PROGRAM OF STUDY GUIDE FOR MASTER'S STUDENTS, 2025-2026

Maseeh College of Engineering and Computer Science (MCECS)
Department of Civil and Environmental Engineering (CEE)

Developing a program of study is a key step in your graduate education and should be developed in consultation with your adviser to meet your personal education and career objectives. Students must complete the *Program of Study* form (posted on the CEE website under "Graduate Advising"), obtain adviser approval, and submit to the CEE Academic Program Administrator. The *Program of Study* should ideally be submitted after the first 9 credits but is required once 18 credits have been completed in the program.

All students in the CEE Master's program must specialize in one of five areas:

- Environmental & Water Resources Engineering,
- Transportation Engineering,
- Geotechnical Engineering,
- Structural Engineering, or
- Engineering & Preservation of Existing Structures (MS or PhD)

This document provides the required core courses and a list of approved electives for each specialization. In all cases, a minimum of 30 credits must be taken in the Department of CEE unless otherwise approved by the Graduate Program Chair. The adviser may require courses that are not listed in this document as required by your research or project topic. Electives not listed in this document for each specialization can still be part of the program of study with adviser approval. Students are encouraged to seek useful and relevant courses outside civil and environmental engineering to develop a robust and relevant program of study.

Note that any courses taken without adviser approval may not be accepted towards degree requirements. If a course listed on the approved *Program of Study* is not available due to changed course offerings, scheduling conflicts, or other reasons, another course can be substituted with adviser approval. Documentation of adviser approval is needed but a new *Program of Study* form is not required.

MASTER OF SCIENCE (MS) PROGRAM

This program involves coursework as well as independent research. The MS program has two options, each requiring a total of 45 credits.

- *Thesis*: The thesis option consists of a total of 45 credit hours including 6-9 hours of CE 503 Thesis credits that results in a thesis and successful completion of a final oral examination or defense covering the thesis. Coursework may include up to 6 hours of CE 501 Research, CE 504 Internship, CE 505 Reading and Conference or CE 506 Projects. This option requires the formation of a formal committee (see defense requirements and timeline)
- *Project*: The project option requires completion of 45 credit hours including 4 credits of CE 501 Research on a research project that produces a report and technical presentation. The presentation must be announced and given in a public forum. Project credits may be taken in one term or over multiple terms. Coursework may include up to 8 credit hours of CE 504 Internship, CE 505 Reading and Conference, or CE 506 Projects.

A student who has been employed as a graduate research assistantship (GRA) is expected to complete the thesis option unless permission is granted by his/her adviser.

MASTER OF ENGINEERING PROGRAM

A coursework only degree. A total of 48 graduate credits are required for the MEng program. Coursework may include up to 8 hours of CE 501 Research, CE 504 Internship, CE 505 Reading and Conference, or CE 506 Projects.

PROGRAM OF STUDY GUIDE PRIOR TO 2024

CEE graduate students admitted prior to 2024 may choose to follow the 2024 or 2023 program of study guide. It is possible that some coursework listed in older study guides may no longer be available. If that is the case, please contact your adviser to discuss options and ensure you will meet the necessary core requirements for your specialization.

- View the Program of Study Guide, 2023

PHD PROGRAM

This Guide is for MS/MEng students. PhD students must complete the following departmental requirements, available in the CEE Graduate Student Handbook.

ENVIRONMENTAL & WATER RESOURCES ENGINEERING

REQUIRED COURSES IN THREE CORE AREAS (20 CREDITS)

Water & Wastewater, Chemistry, Mitigation, Treatment (a minimum of 2 courses - 8 credits)

CE 574 Unit Operations of Environmental Engineering (4)
CE 580 Chemistry of Environmental Toxins (4)
CE 586 Environmental Chemistry (4)
CE 587 Aquatic Chemistry (4)
Other courses subject to approval

Modeling of Surface Water and Air Systems (a minimum of 2 courses - 8 credits)

CE 568 Advanced Methods in Hydrologic System Analysis (4)
CE 572 Environmental Fluid Mechanical Transport (4)
CE 573 Numerical Methods in Environmental and Water Resources Engineering (4)
CE 576 Environmental Fluid Mechanics (4)
CE 578 Water Quality Modeling (4)
CE 588 Air Quality (4)
Other courses subject to approval

Hydrology and Groundwater (a minimum of 1 course - 4 credits)

CE 565 Watershed Hydrology (4)
CE 569 Subsurface Hydrology (4)
CE 571 Subsurface Contaminant Transport (4)
CE 575 Ecohydrology (4)
CE 590 Soil and Groundwater Restoration (4)
Other courses subject to approval

APPROVED ELECTIVE COURSES

The courses listed below are approved electives that can be used to satisfy degree requirements. Other elective courses not included in this list must be approved in advance by a student's adviser. Any of the listed required core courses not used to satisfy the core requirements can also be used to satisfy degree requirements.

CE 510 Selected Topics (any CE 510 class with an environmental or water resources focus)
CE 512 Sustainability in Civil and Environmental Engineering Seminar (1)
CE 561 Water Resource Systems Analysis (4)
CE 566 Environmental Data Analysis (4)
CE 510 Research Methods in CEE (1)

TRANSPORTATION ENGINEERING

REQUIRED CORE COURSES (28 CREDITS)

Transportation Engineering Fundamental Tools (8 credits)

CE 555[1] Transportation Data Science (4)
CE 563 Transportation Optimization (4)

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

Fundamentals of Transp. Operations, Safety, and Travel (a minimum of 4 courses, 16 credits)

CE 550 Transportation Safety Analysis (4)
CE 553 Freight Transportation & Logistics (4)
CE 558 Public Transportation Systems (4)
CE 559 Transportation Operations (4)
CE 593 Design and Operation of Bicycle and Pedestrian Infrastructure (4)
CE 510[1] Integrated Regional Transportation Planning and Design (4)
CE 510[1] Econometric Modeling and Big Data Analysis in Transportation (4)
CE 510[1] Introduction to Smart Cities (4)

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

Special Topics

CE 507 Transportation Research & Communication Seminar (1)
CE 510 Selected Topics (any CE 510 class with Transportation Engineering focus)
CE 514 Transportation Seminar (1) (up to *2 credits may be applied to degree requirements*)
CE 562 Traffic Engineering Applications & Signal Timing (4)
CE 595 Netherlands Study Abroad (*up to 3 credits may be applied to degree requirements*)
CE 597 Transportation and Health (4)
CE 510 Research Methods in CEE (1)[1]

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

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Computer Science

CS 541 Artificial Intelligence (3)
CS 545 Machine Learning (3)
OHSU CS 623 Deep Learning (3)

Math

MTH 561,562 Graph Theory (3)
MTH 577,578 Mathematical Control Theory (3)

Electrical Engineering

EE 516 Mathematical Foundations Machine Learning (3)
EE 518 Machine Learning Algorithms (3)
EE 519 Deep Learning (3)

Statistics

Stat 568 Applied Probability I and II (3)
Stat 572 Bayesian Statistics (3)

System Science

SySc 525 Agent Based Simulation (4)
SySc 535 Modeling and Simulation with R/Python (4)
Sysc 514 System Dynamics (4)

Urban Studies and Planning

USP 583 Transportation Finance (3)
USP 537 Economics of Urban Transportation (3)
USP 575 Urban Design Workshop (4)

GEOTECHNICAL ENGINEERING

REQUIRED CORE COURSES (24 CREDITS)

Geotechnical Engineering Fundamentals (16 credits)

CE 521 Theoretical and Computational Soil Mechanics (4)
CE 541 Advanced Soil Mechanics (4)
CE 543 Introduction to Geotechnical Earthquake Engineering (4)
CE 594/694 Advanced Geotechnical Earthquake Engineering (4)[1]

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

Advanced Topics (a minimum of 2 courses - 8 credits)

CE 542 In Situ Behavior and Testing of Soils (4)
CE 546 Numerical Methods in Soil-Structure Interaction (4)
CE 547 Slope Stability (4)
CE 548 Geotechnical Case Histories (4)

APPROVED ELECTIVE COURSES

The courses listed below are approved electives that can be used to satisfy degree requirements. Other elective courses not included in this list must be approved in advance by a student's adviser. Any of the listed required core courses not used to satisfy the core requirements can also be used to satisfy degree requirements.

CEE Courses – Geotechnical

CE 510 Selected Topics (any CE 510 class with a geotechnical engineering focus)

Geology

G 510 Selected Topics (any G 510 class with a geotechnical engineering application)
G 570 Engineering Geology (4)

Civil Engineering - Structural Engineering

CE 519 Bridge Engineering (4)
CE 523 Vibration Analysis in Structural Engineering (4)
CE 524 Matrix and Computer Methods in Structural Analysis (4)
CE 529 Structural Dynamics (4)
CE 534 Advanced Reinforced Concrete Design (3)
CE 537 Earthquake Engineering (4)

Civil Engineering - Other

CE 510 Research Methods in CEE (1)[1]

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

Mechanical and Materials Engineering

ME 555 Finite Element Modeling and Analysis (4)
ME 565 Advanced Finite Element Applications (4)

STRUCTURAL ENGINEERING

REQUIRED CORE COURSES (16 CREDITS)

Structural Engineering Analysis (a minimum of 2 courses - 8 credits)

CE 523 Vibration Analysis in Structural Engineering (4)
CE 524 Matrix and Computer Methods in Structural Analysis (4)
CE 529 Structural Dynamics (4)

Structural Engineering Design (8 credits)

CE 532 Structural Steel Design (4)
CE 535 Design of Reinforced Concrete Structures (4)

APPROVED ELECTIVE COURSES

The courses listed below are approved electives that can be used to satisfy degree requirements. Other elective courses not included in this list must be approved in advance by a student's adviser. Any of the listed required core courses not used to satisfy the core requirements can also be used to satisfy degree requirements.

CEE Courses - Structural Engineering

CE 510 Selected Topics (any CE 510 class with a structural engineering focus)
CE 515 Machine Learning Methods in Civil Engineering (4)
CE 517 Timber Design (4)
CE 518 Prestressed Concrete Design (4)
CE 519 Bridge Engineering (4)
CE 536 Masonry Design (3)
CE 537 Earthquake Engineering (4)

CEE Courses – Geotechnical

CE 510 Selected Topics (any CE 510 class with a geotechnical engineering focus)
CE 541 Advanced Soil Mechanics (4)
CE 543 Introduction to Geotechnical Earthquake Engineering (4)
CE 546 Numerical Methods in Soil Structure Interaction (4)
CE 547 Slope Stability (4)

CEE Courses – Other

CE 510 Research Methods in CEE (1)[1]
CE 510 Sensing and Monitoring of Structures: Fundamentals (4)[1]
CE 510 Sensing and Monitoring of Structures: Applications (4)[1]
CE 510 Repair and Strengthening of Structures (4)[1]
CE 510 Principles of Infrastructure Management (4)[1]
CE 510 Reliability and Risk Based Civil and Environmental Engineering (4)[1]

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

Mechanical and Materials Engineering

ME 530/630 Solid Mechanics (4)
ME 525 Advanced Topics in Building Science (4)
ME 555 Finite Element Modeling and Analysis (4)
ME 565 Advanced Finite Element Applications (4)
ME 576 Material Failure Analysis (4)

ENGINEERING & PRESERVATION OF EXISTING STRUCTURES

RESTRICTED TO STUDENTS ADMITTED TO THE MS PROGRAM

(Learn more about this specialization)

REQUIRED CORE COURSES (28 CREDITS)

Fundamentals (12 credits)

CE 510 Sensing and Monitoring of Structures: Fundamentals (4)[1]
CE 510 Reliability and Risk in Civil and Environmental Engineering (4)[1]
CE 523 Vibration Analysis in Structural Engineering (4)

Engineering & Preservation (16 credits)

CE 510 Sensing and Monitoring of Structures: Applications (4)[1, 2]
CE 510 Repair and Strengthening of Structures (4)[1]
CE 510 Principles of Infrastructure Management (4)[1]
CE 524 Matrix and Computer Methods in Structural Analysis (4)

APPROVED ELECTIVE COURSES

The courses listed below are approved electives that can be used to satisfy degree requirements. Other elective courses not included in this list must be approved in advance by a student's adviser. Any of the listed required core courses not used to satisfy the core requirements can also be used to satisfy degree requirements.

CEE Courses - Structural & Geotechnical Engineering

CE 510 Sensing the Earth (4)[1]
CE 518 Prestressed Concrete (4)
CE 519 Bridge Engineering (4)
CE 529 Structural Dynamics (4)
CE 532 Structural Steel Design (4)
CE 534 Advanced Reinforced Concrete Design (3)
CE 535 Design of Reinforced Concrete Structures (4)
CE 546 Numerical Methods in Soil Structure Interaction (4)

CEE Courses – Other

CE 510 Research Methods in CEE (1)[1]
CE 510 Modern Statistics for Engineers (4)[1]
CE 515 Machine Learning Methods in Civil Engineering (4)

Mechanical and Materials Engineering

ME 522 Building Energy Use Modeling (4)
ME 530 Solid Mechanics (4)
ME 555 Finite Element Modeling and Analysis (4)
ME 565 Advanced Finite Element Applications (4)
ME 576 Material Failure Analysis (4)

[1] *Course will be offered as CE 510 until approval by University Curriculum Committee*

[2] *Prerequisite: CE 510 Sensing and Monitoring of Structures: Fundamentals (or equivalent)*