

Department of Civil and Environmental Engineering (CEE)

Master of Science Degree Requirements

The Master of Science degree in Civil and Environmental Engineering is primarily designed for students with an undergraduate degree in engineering, although students with other backgrounds may be accommodated with specially designed programs, often including pre-requisite undergraduate courses. All incoming students are admitted into the Professional Master of Science option (1 listed below). With faculty sponsorship and support, any student may transition from the Professional Master of Science Option to the Thesis/Research option. An MS degree may be pursued by a full-time or part-time student in one of two ways:

- 1) **Professional Master of Science (PMS) Option:** 30 semester course credits.
- 2) **Master of Science Thesis/Research Option:** 24 semester course credits plus 6-credit of CEE 2999 thesis research.

* In addition to course and research credits the MS with thesis option requires students to conduct novel and impactful research which is written up in a thesis. The student must successfully defend their thesis to a committee of faculty as described below.

Thesis Defense - Students must pass an oral presentation and defense of their completed written thesis, administered by the student's thesis committee. The committee shall be comprised of 3 or more persons (including the student's graduate advisor). The chair of the committee and at least one other committee member must be appointed to the University of Pittsburgh Graduate Faculty.

NOTES:

- All full-time students are required to attend Graduate Departmental Seminar (CEE 2085).
- Students may select and register for courses only after consultation with their faculty advisor.
- International students from universities where English is not the primary language of study are required to complete an English competency exam upon arrival at the University of Pittsburgh. If the results of this exam are not satisfactory, students may be required to take up to three additional English language courses that do not count towards the degree program coursework requirements.

The following provides coursework specifics for the MS and PMS programs for the possible concentration areas within the CEE Department:

- **Construction Management**
- **Environmental Engineering**
- **Geotechnical Engineering**
- **Pavement Engineering**
- **Structural Engineering and Mechanics**
- **Sustainable Engineering**
- **Transportation Engineering**
- **Water Resources Engineering**

Construction Management
MS Degree Requirements
30 Credits

- a) 3 Credits – *Construction Cost Engineering*
(CEE 2201 or Equivalent)
- b) 3 Credits – *Construction Scheduling*
(CEE 2202 or Equivalent)
- c) 3 Credits – *Construction Methods and Equipment*
(CEE 2203 or Equivalent)
- d) 3 Credits – *Construction Law and Risk Management*
(CEE 2204 or Equivalent)
- e) 3 Credits – *Construction Finance and Cost Control*
(CEE 2205 or Equivalent)
- f) 3 Credits – *Construction and Cost of Electrical Supply OR Construction and Cost of Mechanical Systems*
(CEE 2206 or Equivalent OR CEE 2207 or Equivalent)
- g) 6 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- h) 6 Credits – *MS Thesis* (CEE 2999)

PMS Degree Requirements
30 Credits

- a) 3 Credits – *Construction Cost Engineering*
(CEE 2201 or Equivalent)
- b) 3 Credits – *Construction Scheduling*
(CEE 2202 or Equivalent)
- c) 3 Credits – *Construction Methods and Equipment*
(CEE 2203 or Equivalent)
- d) 3 Credits – *Construction Law and Risk Management*
(CEE 2204 or Equivalent)
- e) 3 Credits – *Construction Finance and Cost Control*
(CEE 2205 or Equivalent)
- f) 3 Credits – *Construction and Cost of Electrical Supply OR Construction and Cost of Mechanical Systems*
(CEE 2206 or Equivalent OR CEE 2207 or Equivalent)
- g) 12 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Environmental Engineering

MS Degree Requirements

30 Credits

- a) 3 Credits – *Environmental Engineering Microbiology*
(CEE 2500 or Equivalent)
- b) 3 Credits – *Environmental Engineering Chemistry*
(CEE 2501 or Equivalent)
- c) 3 Credits – *Physical-Chemical Principles in Environmental Engineering*
(CEE 2502 or Equivalent)
- d) 3 Credits – *Environmental Engineering Processes I*
(CEE 3501 or Equivalent)
- e) 3 Credits – *Environmental Engineering Processes II*
(CEE 3502 or Equivalent)
- f) 9 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- g) 6 Credits – *MS Thesis* (CEE 2999)

PMS Degree Requirements

30 Credits

- a) 3 Credits – *Environmental Engineering Biology*
(CEE 2500 or Equivalent)
- b) 3 Credits – *Environmental Engineering Chemistry*
(CEE 2501 or Equivalent)
- c) 3 Credits – *Physical-Chemical Principles in Environmental Engineering*
(CEE 2502 or Equivalent)
- d) 3 Credits – *Environmental Engineering Processes I*
(CEE 3501 or Equivalent)
- e) 3 Credits – *Environmental Engineering Processes II*
(CEE 3502 or Equivalent)
- f) 15 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Geotechnical Engineering

MS Degree Requirements

30 Credits

- a) 3 Credits – *Engineering Geology*
(CEE 2800 or Equivalent)
- b) 3 Credits – *Advanced Soil Mechanics*
(CEE 2801 or Equivalent)
- c) 3 Credits – *Geotechnical Analysis*
(CEE 2802 or Equivalent)
- d) 3 Credits – *Rock Mechanics*
(CEE 3805 or Equivalent)
- e) 12 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- f) 6 Credits – *MS Thesis*² (CEE 2999)

PMS Degree Requirements

30 Credits

- a) 3 Credits – *Engineering Geology*
(CEE 2800 or Equivalent)
- b) 3 Credits – *Advanced Soil Mechanics*
(CEE 2801 or Equivalent)
- c) 3 Credits – *Geotechnical Analysis*
(CEE 2802 or Equivalent)
- d) 3 Credits – *Rock Mechanics*
(CEE 3805 or Equivalent)
- e) 18 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Pavement Engineering
MS Degree Requirements
30 Credits

- a) 3 Credits – *Pavement Design and Analysis*
(CEE 2714 or Equivalent)
- b) 3 Credits – *Pavement Maintenance and Rehabilitation*
(CEE 2715 or Equivalent)
- c) 3 Credits – *Components, Properties and Design of Portland Cement Concrete OR
Advanced Construction and Bituminous Materials*
(CEE 2717 or Equivalent OR CEE 2718 or Equivalent)
- d) 3 Credits – *Advanced Pavement Design and Analysis*
(CEE 3714 or Equivalent)
- e) 12 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- f) 6 Credits – *MS Thesis (CEE 2999)*

PMS Degree Requirements
30 Credits

- a) 3 Credits – *Pavement Design and Analysis*
(CEE 2714 or Equivalent)
- b) 3 Credits – *Pavement Maintenance and Rehabilitation*
(CEE 2715 or Equivalent)
- c) 3 Credits – *Components, Properties and Design of Portland Cement Concrete OR
Advanced Construction and Bituminous Materials*
(CEE 2717 or Equivalent OR CEE 2718 or Equivalent)
- d) 3 Credits – *Advanced Pavement Design and Analysis*
(CEE 3714 or Equivalent)
- e) 18 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Structural Engineering and Mechanics (SEM)

MS Degree Requirements

30 Credits

- a) 3 Credits – *Advanced Mechanics of Materials (CEE 2320) or Elasticity, Plasticity and Fracture Mechanics (CEE 2321)*
- b) 3 Credits – *Introduction to Finite Elements (CEE 2333 or Equivalent)*
- c) 3 Credits – *SEM Graduate Design Elective (CEE 2340, 2341, 2343, 2346 and 2347)*
- d) 6 Credits – *SEM Graduate Technical Electives (CEE 2330¹, 2343, 2347, 2360, 2370, 3330, and 3333)*
- e) 9 Credits – *Graduate Technical Electives² (any advisor-approved program-related graduate course)*
- f) 6 Credits – *MS Thesis (CEE 2999)*

PMS Degree Requirements

30 Credits

- a) 3 Credits – *Advanced Mechanics of Materials (CEE 2320) or Elasticity, Plasticity and Fracture Mechanics (CEE 2321)*
- b) 3 Credits – *Introduction to Finite Elements (CEE 2333 or Equivalent)*
- c) 3 Credits – *SEM Graduate Design Elective (CEE 2340, 2341, 2343, 2346 and 2347)*
- d) 6 Credits – *SEM Graduate Technical Electives (CEE 2330¹, 2343, 2347, 2360, 2370, 3330, and 3333)*
- e) 15 Credits – *Graduate Technical Electives² (any advisor-approved program-related graduate course)*

NOTES:

¹ CEE 2330 Advanced Structural Analysis may not be taken for graduate credit if the student's undergraduate program includes an equivalent course.

² Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Sustainable Engineering

MS Degree Requirements

30 Credits

- a) 3 Credits – *Life Cycle Assessment Methods and Tools*
(CEE 2609 or Equivalent)
- b) 3 Credits – *Engineering and Sustainable Development*
(CEE 2610 or Equivalent)
- c) 3 Credits – *Advanced Green Building and Construction*
(CEE 2620 or Equivalent)
- d) 15 Credits – *Graduate Technical Electives*²
(any advisor-approved program-related graduate course)
- e) 6 Credits – *MS Thesis* (CEE 2999)

PMS Degree Requirements

30 Credits

- a) 3 Credits – *Life Cycle Assessment Methods and Tools*
(CEE 2609 or Equivalent)
- b) 3 Credits – *Engineering and Sustainable Development*
(CEE 2610 or Equivalent)
- c) 3 Credits – *Advanced Green Building and Construction*
(CEE 2620 or Equivalent)
- d) 21 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Transportation Engineering
MS Degree Requirements
30 Credits

- a) 3 Credits – *Transportation Management Operations*
(CEE 2700 or Equivalent)
- b) 3 Credits – *Traffic Control Systems*
(CEE 2710 or Equivalent)
- c) 3 Credits – *Urban Transportation Planning*
(CEE 2720 or Equivalent)
- d) 3 Credits – *Pavement Design and Analysis OR Highway Engineering*
(CEE 2714 or Equivalent OR CEE 2730 or Equivalent)
- e) 3 Credits – *Project Development and Implementation*
(CEE 2750 or Equivalent)
- f) 9 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- g) 6 Credits – *MS Thesis* (CEE 2999)

PMS Degree Requirements
30 Credits

- a) 3 Credits – *Transportation Management Operations*
(CEE 2700 or Equivalent)
- b) 3 Credits – *Traffic Control Systems*
(CEE 2710 or Equivalent)
- c) 3 Credits – *Urban Transportation Planning*
(CEE 2720 or Equivalent)
- d) 3 Credits – *Pavement Design and Analysis or Highway Engineering*
(CEE 2714 or Equivalent OR CEE 2730 or Equivalent)
- e) 3 Credits – *Project Development and Implementation*
(CEE 2750 or Equivalent)
- f) 15 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.

Water Resources Engineering

MS Degree Requirements

30 Credits

- a) 3 Credits – *Advanced Environmental Fluid Mechanics*
(CEE 3408 or Equivalent)
- b) 3 Credits – *Advanced Hydrology*
(CEE 3414 or Equivalent)
- c) 3 Credits from one of the following courses: *Sediment Transport* (CEE 2416 or Equivalent) or *River Mechanics and Morphodynamics* (CEE 3416 or Equivalent)
- d) 3 Credits – *Water Resources Engineering*
(CEE 2410 or Equivalent)
- e) 12 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)
- f) 6 Credits – *MS Thesis* (CEE 2999)

PMS Degree Requirements

30 Credits

- a) 3 Credits – *Advanced Environmental Fluid Mechanics*
(CEE 3408 or Equivalent)
- b) 3 Credits – *Advanced Hydrology*
(CEE 3414 or Equivalent)
- c) 3 Credits from one of the following courses: *Sediment Transport* (CEE 2416 or Equivalent) or *River Mechanics and Morphodynamics* (CEE 3416 or Equivalent)
- d) 3 Credits – *Water Resources Engineering*
(CEE 2401 and 2410)
- e) 18 Credits – *Graduate Technical Electives*¹
(any advisor-approved program-related graduate course)

NOTES:

¹ Graduate Technical Electives may include any advisor-approved program-related graduate course (i.e., course numbers 2XXX or 3XXX), including guided special investigations (CEE 2996). No more than six credits of CEE 2996 may count towards the degree program coursework requirements.