

Institutional Effectiveness
2024-2025

Program: Civil and Environmental Engineering MS

College and Department: College of Engineering, Civil Engineering

Contact: Dr. Ben Mohr

Mission:

The mission of the civil engineering program is to offer the strong academic content necessary to produce well-educated graduates who become innovative and productive members of society. Graduates will possess both the problem-solving skills and the fundamentals of critical thinking and analysis that are crucial for success within the framework of the civil and environmental engineering profession.

Attach Curriculum Map (Educational Programs Only):

Attached Files: See Appendix 1

Thesis Option (31 hours)

An MSCE program of study with thesis option requires a minimum of 31 semester hours of graduate-level coursework which are on the program of study approved by the student's graduate advisory committee, including one semester hour of [CEE6910 - CEE Graduate Seminar](#), and a minimum of six (6) hours of thesis completed under the supervision of the graduate advisor (31 hours). At least 15 credit hours of graduate coursework must be CEE courses. The required thesis should document the student's research to the satisfaction of both the student's graduate advisory committee and the Graduate School. The student must also successfully defend his/her thesis before the graduate advisory committee. A minimum GPA of 3.0 is also required. Other departmental requirements may apply.

Degree Requirements

- **Core Required Course:** 1 hour
- **Concentration Area Requirement*:** 15 hours
- **Advisor Approved Electives*:** 9 hours
- **Research Requirement:** 6 hours
- **Degree Total Requirements:** 31 hours

* Concentration Area and Advisor Approved Electives maybe selected from CEE, CHE, CSC, EMGT, ENGR, ME, BIOL, ESS, EVS, GEOG, MATH, OR CHEM 5000, 6000, 7000 level courses.

Non-Thesis Option (31 hours)

An MSCE program of study with non-thesis option requires a minimum of 31 credit hours of graduate course work, as specified in the student's approved Program of Study. This program is offered in a fully online delivery mode. The program of study shall include 30 semester hours of graduate-level coursework, one semester hour of [CEE6910 - CEE Graduate Seminar](#). At least 21 credit hours of graduate coursework must be CEE courses. No more than 9 credit hours at the 5000 level are permitted. Non-thesis MSCE will complete a culminating exam to reflect comprehensive knowledge gained from coursework. Successful completion of the exam is required for graduation. Other departmental requirements may apply. Degree Requirements

- **Core Required Course:** 1 hour
- **Concentration Area Requirement*:** 21 hours
- **Advisor Approved Electives*:** 9 hours
- **Total Degree Requirements:** 31 hours

* Selection of appropriate courses (CEE 5000, 6000, 7000 level) will be made in consultation with the student's advisory committee and/or the graduate coordinator. Courses may include, but are not limited to, other relevant engineering disciplines (such as CHE, CSC, EMGT, ENGR, or ME) or outside of engineering such as (BIOL, CHEM, ESS, EVS, GEOG, GEOL, or MATH).

SLO1: Understanding of Sub-Discipline

Define Outcome:

MS graduates will demonstrate clear understanding of the chosen sub-discipline of civil engineering covered in course material in the graduate program.

SLO1 requires a clear understanding of the course material within the chosen sub-discipline in civil engineering of each student, in particular the specific outcomes for each specialization. Evidence of this outcome is provided primarily through course grades. Graduates gain additional understanding and an opportunity to apply course materials through the in-depth research performed as part of their thesis or project work.

Assessment Methods:

Summary of Grades and Five-Year Average of Course Enrollment (when offered) in Core MS CEE Courses

- Water Resources and Environmental Engineering
 - CEE 6520 - Open Channel Hydraulics
 - CEE 6610 - Applied Environmental Chemistry
- Structural Engineering and Structural Mechanics
 - CEE 6350 - Finite Element Analysis
 - CEE 6930 - Theory of Elasticity
- Transportation Engineering
 - CEE 6410 - Traffic Control Systems
 - CEE 6470 - Transportation Demand Analysis
- Civil Engineering Materials
 - CEE 6300 - Multiscale Analysis of Concrete
 - CEE 7450 - Advanced Topics in Concrete Durability
- Geotechnical Engineering
 - CEE 6800 - Advanced Soil Mechanics
 - CEE 6820 - Seepage and Slope Stability

Criteria for Success (Thresholds for Assessment Methods):

SLO1 is evaluated through primarily through course grades in core courses with an acceptability threshold being above 3.00, demonstrating that students achieve technical competence on course content.

Link to 'Tech Tomorrow' Strategic Plan:

2.A Technology Infused Programs, 2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:

Table SLO1.Summary of Average Grade and Average Enrollment in Core CEE MS Courses

Course	Average Grades (by academic year)					Average number of students
	2020-21	2021-22	2022-23	2023-24	2024-25	
CEE 6520 – Open-Channel Hydraulics	-	4.00 (2)	-	3.33 (6)	-	4.0
CEE 6610 – Applied Environmental Chemistry	4.00 (7)	3.75 (4)	-	-	(9)	6.7
CEE6350 – Finite Element Analysis	3.33 (8)	3.57 (5)	2.67 (3)	3.50 (2)	(2)	4.0
CEE 6930 – Theory of Elasticity	3.50 (6)	3.75 (4)	3.67 (4)	3.00 (2)	3.50 (4)	4.0
CEE 6410 – Traffic Control Systems	-	4.00 (4)	-	3.67 (3)	-	3.5
CEE 6470 – Transportation Demand Analysis	3.00 (2)	3.50 (6)	3.00 (1)	-	-	3.0
CEE 6300 – Multiscale Analysis of Concrete	4.00 (4)	-	4.00 (2)	3.80 (5)	4.00 (1)	3.0
CEE 7450 – Advanced Topics in Concrete Durability	3.75 (4)	4.00 (1)	4.00 (2)	4.00 (5)	4.00 (1)	2.6
CEE 6800 – Advanced Soil Mechanics	-	3.67 (6)	3.00 (3)	3.25 (3)	(1)	3.3

Course	Average Grades (by academic year)					Average number of students
	2020-21	2021-22	2022-23	2023-24	2024-25	
CEE 6820 – Seepage and Slope Stability	-	-	3.75 (9)	3.50 (4)	-	6.5

Note: Grade distribution reports for Spring 2025 unavailable as of 05/21/2025

Use of Results to Improve Outcomes:

In AY 2022-23, the average grade in CEE 6350 fell below the previously defined threshold of 3.00. The average grade for CEE 6350 Spring 2023 was 2.67 - 3 students were registered, and the grade distribution was 2-A and 1-F. Upon further investigation, the student who received an "F" was a first-semester graduate student admitted in Provisional Standing. After Spring 2023, the student was dismissed from the graduate program indicating that the academic controls in place are working. As such, this data point is not deemed to be indicative of attainment of SLO1. Otherwise, all other metrics indicate that attainment of SLO1 has been successful.

SLO2: Apply Advanced Methods

Define Outcome:

MS graduates will apply advanced methods in the development of solutions in the chosen sub-discipline of civil engineering.

SLO2 involves the application of advanced methods to develop solutions in the graduate's chosen sub-discipline in civil engineering.

Assessment Methods:

The evidence for this outcome is primarily obtained through specific research design or analyses performed by students for projects and theses. The graduate committee of individual students evaluates the methodology adopted and the results and interpretation of these analyses by the students. Successful completion of the MS thesis or project indicates that advanced analytical or quantitative methods have been employed. MS students are evaluated during their MS proposal and thesis defense for several criteria.

Criteria for Success (Thresholds for Assessment Methods):

The threshold of acceptability is 3.0 for average scores on the following:

- MS Proposal Presentations
 - Content
 - Response to Questions and Comments
- MS Thesis Defense Presentations
 - Content
 - Response to Questions and Comments

Link to 'Tech Tomorrow' Strategic Plan:

2.A Technology Infused Programs, 2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:

Table SLO2-1. Assessments of MS Proposal Presentations

Assessed by	Academic Year	Number of Evaluations	Average Score				
			Content	Visual Aids	Presenter Preparation	Presentation Mechanics	Response to Questions and Comments
Committee Members	2020-21	9	3.22	3.33	3.44	3.33	3.44
	2021-22	8	3.34	3.42	3.67	3.42	3.25
	2022-23	18	3.35	3.47	3.45	3.28	3.34
	2023-24	10	3.30	3.05	3.13	3.10	2.78
	2024-25	15	3.38	3.26	3.44	3.31	3.11
Other Faculty in Attendance	2020-21	0					
	2021-22	0					
	2022-23	1	3.00	4.00	4.00	3.00	3.00
	2023-24	0					
	2024-25	0					

Assessment scale: 1 = Not Acceptable, 2 = Below Expectations, 3 = Meets Expectations, 4 = Above Expectations

Table SLO2-2. Assessments of MS Thesis Defense Presentations

Assessed by	Academic Year	Number of Evaluations	Average Score				
			Content	Visual Aids	Presenter Preparation	Presentation Mechanics	Response to Questions and Comments
Committee Members	2020-21	15	3.55	3.60	3.67	3.60	3.64
	2021-22	23	3.48	3.52	3.52	3.44	3.17
	2022-23	26	3.06	3.08	3.14	3.12	3.03
	2023-24	13	3.26	3.40	3.06	2.90	3.06
	2024-25	13	3.29	3.26	3.53	3.31	3.20
Other Faculty in Attendance	2020-21	1	4.00	4.00	4.00	3.00	4.00
	2021-22	0					
	2022-23	4	3.67	3.84	3.84	3.67	3.67
	2023-24	0					
	2024-25	3	3.50	3.00	3.50	4.00	4.00

Assessment scale: 1 = Not Acceptable, 2 = Below Expectations, 3 = Meets Expectations, 4 = Above Expectations

Use of Results to Improve Outcomes:

Using the previously defined threshold of 3.0 for acceptability, it can be seen that for the MS Proposal, in AY2023-24, the "Response to Questions and Comments" was 2.78, falling below the threshold. The CEE Graduate Affairs committee discussed this during AY2024-25. Efforts were made by graduate advisors to better prepare students for questioning.

As for the MS Defense, it was noted that "Presentation Mechanics" for AY2023-24 was 2.90. Again, the CEE Graduate Affairs committee discussed in AY2024-25 and determined that no action was necessary at this time.

Generally, all metrics for AY 2024-25 showed improvements over the previous year, indicating that the continuous improvement processes in place were effective and attainment of SLO2 was successful.

SLO3: Conduct Professional Presentations and Write Scholarly Manuscripts

Define Outcome:

MS graduates will demonstrate the ability to conduct professional presentations or write scholarly manuscripts worthy of publication in peer reviewed journals.

Assessment Methods:

Thesis and Oral Defense Rubric: CEE MS students are required to undertake thesis research or a project independently under the direction of a CEE faculty advisor and the student's graduate advisory committee. Students through this experience learn to manage a significant research or project effort, acquire the technical knowledge and skills required for its successful completion, learn to pose the appropriate questions whose answers lead to the advancement of their research or project, and also learn to have meaningful periodic interaction with their advisory committee.

Criteria for Success (Thresholds for Assessment Methods):

The threshold of acceptability is 3.0 for average scores on the following:

- MS Proposal Presentations
 - Visual Aids
 - Presenter Preparation
 - Presentation Mechanics
- MS Thesis Defense Presentations
 - Visual Aids
 - Presenter Preparation
 - Presentation Mechanics

Link to 'Tech Tomorrow' Strategic Plan:

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Results and Analysis:

Table SLO3. Student Co-Authored Publications, Presentations, and Awards/Accolades

Academic Year	Student Co-Authored Publications			Oral Presentations		Regional / National Awards
	Journals	Conference Proceedings	Thesis Documents	MS Defense	Conference	
2020-21	6	7	8	8	6	1
2021-22	9	22	7	7	22	1
2022-23	6	7	10	10	9	1
2023-24	16	6	3	3	15	2
2024-25	11	6	4	4	8	1

Academic Year (AY) is defined as Fall, Spring, Summer. For example, AY 2022-23 would include the period beginning Fall 2022 (August 1, 2022) through Summer 2023 (July 31, 2023)

Note: Data for AY 2024-25 are through 05/21/2025.

Use of Results to Improve Outcomes:

Based on the assessment metrics for AY 2024-25 in conjunction with previously defined thresholds, no actions are required.

A departmental goal has been to increase the number of peer-reviewed publications by students/faculty. As seen in the past two years, there has been a noticeable increase in publications (despite lower MS enrollments, due to highly active job market), indicating achievement of SLO3.

Summative Evaluation:

Overall, the CEE MS program appears on track for attainment of all student learning outcomes. While a couple data points in SLO2 fell below the defined thresholds in AY 2023-24, the CEE Graduate Affairs committee investigated and recommended action in one case. For AY 2024-25, all metrics were above the defined thresholds, indicating that the department continuous improvement processes in place are effective.

Assessment Plan Changes:

No changes are planned for the upcoming year.

List of Appendices:

Appendix 1: Curriculum Map

Appendix 1: Curriculum Map

	1 – Understanding of sub-discipline	2 – Apply advanced methods	3 –Ability to communicate effectively...
Courses by Subdiscipline			
<i>Environmental Engineering and Water Resources</i>			
CEE 6520 – Open-Channel Hydraulics			
CEE 6610 – Applied Environmental Chemistry			
<i>Structural Engineering and Mechanics</i>			
CEE 6350 – Finite Element Analysis			
CEE 6930 – Theory of Elasticity			
<i>Transportation Engineering</i>			
CEE 6410 – Traffic Control Systems			
CEE 6470 – Transportation Demand Analysis			
<i>Materials Engineering</i>			
CEE 6300 – Multiscale Analysis of Concrete			
CEE 7450 – Advanced Topics in Concrete Durability			
<i>Geotechnical Engineering</i>			
CEE 6800 – Advanced Soil Mechanics			
CEE 6820 – Seepage and Slope Stability			
Thesis Proposal and Defense			
Technical Content			
Visual Aids			
Presenter Preparation			
Presentation Mechanics			
Response to Questions and Comments			
Scholarly Works			

Peer-reviewed Publications/Conference Proceedings			
Conference Presentations			