	OE 937	Advanced Hydrodynamics
	OE 954	Ocean Waves and Tides II
	OE995	Littoral Sediment Transport
Plant Biology	PBIO 817	Lake Ecology
	PBIO 819	Field Studies in Lake Ecology
	PBIO 832	Lake Management: A Multidisciplinary Approach
Public Health	PHP 902	Environmental Health
	PHP 903	Biostatistics
Resource Administration and Management	RAM 911	Natural and Environmental Resource Management

February 9, 2018