

WATER/ENVIRONMENTAL AREA

Essential Student Learning Objectives for Water/Environmental Graduate (MS) Students

Students will have advanced level knowledge on environmental chemistry, transport and quantitative methods

Semester 1 (10 hours of coursework)

Core courses to build breadth

CEE6520 –Open Channel Hydraulics

CEE 6610 – Environmental Chemistry

Quantitative methods (e.g. CEE6430 – Probabilistic Methods)

CEE6910 – CEE Graduate Seminar (1 hour)

Semester 2 (9 hours of coursework)

Two CEE Courses to build depth in research area

One CEE or non-CEE Course to perform inter-disciplinary work in the area of research

Note:

- Plan of Study is completed before the end of Semester 2.
- Advisory Committee is setup.
- Candidate presents research proposal to Advisory Committee for approval and revision
- Candidate should have taken 1 hour of CEE6910 by Semester 2

Semester 3 (6 hours)

One CEE or non-CEE course in relevant area of research

CEE6990 – Research and Thesis (3 hours)

Note:

- Candidate's research work should be initiated by Semester 3

Semester 4 (6 hours)

One CEE or non-CEE course in relevant area of research

CEE6990 – Research and Thesis (3 hours)

Note:

- Candidate applies for graduation with graduate school
- Candidate presents draft of thesis to Advisory Committee for comment/revisions
- Candidate schedules a date for comprehensive exam and oral defense of thesis on or before the deadline set by graduate school

Electives Courses to build Depth and Support Area of Research:

CEE 6420 Fluvial Hydraulics

CEE 6440 Hydrometeorology

CEE 6710-20 Environmental Engineering Unit Operations and Processes

CEE 6750 Water Quality Modeling

CEE 7310 Hazardous Waste Remediation in Groundwater and Soil

GEOG 5510 Theory of GIS I

GEOG 5511 Theory of GIS II

GEOG 5620 Principles of GIS

GEOL 5330 Environmental Geology
GEOL 5410 Remote Sensing (4 Cr)
GEOL 5710 Hydrogeology
GEOL 5720 Advanced Hydrogeology
ME (ECE) 6200 Linear Systems Analysis (Kalman Filtering)
ME (ECE) 6260 State Estimation and System Identification
ME 6850 (ECE 6620) Fuzzy Logic Control Systems
ME 5740 Transport Phenomena
CHE 5660 Applied Mathematics in Chemical Engineering
MATH 5210-20 Numerical Analysis I-II
MATH 5470-80 Probability and Statistics I-II (for those weak in Stats for CEE6430)
MATH 6170-80 Experimental Design I-II

STRUCTURAL ENGINEERING AREA

Essential Student Learning Objectives for Structures Graduate Students

Students will have advanced level knowledge in the areas of structural analysis, behavior of structures, and design of structures with concrete, steel or masonry.

Typical Sequence of Coursework and Research

Core Courses:

(1) CEE 6930 – Theory of Elasticity

(2) CEE 7610 – Finite Element Analysis I

Note: To be taken as offered (preferably early in the program)

Flow Chart:

Semester 1

Coursework:

- Three CEE courses to build breadth. One of the three should be, if available, CEE 6930 (of the core courses) that is a prerequisite to CEE 7610 (another core course).
- CEE 6910 – CEE Graduate Seminar (1hr)

Research Objectives:

- Begin scheduled discussions of research and initiate literature review if possible
- Formulate four semester plan for completion of graduate studies
- Become familiar with (and begin to plan for) grad requirements (committee formation, committee meetings, thesis layout, important dates, etc.)

Semester 2

Coursework:

- Two CEE courses to build depth in research area. One should be CEE 7610 which is a core course.
- One CEE or non-CEE course complimentary to research area

Research Objectives:

- Plan of Study is complete
- Advisory Committee is setup
- Candidate presents research proposal to Advisory Committee
- Candidate should have taken CEE 6910

Semester 3

Coursework:

- One CEE or non-CEE course complimentary to research area
- CEE 6990 – Research and Thesis (3 hours)

Research Objectives:

- Research work is initiated and significantly underway

Semester 4

Coursework:

- One CEE or non-CEE course complimentary to research area

- CEE 6990 – Research and Thesis (3 hours)

Research Objectives:

- Candidate applies for graduation
- Candidate presents draft thesis to Advisory Committee
- Candidate schedules a date for comprehensive exam (Ph.D.) and/or oral defense of thesis

Elective Courses to Build Depth and Support Area of Research

CEE 4130 (5130).Matrix and Finite Element Methods.

CEE (ME) 4160 (5160).Experimental Stress Analysis.

CEE (ME) 4190 (5190).Advanced Mechanics of Materials.

CEE 4350 (5350).Advanced Structural Design.

CEE 4360 (5360).Advanced Topics in Structural Concrete Design.

CEE 4380 (5380).Bridge Design.

CEE 4700 (5700).Masonry Design.

CEE 6100.Advanced Computer Applications in Civil Engineering.

CEE (ME) 6360.Introduction to Continuum Mechanics.

CEE (ME) 6370.Vibrations of Continuous Media.

CEE 6810.Advanced Structural Mechanics.

CEE 6900.Special Problems.

CEE 6930 (ME 6840).Theory of Elasticity.

CEE 7100.Advanced Computational Methods in Engineering.

CEE 7360.Advanced Topics in Prestressed Concrete Design.

CEE 7510 (ME 7600).Theory of Plates and Shells.

CEE (ME) 7610.Finite Element Analysis I.

CEE (ME) 7640.Theory of Inelastic Material Behavior.

CEE 7710 (ME 7660). Fracture Mechanics.

CEE 7720 (ME 7670).Fiber-Reinforced Composite Materials.

CEE 7810.Structural Dynamics.

CEE 7820 (ME 7680).Theory of Elastic Stability.

CEE 7910/11/12. Study of Current Literature

TRANSPORTATION/MATERIALS AREA

Essential Student Learning Objectives for Transportation/Materials Graduate Students

Students will have advanced level knowledge in the areas of cement-based materials or transportation planning and operations.

Typical Sequence of Coursework and Research

Core Courses – Transportation Planning and Operations Concentration:

- (1) CEE 6410 – Traffic Control Systems
- (2) CEE 6470 – Transportation Demand Analysis
- (3) Graduate level course in probability and statistics

Note: To be taken as offered (preferably early in the program)

Core Courses – Materials Concentration:

- (1) CEE 6300 - Multiscale Analysis of Concrete
- (2) CEE 5190 – Advanced Mechanics of Material or graduate level course in probability and statistics

Note: To be taken as offered (preferably early in the program)

Semester Activities

Semester 1

Coursework:

- Three graduate level courses to build capability in transportation engineering, materials, and statistics.
- CEE 6910 – CEE Graduate Seminar (1hour)

Research Objectives:

- Begin scheduled discussions of research and initiate literature review if possible
- Formulate four semester plan for completion of MS graduate program
- Become familiar with program requirements and begin to plan for MS Advisory Committee formation, important dates, etc.

Semester 2

Coursework:

- Three graduate level courses to build capability in transportation engineering, materials, and statistics.

Research Objectives:

- Program of Study should be completed
- Advisory Committee should be setup
- Candidate presents research proposal to MS Advisory Committee

Semester 3

Coursework:

- Two graduate level courses. Courses could be from transportation engineering, materials, statistics, or geography
- CEE 6990 – Research and Thesis (3 hours)

Research Objectives:

- Significant progress on research work
- Begin documentation of research

Semester 4

Coursework:

- One CEE or non-CEE course complimentary to research area
- CEE 6990 – Research and Thesis (3 hours)

Research Objectives:

- Complete documentation of research
- Present draft thesis to Advisory Committee
- Schedule a date for oral defense of thesis

Elective Courses to Build Depth and Support in Area of Research

CEE 5600 - Civil Engineering Materials II

CEE 5610 - Pavement Design

CEE 5630 - Traffic Engineering

CEE 5640 - Highway Engineering

CEE 5660 - Transportation Planning

CEE 5930 - Noise Control

CEE 5990 - Special Problems

GEOG 5510 - Theory of GIS I

GEOG 5511 - Theory of GIS II

GEOG 5850 - Advanced GIS

MATH 5470 - Probability and Statistics I

MATH 5480 - Probability and Statistics II

ME 5480 - Microstructure Analysis

CEE 6310 - Bituminous Materials

CEE 6330 - Advanced Pavement Design

CEE 6450 - Geometric Design of Roadways

CEE 6460 - Transportation Safety Engineering

CEE 6900 - Special Problems

ISE 6200 - Statistical Methods for Engineers

MATH 6070 - Applied Linear Statistical Methods I

MATH 6080 - Applied Linear Statistical Methods II

MATH 6170 - Experimental Design I

MATH 6180 - Experimental Design II

CEE 7410 - Advanced Travel Demand Modeling

CEE 7420 - Public Transportation

CEE 7450 - Advanced Topics in Concrete Durability

CEE 7970 - Selected Topics

CEE 7980 - Directed Study

STRUCTURAL MECHANICS AREA

LIU or RAMIREZ NEEDS TO FILL THIS OUT

Essential Student Learning Objectives for Structural Mechanics Graduate Students

Typical Sequence of Coursework and Research

CEE 6930 – Theory of Elasticity

CEE 7610 – Finite Element Analysis I

MATH 5510 – Advanced Math for Engineers

Semester Activities

Semester 1

Coursework:

Research Objectives:

- Begin scheduled discussions of research and initiate literature review if possible
- Formulate four semester plan for completion of MS graduate program
- Become familiar with program requirements and begin to plan for MS Advisory Committee formation, important dates, etc.

Semester 2

Coursework:

Research Objectives:

- Program of Study should be completed
- Advisory Committee should be setup
- Candidate presents research proposal to MS Advisory Committee

Semester 3

Coursework:

Research Objectives:

- Significant progress on research work
- Begin documentation of research

Semester 4

Coursework:

Research Objectives:

- Complete documentation of research
- Present draft thesis to Advisory Committee
- Schedule a date for oral defense of thesis

Elective Courses to Build Depth and Support in Area of Research

