

Institutional Effectiveness 2023-2024

Program: Civil Engineering MS

College and Department: College of Engineering, Civil & Environmental Engineering MS

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):

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

Attached Files: See Appendix 1

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:

Course	Average Grades (by academic year)					Average number of students
	2019-20	2020-21	2021-22	2022-23	2023-24	
CEE 6520 – Open-Channel Hydraulics	4.00 (5)	-	4.00 (2)	-	3.33 (6)	4.33
CEE 6610 – Applied Environmental Chemistry	-	4.00 (7)	3.75 (4)	-	-	5.50
CEE6350 – Finite Element Analysis	3.50 (6)	3.33 (8)	3.57 (5)	2.67 (3)	(2)	4.80
CEE 6930 – Theory of Elasticity	3.00 (5)	3.50 (6)	3.75 (4)	3.67 (4)	3.00 (2)	4.20
CEE 6410 – Traffic Control Systems	-	-	4.00	-	(3)	3.50

Course	Average Grades (by academic year)					Average number of students
	2019-20	2020-21	2021-22	2022-23	2023-24	
			(4)			
CEE 6470 – Transportation Demand Analysis	4.00 (2)	3.00 (2)	3.50 (6)	3.00 (1)	-	2.75
CEE 6300 – Multiscale Analysis of Concrete	4.00 (5)	4.00 (4)	-	4.00 (2)	3.80 (5)	4.00
CEE 7450 – Advanced Topics in Concrete Durability	4.00 (1)	3.75 (4)	4.00 (1)	4.00 (2)	4.00 (5)	2.60
CEE 6800 – Advanced Soil Mechanics	-	-	3.67 (6)	3.00 (3)	3.25 (3)	4.00
CEE 6820 – Seepage and Slope Stability	3.50 (6)	-	-	3.75 (9)	(4)	6.33

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.

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.

Attached Files: See Appendix 2

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 ¹				
			Content	Visual Aids	Presenter Preparation	Presentation Mechanics	Response to Questions and Comments
Committee Members	2019-20	5	3.00	3.67	3.33	3.67	3.50
	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
Other Faculty in Attendance	2019-20	2	3.50	3.50	3.00	3.00	3.00
	2020-21	0					
	2021-22	0					
	2022-23	1	3.00	4.00	4.00	3.00	3.00
	2023-24	0					

¹ 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 ¹				
			Content	Visual Aids	Presenter Preparation	Presentation Mechanics	Response to Questions and Comments
Committee Members	2019-20	15	3.57	3.40	3.53	3.30	3.20
	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
Other Faculty in Attendance	2019-20	3	4.00	2.67	3.67	4.00	4.00
	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					

¹ 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 will discuss this during AY2024-25 to see if any actions are needed. At the same time, the MS Proposal is a preliminary indication of student attainment of SLO2.

As for the MS Defense, it was noted that "Presentation Mechanics" for AY2023-24 was 2.90. Again, the CEE Graduate Affairs committee will discuss in AY2024-25 to see if action is warranted.

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.

Attached Files: See Appendix 3

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:

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

Results and Analysis:

Academic Year	Student Co-Authored Publications			Oral Presentations		Regional / National Awards
	Journals	Conference Proceedings	Thesis Documents	MS Defense	Conference	
2019-20	6	3	7	7	2	2
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

Use of Results to Improve Outcomes:

Based on the assessment metrics for AY 2023-2 in conjunction with previously defined thresholds, no actions are required.

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, the CEE Graduate Affairs committee will investigate to see if action is needed to improve these metrics.

Assessment Plan Changes:

No changes are planned for the upcoming year.

List of Appendices:

Appendix 1: Civil Engineering MS SLO 1 Assessment

Appendix 2: Civil Engineering MS SLO 2 Assessment

Appendix 3: Civil Engineering MS SLO 3 Assessment

Appendix 1: Civil Engineering MS SLO 1 Assessment

Table 1. Summary of Average Grade and Average Enrollment in Core CEE MS Courses

Course	Average Grades (by academic year)					Average number of students
	2017-18	2018-19	2019-20	2020-21	2021-22	
CEE 6300 – Multiscale Analysis of Concrete	4.00	4.00	4.00	4.00	-	4.75
CEE 6410 – Traffic Control Systems	-	-	-	-	4.00	3.00
CEE 6470 – Transportation Demand Analysis	4.00	3.33	4.00	3.00	3.50	2.80
CEE 6520 – Open-Channel Hydraulics	4.00	4.00	4.00		4.00	4.00
CEE 6610 – Applied Environmental Chemistry	-	3.57	-	4.00	3.75	6.00
CEE 6800 – Advanced Soil Mechanics	3.40			3.67		5.50
CEE 6820 – Seepage and Slope Stability		3.50				6.00
CEE 6930 – Theory of Elasticity	3.33	3.00	3.00	3.50	3.75	5.80
CEE 6350 – Finite Element Analysis	3.33	3.14	3.50	3.33	3.57	5.00

Appendix 2: Civil Engineering MS SLO 2 Assessment

Table 2. Assessments of MS Proposal Presentations

Assessed by	Academic Year	Number of Evaluations	Average Score ¹				
			Content	Visual Aids	Presenter Preparation	Presentation Mechanics	Response to Questions and Comments
Committee Members	2017-2018	16	3.420	3.360	3.360	3.390	3.170
	2018-2019	16	3.027	3.000	3.112	3.140	2.945
	2019-2020	5	3.000	3.667	3.333	3.667	3.500
	2020-2021	9	3.220	3.330	3.440	3.330	3.440
	2021-2022	1	3.000	4.000	3.000	3.000	3.000
Other Faculty in Attendance	2017-2018	0					
	2018-2019	0					
	2019-2020	2	3.500	3.500	3.000	3.000	3.000
	2020-2021	0					
	2021-2022	0					

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

Appendix 3: Civil Engineering MS SLO 3 Assessment

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	
2017-18	10	9	10	10	11	3
2018-19	9	12	12	12	12	1
2019-20	6	3	7	7	2	2
2020-21	6	7	8	8	6	1
2021-22	9	22	7	7	22	1