

PROGRAM OF STUDY

Developing a program of study is key step in your graduate education. The program of study is a planning document and should be developed in consultation with your adviser to create a customized set of courses that meet your personal education and career objectives. This guide identifies the required (core) courses and includes a list of approved electives. Electives not listed in this document for each specialization can still be listed on the program of study with adviser approval. Students are encouraged to seek useful and relevant courses outside the Department.

Students are required to complete the Program of Study form (posted on the CEE web site) and submit to the CEE Front Desk after completing 18 credits. Please note that coursework taken without adviser approval may not be accepted as part of the student's program. If a course listed on the program of study is not available be taken due to changed course offerings, schedule conflicts, or other reason, another course can be substituted with adviser approval. A new program of study form is not required.

CORE AND ELECTIVE COURSE LISTS

The core and elective course lists on the following pages are meant to help guide students in drafting their programs of study for adviser approval. Students specialize in one of four areas: Environmental/Water Resources, Transportation, Geotechnical, or Structural. Each discipline requires a different set of core courses. Approved elective courses for each specialty area are also listed. Students must obtain adviser approval prior to taking any elective courses that do not appear on the list of approved electives for their specialty area. Note that as required by research, project topic, or student skills the adviser may require courses that are not listed in this document.

MASTER OF SCIENCE PROGRAM

The Master of Science program consists of two options, each with 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 plus successful completion of a final oral examination 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.
- Project: The project option requires completion of 45 credit hours including 4 CE 501 Research credit hours 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 hours of CE 504 Internship, CE 505 Reading and Conference or CE 506 Projects.

In both options, a minimum of 30 credits must be taken in the Department of Civil and Environmental Engineering unless otherwise approved by the Department Graduate Program Chair. A student who has benefited from a graduate research assistantship (GRA) must follow the thesis option unless permission is granted by his/her adviser. Student research is conducted under the supervision of faculty.

MASTER OF ENGINEERING PROGRAM

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. Internship credits (CE 504) require a project and final report; these credits must be arranged in advance between the CEE faculty adviser and the student. A minimum of 30 credits must be taken in the Department of Civil and Environmental Engineering unless otherwise approved by the Department Graduate Program Chair.



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MS/ MEng Program of Study Guide

ENVIRONMENTAL AND WATER RESOURCES ENGINEERING

Maseeh College of Engineering and Computer Science

Department of Civil and Environmental Engineering

REQUIRED CORE COURSES (20 CREDITS)

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

- CE 574 Unit Operations of Environmental Engineering (4)
- CE 579 Fate and Transport of Toxics in the Environment (4)
- CE 580 Chemistry of Environmental Toxins (4)
- CE 587 Aquatic Chemistry (4)

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

- CE 510 Advanced Methods in Hydrosystem Analysis (4)
- CE 572 Environmental Fluid Mechanical Transport (4)
- CE 573 Numerical Methods in Environmental and Water Resources Engineering (4)
- CE 578 Water Quality Modeling (4)
- CE 582 Introduction to Sediment Transport (4)
- CE 583 Estuarine Circulation (4)
- CE 588 Air Quality Modeling (4)

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

- CE 565 Watershed Hydrology (4)
- CE 568 Soil and Groundwater Restoration (4)
- CE 569 Subsurface Hydrology (4)
- CE 571 Subsurface Contaminant Transport (4)

APPROVED ELECTIVE COURSES

Any of the listed core courses taken in addition to the core course requirements can be used as approved electives, as well as the following pre-approved courses. Other elective courses must be approved in advance by a student's adviser.

- CE 510 Advanced Fluid Mechanics (4)
- CE 564 Hydrologic and Hydraulic Modeling (4)
- CE 566 Environmental Data Analysis (4)
- CE 567 Hydrologic and Hydraulic Design (4)
- CE 570 Groundwater Modeling (4)
- CE 576 Environmental Fluid Mechanics (4)
- CE 581 The Columbia River as a System (2)
- CE 586 Environmental Chemistry (4)



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TRANSPORTATION ENGINEERING
Maseeh College of Engineering and Computer Science
Department of Civil and Environmental Engineering

REQUIRED CORE COURSES (20 CREDITS)

Transportation Engineering Research Fundamentals (17 credits)

CE 510 Introduction to Transportation Research Methods (4)
CE 563 Transportation & Logistics Modeling & Optimization (4)
CE 559 Transportation Operations (4)
CE 507 Transportation Research Communication Seminar (1)
CE 510 Theories & Methods of Travel Behavior (4)

Mathematical Sciences / Statistics (a minimum of 1 course by end of 27 credits - 3 credits)

MTH 520 Introduction to Complexity Theory (3)
MTH 561/562 Graph Theory I/II (3)
MTH 567/568 Applied Probability I/II (3)
MTH 621/2/3 Advanced Differential Equations (3)
MTH 651/2/3 Advanced Numerical Analysis I/II/III (3)
MTH 667/8/9 Stochastic Processes and Prob. Theory (3)
STAT 551 Applied Statistics for Engineers and Sci. I (4)
STAT 561 Introduction to Mathematical Statistics I (4)
STAT 564 Applied Regression Analysis (4)
STAT 565/6 Experimental Design: Theory & Methods I/II (4)
STAT 543 Survey of Statistical Methods (4)
STAT 510 Bayesian Data Analysis (4)

APPROVED ELECTIVE COURSES

Any of the listed core courses taken in addition to the core course requirements can be used as approved electives, as well as the following pre-approved courses. Other elective courses must be approved in advance by a student's adviser.

CEE Electives

CE 550 Transportation Safety Analysis (4)
CE 510 Transportation & Health (4)
CE 553 Freight Transportation & Logistics (4)
CE 510 Adv. Transportation Modeling & Opt. (4)
CE 555 Intelligent Transportation Systems (4)
CE 510 Topics in Adv. Travel Demand Modeling (4)
CE 557 Pavement Design (4)
CE 510 Bicycle & Pedestrian Engineering (4)
CE 558 Public Transportation Systems (4)
CE 510 Travel Survey Methods (4)
CE 556 Traffic Engineering (4)
CE 510 Netherlands Study Abroad (up to 6)
CE 562 Traffic Engineering Apps & Signal Timing (4)
CE 514 Transportation Seminar (1) up to 2 credits

Urban Studies and Planning

Analytical

USP 537 Economics of Urban Transportation (3)
USP 587 Travel Demand Modeling (3)
USP 510 Discrete Choice Analysis (3)
USP 634 Data Analysis I
USP 654 Data Analysis II

Policy and Planning

USP 556 Urban Transportation Policies & Problems (3)
USP 544 Urban Transportation Planning (3)
USP 570 Transportation and Land Use (3)
USP 591/592 Geographic Information Systems I/II (3)
USP 510 Sustainable Transportation (3)
USP 565 Pedestrian and Bicycle Planning (3)

Economics

EC 531 Urban Economics (4)
EC 585 Cost-Benefit Analysis (4)
EC 586 Project Evaluation (4)
EC 570 Econometrics (4)
EC 571 Advanced Econometrics (4)
EC 4/572 Time Series Analysis & Forecasting

Systems Science

SYSC 527 Discrete System Simulation (4)

Environmental Science

ESR 528 Urban Ecology (4)
ESR 560 Air Quality (4)

Computer Science

CS 584 Algorithm Design & Analysis (3)
CS 541 Artificial Intelligence (3)

Geography

GEOG 4/597 Spatial Quantitative Analysis (4)

Public Administration

PA 515 Public Works Administration (3)

Mechanical Engineering

ME 552/553 Control Engineering I/II (4)

Electrical and Computer Engineering

ECE 555/556 AI: Neural Networks I/II (4)
ECE 568 Introductory Image Processing (4)
ECE 569 Advanced Image Processing (4)

Business Administration

ISQA 529 Transportation and Logistics Mgmt (4)
ISQA 539 Purchasing & Supply Chain Mgmt (4)

English

WR 525 Advanced Technical Writing (4)



MS/ MEng Program of Study Guide
GEOTECHNICAL ENGINEERING
Maseeh College of Engineering and Computer Science
Department of Civil and Environmental Engineering

REQUIRED CORE COURSES (20 CREDITS)

Geotechnical Engineering Fundamentals (12 credits)

CE 540 Geosynthetics in Infrastructure Engineering (2)
CE 541 Advanced Soil Mechanics (4)
CE 542 In Situ Behavior and Testing of Soils (4)
CE 545 Geo-environmental Engineering with Geosynthetics (2)

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

CE 543 Introduction to Seismology and Site Evaluation (4)
CE 544 Advanced Shallow Foundation Design (4)
CE 546 Numerical Methods in Soil Structure Interaction (4)
CE 549 Deep Foundation Design and Analysis (4)

APPROVED ELECTIVE COURSES

Any of the listed core courses taken in addition to the core course requirements can be used as approved electives. Other elective courses must be approved in advance by a student's adviser.

NOTE: DUE TO ADVISING LOADS THE DEPARTMENT ONLY OFFERS MS-PROJECT and MENG DEGREE OPTIONS IN GEOTECHNICAL ENGINEERING



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STRUCTURAL ENGINEERING

Maseeh College of Engineering and Computer Science

Department of Civil and Environmental Engineering

REQUIRED CORE COURSES (15 CREDITS)

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

- CE 520 Advanced Mechanics of Materials (4)
- CE 521 Analysis of Framed Structures (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 531 Stability of Structures (4)

Structural Engineering Design (all of the courses listed - 7 credits)

- CE 534 Advanced Reinforced Concrete Design (3)
- CE 539 Advanced Steel Design (4)

APPROVED ELECTIVE COURSES

Any of the listed core courses taken in addition to the core course requirements can be used as approved electives, as well as the following pre-approved courses. Other elective courses must be approved in advance by a student's adviser.

CEE Courses - Structural Engineering

- CE 518 Prestressed Concrete Design (4)
- CE 519 Bridge Engineering (4)
- CE 524 Matrix and Computer Methods in Structural Analysis (4)
- CE 526 Theory of Plates (4)
- CE 527 Finite Elements in Structural Mechanics (4)
- CE 532 Structural Steel Design – LRFD Method (4)
- CE 533 Cold Formed Steel Design (4)
- CE 535 Design of Reinforced Concrete Structures (4)
- CE 536 Masonry Design (3)
- CE 537 Earthquake Engineering (4)
- CE 538 Design of Composite Structures (4)

CEE Courses - Geotechnical

- CE540 Infrastructure Engineering with Geosynthetics
- CE544/644 Advanced Shallow Foundation Design
- CE546/646 Numerical Methods in Soil Structure Interaction
- CE549/649 Deep Foundation Design and Analysis

MME Courses

- ME 555 Finite Element Modeling and Analysis (4)
- ME 565 Advanced Finite Element Applications (4)
- ME 576 Material Failure Analysis (4)
- MSE 576 Failure Analysis (4)