



Department of Civil and Geomatics Engineering
Master of Science in Civil Engineering, and
Water Resources and Environmental Engineering Option

STUDENT OUTCOME ASSESSMENT PLAN

2014-15

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Mission Statement, Goals, and Objectives

Mission of the MSCE Program and WREE Option

The mission of the Master of Science in Civil Engineering (MSCE) Program and the program's option in Water Resources and Environmental Engineering (WREE) is to educate engineers who, entrusted by society, will create a sustainable world and enhance the quality of life during the 21st century as planners, analysts, designers, constructors, and operators of the built environment. The basic tenet of their formation is the instilling of the professional rectitude of intention. As professionals, using the principles of mathematics and the natural sciences, they will use economically the materials and forces of nature for the progressive well-being of society in the following activities: creating, improving, and protecting the environment; planning, designing, and building facilities and structures for community living, industry, and transportation.

Our program is designed for students who wish to gain technical depth and educational experience geared toward professional practice and advanced study, through creative instruction and research.

Goals of the MSCE Program and WREE Option

The overall goal of the MSCE program and the WREE Option is to prepare students for professional practice and advanced study beyond the master's degree. Upon completion of the graduate program of study in Civil Engineering, the competent student will successfully attain the knowledge and skills necessary to:

- Describe and embrace principles of professional ethics, personal responsibility, and environmental stewardship.
- Describe and explain, beyond the undergraduate level, the scientific principles involved in the planning, mapping, analysis, and/or design of the built environment.
- Evaluate and employ advanced concepts and methodologies for the design of the built infrastructure or for mapping and measuring it.
- Evaluate and employ advanced techniques of analysis, including mathematical analysis and modeling, numerical techniques, and professional software for analysis and/or design in civil or geomatics engineering.
- Exhibit excellent communication skills.

MSCE and WREE Student Learning Outcomes

Students graduating from the MSCE Program and WREE Option will (according to their area of concentration) be able to:

1. Describe and embrace principles of professional ethics, personal responsibility, and environmental stewardship.
2. Describe, explain, and employ the scientific principles and modern professional techniques used in the analysis and/or design of:
 - a. buildings, bridges, and other structures, and/ or
 - b. transportation systems, transportation planning, and traffic operations, and/ or
 - c. water supply, flood management, water treatment, and environmental protection/ remediation facilities, and/ or
 - d. soil engineering, retaining walls, foundations, tunnels, and other geotechnical structures, and/or
 - e. measuring and mapping the earth and the built infrastructure.
3. Identify major regulations, codes, and specifications applicable to the planning, analysis, measuring, mapping, or design of the built infrastructure; and be able to specify where current versions can be obtained.
4. Solve problems in engineering analysis and/or design through the use of mathematical analysis, differential equations, finite elements, finite differences, least square errors, or other numerical methods.
5. Use modern computer software for analysis, design, measuring, or mapping of the built infrastructure.
6. Exhibit excellence in written and graphical communication, including technical documents, research reports, proposals, and presentations.
7. Exhibit excellence in oral communication, including public presentations to technical and non-technical audiences.

Relationship between Program Goals and Student Learning Outcomes

The relationship between the MSCE Program and WREE Option goals and student learning outcomes are summarized in Table 1. Some program goals are represented in one or a few learning outcomes, while others have been articulated in several outcomes. For example, the first program goal, student embracement of professional ethics, personal responsibility, and environmental stewardship, is represented by Learning Outcome 1 and considered to have been achieved only to the degree that Outcome 1 has been achieved. In contrast, several learning outcomes are used to assess how well the second program goal is achieved.

Table 1. Relationship between Program Goals and Student Learning Outcomes.

	Student Learning Outcomes:						
	Students graduating from the MSCE program will (according to their area of concentration) be able to:						
	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7
<p>Program Goals: The overall goal of the MSCE program is to prepare MSCE students for professional practice and advanced study beyond the Master of Science degree. Upon completion of the graduate program of study in Civil Engineering, the competent student will successfully attain the knowledge and skills necessary to:</p>	Describe and embrace principles of professional ethics, personal responsibility, and environmental stewardship	Describe, explain, and employ the scientific principles and modern professional techniques used in the analysis and/or design of: buildings, bridges, and other structures; and/ or transportation systems, transportation planning, and traffic operations; and/ or water supply, flood management, water treatment, and environmental protection/ remediation facilities; and/ or soil engineering, retaining walls, foundations, tunnels, and other geotechnical structures; and/ or measuring and mapping the earth and the built infrastructure	Identify major regulations, codes, and specifications applicable to the planning, analysis, measuring, mapping, or design of the built infrastructure; and be able to specify where current versions can be obtained	Solve problems in engineering analysis and/or design through the use of mathematical analysis, differential equations, finite elements, finite differences, least square errors, or other numerical methods	Use modern computer software for analysis, design, measuring, or mapping of the built infrastructure	Exhibit excellence in written and graphical communication, including technical documents, research reports, proposals, and presentations	Exhibit excellence in oral communication, including public presentations to technical and non-technical audiences.
Describe and embrace principles of professional ethics, personal responsibility, and environmental stewardship.	X						
Describe and explain, beyond the undergraduate level, the scientific principles involved in the planning, mapping, analysis, and/or design of the built environment.		X	X	X	X		
Evaluate and employ advanced concepts and methodologies for the design of the built infrastructure or for mapping and measuring it.		X		X	X		
Evaluate and employ advanced techniques of analysis, including mathematical analysis and modeling, numerical techniques, and professional software for analysis and/or design in civil or geomatics engineering.		X		X	X		
Exhibit excellent communication skills.						X	X

Relationship between Program Courses and Learning Outcomes

The relationship between MSCE Program and WREE Option courses and student learning outcomes are summarized in Table 2. WREE option courses are identified by grey highlight. Information on whether the learning outcome was introduced, reinforced, or advanced in the course is indicated by the letters I, R, and A, respectively. Just a few learning outcomes are associated with some courses (e.g., CE 232 or 233) while several outcomes are covered in other courses (e.g., CE 223).

Table 2. Relationship between program courses and student learning outcomes.

Course	Assessment Instrument	Student Learning Outcomes						
		Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7
CE 205 Comp in Engr Analysis	√		I		A	A		
CE 206 Engr Env Impact	√	A		A				
CE 210 Research Methods		Outcomes depend on topic selected by student and/or instructor					A	A
CE 220 Adv Found Engr	√		A	A	I	A		
CE 223 Adv Soil Mechnics	√		A	A	I	A	A	
CE 225 Num Methds Geot Engr			A	A	A	A	A	
CE 230 Adv Theory Structures			A	A	A			
CE 232 Prestressed Conc Desgn	√		A	A				
CE 233 Adv Beh & Des Steel Struct	√	R	A	A	R		R	
CE 235 Finite Elmt Anal			A		A	A		
CE 236 Reinf Masonry Ther & Desgn			A	A	A			
CE 237 Dynamics of Struct			A		A	A	R	
CE 239 Adv Reinf Conc Theory			A	A	A		A	A
CE 240 Engr Hydrology	√	R	A		A	A		
CE 241 Cont. Fate & Transport Engr.		R	A		A	A		R
CE 242 Urban & Indust. Water Syst.	√	R	A	A	R			
CE 245 Geoenv Engr		A	A	A	R	A		
CE 246A Adv Wat Qual (Phys/Chem)		R	A	A	R			
CE 246B Adv Wat Qual (Biol)		R	A	A	R			
CE 247 Solid Waste Engr		R	A	A			A	A
CE 251 Adv Boundary Law	√	A	R	A		I	A	A
CE 261 Geoprocessing	√		A	R	R	A	R	R
CE 271 Geod Syst Optim			A		R	R	R	
CE 276 GPS Theory & Appl			A		A	A		
CE 280 Geom Engr Seminar		Outcomes depend on topic selected by student and/or instructor					R	
CE 283 Digit Remote Sens			R	R	I	A	R	R
CE 285 Adv Analyt Photogram					A	A	R	R
CE 286 Geogr Info Syst Desgn				R	A	A	R	R
CE 290 Independent Study		Outcomes depend on topic selected by student and/or instructor					A	
CE 291T Topics in Engr		Outcomes depend on topic selected by student and/or instructor						
CE 298 Project		Outcomes depend on topic selected by student and/or instructor					A	A
CE 299 Thesis		Outcomes depend on topic selected by student and/or instructor					A	A

Notes: I = Introduce; R = Reinforce; A = Advance

Several courses are continuation of corresponding undergraduate courses where the material has already been introduced.

Courses designated with grey shading are part of the Water Resources and Environmental Engineering option.

Assessment Methods

Assessment of student learning outcomes is achieved through formative instruments to measure students' progress while going through the program, and with summative instruments to measure the students' level of achievement at the end of the program. Assessment methods are also divided into direct measures and indirect measures. Direct measures are defined here as first-hand objective assessments of student learning. Direct measure instruments are typically implemented by a faculty member. Indirect measures are defined here as subjective assessments of student learning that are typically reported by the student or a third-party. The assessment activities are summarized then discussed as follows:

Direct Measures:

1. Students' scores on specific questions in specific courses (*formative*)
2. Students' performance in writing and in oral presentations in CE 210 (*formative*)
3. Students' performance in the culminating experience (*summative*)

Indirect Measures:

1. Student Exit Surveys (*summative*)
 - a. Administered by MSCE Program
 - b. Administered by Office of Institutional Effectiveness (when available)
2. *Planned:* Alumni Surveys and Employer Surveys (*summative*)

Students' scores on specific questions in specific courses.

Statistical analysis of student scores on one (or more) exam or assignment question in a specific course are used to assess Outcomes 1 through 5 (ethics and technical knowledge and skills). The same or similar questions from prior assessments are used when possible. The MSCE and WREE curriculum currently includes four clearly defined areas of specialization within civil engineering, namely: environmental/ water resources, geotechnical, geomatics, structural, and recently transportation. An option is available in the environmental/ water resources focal area. Students graduating with the MSCE and WREE degrees will have a level of preparation that is unique to the individual area of concentration and thus not all students will take all the courses that are designated as assessment instruments.

Students' performance in writing and in oral presentations in CE 210

Outcomes 6 and 7 (written and oral communication skills, respectively) are assessed every year in CE 210 Research Methods (typically in the Fall semester). The two main objectives of CE 210 are to prepare the students to undertake the culminating experience in the form of master's project or thesis, and to develop their communication skills. Students in this course are graded for the general performance in the course and graded separately for their writing and oral presentation competency. The communication skills component of CE 210 in writing and oral presentations is strong and the overall performance of students is used for assessment purposes. The rubrics used to assess the writing component are given in the syllabus of the CE 210 course. Skill in graphical communication is not currently assessed in either written reports or in presentations, however, the grading rubrics could be expanded to include this important skill. The potential to assess additional learning outcomes in CE 210 exist, and Outcome 1 is a good candidate (Outcomes 2-5 are advanced knowledge and therefore not relevant in this first or second semester course). These topics will be discussed within the Program.

The writing component of CE 210 is the primary instrument used to assess the Graduate Writing Requirement. A student may pass the course satisfactorily but not the writing component. In that case the student is allowed to pursue the completion of the writing requirements independently from the course and in collaboration with his/ her graduate advisor (specifics are provided in the CE 210 syllabus and the MSCE Graduate Student Handbook). Students must pass CE 210 with a grade of 'B' or higher to meet the program qualifying exam requirement and be eligible for Advancement to Candidacy. This requirement demonstrates that he/ she has sufficient technical proficiency to continue in the program.

Students' performance in the culminating experience

The MSCE Program and WREE option offer three culminating experience plans to complete the program, namely: (A) CE 299 Thesis, (B) CE 298 Project, or (C) Comprehensive Exam. All students following plans (A) and (B) are required to make a final oral presentation/ defense of their project or thesis work and submit a final report. Currently students who select Plan C (Comprehensive Exam) are not required to make a final oral presentation/ defense of their work, and their culminating experience is not part of the program assessment. Program faculty has adopted in concept the requirement of an oral presentation/ defense for all culminating experiences. Implementation is pending.

The rubrics used to evaluate and score master's projects can be found in Appendix A. Currently only Outcomes 7 and 8 are assessed, based on the total score from Rubric I (written report) and Rubric II (oral presentation), respectively. As was noted for CE 210, skill in graphical communication is not currently assessed in culminating experience written reports or presentations and the grading rubrics could be modified to include this skill. Parts of Rubrics I and II have the potential to be used as assessment tools for Outcomes 1 through 6, and that possibility is being discussed within the MSCE Program. Future plans include developing a set of rubrics for CE 299 Thesis for assessment purposes. Consideration is also being given to using the comprehensive exam as a means for assessing technical objectives.

Program Standards

A uniform standard of 75% for numeric scores has been adopted across all learning outcomes. The merits and drawbacks of using a single standard for achievement of all outcomes and all assessment instruments will be reviewed over time.

Student Retention & Residence Time

Consideration is being given to tracking student retention statistics and the average time to complete their degree.

Exit Surveys

Every other year students graduating from the MSCE Program and WREE Option are asked to complete a program exit survey (on a voluntary basis). The exit survey is shown in Figure 1. In addition to the program-administered exit survey, the campus Office of Institutional Effectiveness collects data from graduating students and, when data specific to our program can be identified, the data is requested for use in assessment.

Alumni and Employer Surveys

Surveys of prior graduates of the MSCE Program and WREE Option, who have been working at least one year, are planned for implementation in the near future. The proposed survey instrument is shown in Figure 2. Also planned is a survey for employers of program graduates. Consideration is being given to the possibility of assessing the percentage of students who obtain professional licenses (from the State Board or NCEES) and who go on to earn doctorate degrees.

Outcomes & Methods Matrix

The relationship between MSCE Program and WREE Option goals and the instruments used to measure student learning outcomes are summarized in Table 3. All five program goals are assessed using the program exit interview, four goals are assessed using questions in specific courses, one program goal is assessed using the CE 210 Research Methods course and the CE 298 Project or CE 299 Thesis culminating experiences. Measurement of additional goals via CE 210, CE 298, CE 299 and in the comprehensive exam are being considered. Assessment using alumni and employer surveys are planned for the future.

Table 3. Relationship between program goals and instruments used to measure student learning outcomes.

	Outcome Measurement Instrument					
	1	2	3	4	5	6
	CE 210 Research Methods	Questions in specific courses	Culminating Experience (Project or Thesis)	Program Exit Survey	Alumni Survey (future)	Employer Survey (future)
Program Goals: The overall goal of the MSCE program is to prepare MSCE students for professional practice and advanced study beyond the Master of Science degree. Upon completion of the graduate program of study in Civil Engineering, the competent student will successfully attain the knowledge and skills necessary to:						
Describe and embrace principles of professional ethics, personal responsibility, and environmental stewardship.	X *	X	X *	X	X	X
Describe and explain, beyond the undergraduate level, the scientific principles involved in the planning, mapping, analysis, and/or design of the built environment.		X	X	X	X	X
Evaluate and employ advanced concepts and methodologies for the design of the built infrastructure or for mapping and measuring it.		X	X	X	X	X
Evaluate and employ advanced techniques of analysis, including mathematical analysis and modeling, numerical techniques, and professional software for analysis and/or design in civil or geomatics engineering.		X	X	X	X	X
Exhibit excellent communication skills.	X		X	X	X	X

* Degree of attainment of this goal will vary by student depending on the activity topic selected by the student.

Shading represents instruments that are planned for implementation in the future.

Timeline for Implementation of Assessment Methods

Timelines for implementation of assessment activities are provided below. A schedule for implementation of assessment instruments is provided first (Table 4), followed by a schedule for implementing of questions in specific courses (Table 5) and an overall action plan (Table 6) concludes this section.

Beginning in AY 2014-15 instruments will be implemented on a biennial basis, except, Instrument 2 will be implemented each year with outcomes rotated biennially and Instrument 5 will implemented once every five years. The implementation schedule is shown in Table 4.

Table 4. Implementing schedule for assessment activities.

Instrument	Academic Year and Outcomes to be Assessed							
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2018-19
Instrument 1 – CE 210 Research Methods	6, 7	6, 7	6, 7	--	6, 7	--	6, 7	--
Instrument 2 – Questions in specific courses ¹	4, 5	1, 2	3, 4	5, 1	2, 3	4, 5	1, 2	3, 4
Instrument 3 – Culminating Experience	6, 7	6, 7	--	6, 7	--	6, 7	--	6, 7
Instrument 4 – Program Exit Survey	1 thru 7	1 thru 7	--	1 thru 7	--	1 thru 7	--	1 thru 7
Instrument 5 – Alumni Survey	--	--	1 thru 7	--	--	--	--	1 thru 7

¹ The courses are indicated in Table 5.

The courses used for outcomes assessment in the various specializations within the program are shown in Table 5, along with an implementation schedule. Outcomes 1 - 6 are rotated in pairs each year (identified with a check mark). Outcomes assessed in past years are identified by pattern fill in the box.

Table 5. Implementation schedule for formative assessment via student scores on course questions.

Course	Area of Specialization					Implementation Schedule ¹																				
	Environmental & Water Resources	Geotechnical	Geomatics	Structures	Transportation	2013-14				2014-15				2015-16				2016-17								
						Taught? ²	Outcome				Taught? ²	Outcome				Taught? ²	Outcome				Taught? ²	Outcome				
							1	2	6	7		3	4	6	7		5	1	6	7		2	3	6	7	
CE 205 Comp in Engr Analysis		X	X	X		Y						√					√					√				
CE 206 Engr Env Impact	X						√				√						√						√			
CE 210 Research Methods	See Note 3					Y					√	√	√	√				√	√				√	√	√	√
CE 220 Adv Found Engr		X		X							√	√					√						√	√		
CE 223 Adv Soil Mechanics		X									√	√					√						√	√		
CE 232 Prestressed Conc				X		Y		√			√												√	√		
CE 233 Adv Beh & Des Steel Struct				X			√	√			√	√						√					√	√		
CE 240 Engr Hydrology	X					Y	√				√						√	√					√			
CE 242 Urban & Indust. Water Syst.	X						√	√			√	√						√					√	√		
CE 251 Adv Boundary Law				X			√	√			√						√	√					√	√		
CE 261 Geoprocessing				X				√			√	√					√						√	√		

¹ Course Learning Outcomes: a) are identified in the table with a check mark; b) are shown even if they were not measured; and c) measured outcomes are indicated by dot pattern fill around the check mark.

² A blank box indicates that the course was not taught during the academic year indicated.

³ Area depends on topic selected by student.

Table 6. Assessment time table and action plan.

Assessment Activity	How Often	Who	How	
Student scores on problems in selected MSCE/ WREE courses	In accordance with Table 5	Course instructor provides summary to Graduate Coordinator	Graduate coordinator compiles information and summarizes it every year	Graduate coordinator compiles and summarizes information. Course of action is suggested by Graduate coordinator and Graduate Faculty and decided by the majority in the graduate faculty.
Student performance in oral presentation and writing in CE 210	In accordance with Table 5	Course instructor provides summary of results to Graduate Coordinator	Graduate coordinator compiles information and summarizes it every year	
Student performance in culminating experience	In accordance with Table 4	Advisor provides summary of results to Graduate Coordinator	Graduate coordinator compiles information and prepares a summary every year	
Exit Surveys	In accordance with Table 4	Graduate coordinator asks graduating students to complete the form and return it to the Dept. Administrative Assistant anonymously.	Graduate coordinator compiles results and prepares a summary every year.	
Alumni and Employer Surveys	In accordance with Table 4 (<i>planned</i>)	Graduate coordinator requests surveys	Graduate coordinator compiles information every two years	

Evaluation, Curriculum Adjustment, and Reporting (Closing the Loop)

The MSCE Program/ WREE Option SOAP will be reviewed annually, and modifications made when warranted. Assessment data will be collected on a continuous basis throughout the academic year. Data analysis, evaluation, and reporting will be conducted on an annual basis, after the conclusion of the spring semester. Summary results will be reported to the department faculty and chair, college dean, and campus Office of Institutional Effectiveness for inclusion in the Annual Report to the Provost. Findings that suggest that there may be a need for curriculum adjustment will be brought to the attention of graduate faculty for discussion and resolution.

MSCE Program & WREE Option
Graduating Student Feedback

Today's Date _____ Graduation Year: _____ Spring [] Fall [] Summer []

Which program did you complete? (check one) MSCE [] WREE []

What area of concentration, if any? (check one or two) Geomatics [] Geotech. [] Structural []
 Water/ Env. [] Transport. []

Which culminating experience plan did you complete? Thesis [] Project [] Comp. Exam []

Did you work off campus while pursuing your degree? Full-time [] Part-time [] No []

Do you have a full-time job offer? Yes [] No [] N/A []

Is the nature of your employment or employment offer civil engineering?" Yes [] No []

If you had a job offer, what is the starting salary (voluntary) ? [_____]

What was the best thing you remember about the MSCE/ WREE Program?

What is the worst thing you remember about the MSCE/ WREE Program?

Based on your experience while in the MSCE/ WREE program, provide your assessment as to how the program fulfills its goals. **(Use a numerical rating from 1 through 4, where: 1.0 = inadequately and 4.0 = excellently)**

Learning Outcomes (as applicable to your area)	Scale 1.0 to 4.0
Did the MSCE program help you better understand and employ, beyond the undergraduate level, the scientific principles and modern professional techniques used in the planning, analysis and/ or design of the built environment, including: <ul style="list-style-type: none"> • buildings, bridges, and other structures; and/ or transportation systems, transportation planning, and traffic operations; and/ or • water supply, flood management, water treatment, and environmental protection/ remediation facilities; and/ or • soil engineering, retaining walls, foundations, tunnels, & other geotechnical structures; and/or • measuring and mapping the earth and the built infrastructure? 	[]
Did the MSCE program help you learn major regulations, codes, and specifications applicable to the planning, analysis, measuring, mapping, or design of the built infrastructure; and be able to specify where current versions can be obtained?	[]
Did the MSCE program help you learn how to solve problems in engineering analysis and/ or design through the use of mathematical analysis, differential equations, finite elements, finite differences, least square errors, or other numerical methods?	[]
Did the MSCE program help you learn how to use modern computer software for analysis, design, measuring or mapping of the built infrastructure?	[]
Did the MSCE program help you to exhibit excellence in communication, specifically: <ul style="list-style-type: none"> • written and graphical communication, including technical documents, research reports, proposals and presentations? • oral communication, including public presentations to technical and non-technical audiences 	[]
Did the MSCE program help you to understand and embrace principles of professional ethics, personal responsibility, and environmental stewardship?	[]

Figure 1. MSCE Program and WREE Option Student Exit Survey form.

**Alumni Survey
MSCE Program
Lyles College of Engineering**

1. When did you complete your MSCE degree?
(month, year) _____

2. Current job title: _____
Current Salary (optional) _____
Name and Address (optional) _____

3. Current employer: _____

4. In what field do you work?
____ Industry
____ Government
____ Private Practice/consulting
____ Education
____ Construction
____ Other: _____

5. Indicate your present employment status:
____ Employed full-time
____ Full-time graduate student
____ Temporarily not employed
Reason: _____
____ Working in another field
Reason: _____
Do you intend to return to your field?
___ Yes ___ No ___ Not sure
____ Other, please explain:

6. Please rank your professional success level:
____ Very successful
____ Successful
____ Average
____ Unsuccessful
Please explain briefly: _____

7. As you compare yourself to other beginning professionals in your field, how do you rate the quality of your educational preparation through the MSCE program?

- _____ Far higher than average
- _____ Higher than average
- _____ Average
- _____ Lower than average
- _____ Far lower than average

8. Using the following scale, please rate the following items relative to your education in the MSCE program

	weak --> strong			
	1	2	3	4
Overall quality of your MSCE education				
Support, assistance, and general help from the Civil Engr. Office				
Support, assistance and general help you received from faculty in the MSCE program				
How confident and prepared you felt in handling professional tasks when you completed the MSCE				
How confident and prepared you feel in handling professional tasks now				

Figure 2. MSCE Program proposed Alumni Survey form (Page 1 of 2). *[To be updated prior to use to include the WREE Option and Question 9 to reflect recent changes made to program goals]*

9. Using the following scale, please indicate the degree to which your MSCE education provided you with the ability to:

weak --> strong
1 2 3 4

understand, beyond the undergraduate level, the scientific principles involved in the analysis of structures, water supply and water treatment facilities, and soil structures				
know the methodologies for design of the built infrastructure and to know how to map and measure it (as applicable)				
Know advanced techniques of analysis, including mathematical analysis and modeling, numerical techniques, and know the use of professional software for the analysis and design in civil and geomatics engineering				
Have excellent communication skills in writing, oral, graphical, and public speaking				

content, specific lab or field experience, specific instructional equipment, etc. Please explain.

13. To follow up on question 14, please identify the areas in your program of study that contributed **MOST** to your professional development.

10. Do you think that any aspects of the MSCE program at CSU-Fresno should be modified?

yes no

If yes, explain:

11. What changes do you foresee in your field in the next ten years? How might the MSCE program address these changes?

12. Please identify the areas in your MSCE program of study that contributed **LEAST** to your professional development. Such areas might include a specific course or specific course

Figure 2.b. MSCE Program proposed Alumni Survey form (Page 2 of 2). [To be updated to include the WREE Option]

Appendix A

Learning Outcomes Rubrics to assess student performance in the CE 298 Project
culminating experience

Rationale

Similarly to the thesis, the work performed in the CE 298 Project option must show evidence of originality, organization, clarity of purpose, critical analysis, accuracy, completeness, and quality of writing consisting with the standards appropriate for publication in the scholarly journals of the field. Additional insight on the nature of the project can be found in California's Title 5 (Education Code) as follows:

A project is a significant undertaking appropriate to the fine and applied arts or to professional fields.

It evidences:

1. originality and independent thinking
2. appropriate form and organization, and
3. a rationale.

It is described and summarized in a written abstract that includes the project's:

1. significance
2. objectives
3. methodology and
4. a conclusion or recommendation.

An oral defense of the project shall be required.

Although the Final Project Report does not have to comply with the datelines and format requirements of the thesis option, it is highly recommended that the format and deadlines are followed as guidelines in the preparation and submittal of the Final Project Report. The following content and organization guidelines for projects have been approved by the University Graduate Committee (11/9/10):

- | | |
|---|---|
| 1. Title Page | 6. Introductory Statement |
| 2. Personal Responsibility Statement ¹ | 7. Literature Review |
| 3. Signature Page | 8. Data Collection/Analysis/Project Documents |
| 4. Table of Contents | 9. Conclusions/Recommendations |
| 5. Abstract | 10. References |
| 11. Appendixes | |

The project option is completed when the graduate advisor submits the final grade for the project and the student has successfully made an oral presentation summarizing the importance, approach, and findings of his/her research project. It is required that this final oral presentation be made before all interested faculty and students and be appropriately announced by the student (e.g., via e-mail, flyers, or other effective advertisement) ahead of time.

¹ The following statement shall be included at the center of the Personal Responsibility Page (*scheduled to be implemented beginning in AY 2012-13*):

“Personal Responsibility Statement:

I have completed this work under the direction of my faculty advisor _____ (*add name*) and all results presented are my original work, or otherwise explicitly acknowledged in writing within this report. The conclusions and recommendations therein are based on my best assessment of the obtained or experimentally developed evidence.

Signed _____”

Grading

The grade in the CE 298 Project option is thus calculated based on the following two parts:

Part I.-Nature, merit, quality, completeness of the work performed and correctness, quality, clarity, and organization of the written report.

See attached Rubrics: **Points: 160**

Part II.-Clarity, correctness, completeness, and effectiveness of oral presentation.

See Oral Presentation Rubrics: **Points: 100**

Total Points: 260

Grade Scale:	A:	> 240
	B:	> 214 ≤ 240
	C:	> 202 ≤ 214
	D:	≥ 170 ≤ 202
	F:	< 170

Part I Rubric (Project Content and Written Report)

Student's name _____

Abstract

(10)

- a. project/problem statement _____ out of 3 points
- b. A brief statement of the merit of the study _____ out of 2 points
- c. A brief summary of results and conclusion _____ out of 3 points
- d. 3-5 Key Words _____ out of 2 points

Introduction

(30)

- e. format/grammar _____ out of 5 points
- f. Description of the importance of the project _____ out of 5 points
- g. Literature Review, including:
 - i. pertinent background knowledge and technology _____ out of 5 points
 - ii. similar works done by others _____ out of 3 point
 - iii. reference citations _____ out of 2 points
- h. Project statement and objectives _____ out of 5 point
- i. Tasks and hypothesis _____ out of 5 points

Data Acquisition

(30)

- j. format/grammar _____ out of 5 points
- k. List of data types, names and meanings and sources _____ out of 5 points
- l. list of the names of equipment, software and parameters _____ out of 3 points
- m. data acquisition procedures _____ out of 6 points
- n. evaluation of the quality of each type of data _____ out of 6 points
- o. lists of any uncertain or unexpected factors _____ out of 5 points

Results and Discussion

(50)

- p. format/grammar _____ out of 5 points
- q. logic of content _____ out of 5 points
- r. proper tables and figures, including:
 - i. proper figures and tables with captions _____ out of 10 points
 - ii. consistent format of the tables and figures _____ out of 5 points
- s. interpretation and inclusion of all data, tables and figures _____ out of 15 points
- t. discussion of the uncertainty and reliability of the data _____ out of 5 points
- u. final results _____ out of 5 points

Conclusion

(30)

- v. format/grammar _____ out of 5 points
- w. summary of project results and findings _____ out of 15 points
- x. the impact of results on the project's objective _____ out of 5 points
- y. recommendation for future study _____ out of 5 points

References

(5)

- z. follows ASCE Journal Paper format _____ out of 5 points

Acknowledgement, Appendices, Electronic Documents

(5)

- aa. acknowledgements (funding, contributors) _____ out of 2 points
- bb. Appendix(es) and electronic attachments _____ out of 3 points

Part I Score _____ out of 160 points or _____ %

Part II Rubric (Project Oral Presentation)

Student's name _____

Delivery

- Was the presenter enthusiastic about the presentation
1 through 5 (5 = best) []
- Was the voice clear, audible, and understandable
1 through 5 (5 = best) []
- Did the presenter use proper terminology and grammar
1 through 5 (5 = best) []
- Did the presenter introduced her/himself and the topic concisely
1 through 5 (5 = best) []
- Was there an outline of the presentation given at the beginning
1 through 5 (5 = best) []
- Did the presenter summarize the presentation at the end
1 through 5 (5 = best) []
- Did the presenter allow for questions at the appropriate time
1 through 5 (5 = best) []
- Was time allotted used appropriately
1 through 5 (5 = best) []

Delivery Subtotal (out of 40): _____

Content

- Were the objectives of the research topics clearly presented?
1 through 10 (10 = best) []
- Was the State-of-the-Art presented factually, quantitatively, precisely?
1 through 10 (10 = best) []
- Were the Research Needs presented clearly as a natural continuation of the State-of-the-Art?
1 through 10 (10 = best) []
- Was the Methodology presented clearly and convincingly?
1 through 10 (10 = best) []
- Was the analysis presented clearly and quantitatively as appropriate
1 through 10 (10 = best) []
- Were the conclusion presented succinctly, and clearly supported by the data and analysis
1 through 10 (10 = best) []

Content Subtotal (out of 60): _____

Part II Score _____ out of 100 points or _____ %