



Department of Civil and Geomatics Engineering
Master of Science in Civil Engineering
STUDENT OUTCOME ASSESSMENT PLAN
2012-13

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Mission of the MSCE Program

The mission of the MSCE Program at CSU Fresno 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 additional technical depth and educational experience geared toward professional practice, through creative instruction and research.

MSCE Program Goals

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

- Embrace principles of professional ethics, personal responsibility, and environmental stewardship.
- Describe and explain, beyond the undergraduate level, the scientific principles involved in the mapping, or analysis, or design of the built environment.
- Evaluate and employ advanced concepts and methodologies for the design of the built infrastructure and 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 design in civil and geomatics engineering.
- Exhibit excellent communication skills in writing, oral, graphical, and public speaking.

MSCE Student Learning Outcomes

Students graduating from the MSCE program will (according to their area of concentration) be able to:

1. adhere to principles of professional ethics, personal responsibility, and environmental stewardship.
2. describe, explain, and employ the scientific principles and modern professional techniques in the analysis of:
 - a. structures,
 - b. water supply and water and wastewater treatment facilities,
 - c. or geotechnical structures.
3. design structures, water supply and water treatment facilities, or geotechnical structures,
and/or
describe, explain, and employ modern procedures for the analysis and design of water supply and distribution, storm drainage management, wastewater collection and reuse/ disposal, water and wastewater treatment, solid waste management, and environmental protection and remediation systems,
and/or
describe, explain, and employ modern scientific principles and techniques for measuring and mapping the earth and the built infrastructure.
4. identify major regulations, codes, and specifications applicable to the planning, analysis, measuring, mapping, and design of the built infrastructure; and be able to specify where current versions can be obtained.
5. solve problems in engineering analysis and design through the use of mathematical analysis, differential equations, finite elements, finite differences, least square errors, or other numerical methods.
6. use modern computer software for analysis, design, measuring, and mapping of the built infrastructure.
7. exhibit excellence in writing technical documents, research reports, and proposals.
8. exhibit excellence in oral and public presentations in front of technical and non-technical audiences.

Relationship between Program Goals and Outcome Measurement Instruments

The relationship between MSCE Program goals and outcome measurement instruments are summarized in Table 1. Three program goals are currently assessed using two instruments, the Graduate Writing Exam and CE 298 Project or CE 299 Thesis. Use of additional instruments and assessment of all goals is planned in the future. Data on student assessment of their own level of attainment of goals is collected via the exit survey (and in the future by the alumni survey). However, this data is considered to be non-objective and therefore those instruments have been omitted from Table 1.

Table 1. Relationship between program goals and outcome measurement instrument.

	Outcome Measurement Instrument			
	1	2	3	4
<p>Program Goals: The overall goal of the MSCE program is to prepare the MSCE students for professional practice and further advanced study. Upon completion of the graduate program of study in Civil Engineering, the competent student will successfully attain the knowledge and skills necessary to:</p>	Graduate Writing Requirement	Culminating Experience (Project or Thesis)	Employer Survey (future)	Advisory Council Survey (future)
Embrace principles of professional ethics, personal responsibility, and environmental stewardship.	X *	X *	X	X
Describe and explain, beyond the undergraduate level, the scientific principles involved in the mapping, or analysis, or design of the built environment.	X*	X	X	X
Evaluate and employ advanced concepts and methodologies for the design of the built infrastructure and 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 the analysis and design in civil and geomatics engineering.		X	X	X
Exhibit excellent communication skills in writing, oral, graphical, and public speaking.	X	X	X	X

* Attainment of specific goals vary with topic, scope, objectives of the activity.

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

Relationship between Program Goals, Learning Outcomes, and Courses

The relationship between MSCE Program goals and student learning outcomes, and the relationship between MSCE Program courses and student learning outcomes, are articulated below.

Relationship between Program Goals and Learning Outcomes

The relationship between MSCE Program goals and student learning outcomes are summarized in Table 2. 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 2. 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	Outcome 8
<p>Program Goals: The overall goal of the MSCE program is to prepare the MSCE students for professional practice and further advanced study. Upon completion of the graduate program of study in Civil Engineering, the competent student will successfully attain the knowledge and skills necessary to:</p>	adhere to principles of professional ethics, personal responsibility, and environmental stewardship	describe, explain, and employ the scientific principles and modern professional techniques in the analysis of: structures, water supply and water or wastewater treatment facilities, or geotechnical structures	design structures, water supply and water treatment facilities, or geotechnical structures, and/or describe, explain, and employ modern procedures for the analysis and design of water supply and distribution, storm drainage management, wastewater collection and reuse/ disposal, water and wastewater treatment, solid waste management, and environmental protection and remediation systems, and/or describe, explain, and employ modern scientific principles and techniques for measuring and mapping the earth and the built infrastructure	identify major regulations, codes, and specifications applicable to the planning, analysis, measuring, mapping, and design of the built infrastructure; and be able to specify where current versions can be obtained	solve problems in engineering analysis and 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, and mapping of the built infrastructure	exhibit excellence in writing technical documents, research reports, and proposals	exhibit excellence in oral and public presentations in front of technical and non-technical audiences
Embrace principles of professional ethics, personal responsibility, and environmental stewardship.	X							
Describe and explain, beyond the undergraduate level, the scientific principles involved in the mapping, or analysis, 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 and 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 the analysis and design in civil and geomatics engineering.		X	X		X	X		
Exhibit excellent communication skills in writing, oral, graphical, and public speaking.							X	X

Relationship between Program Courses and Learning Outcomes

The relationship between MSCE Program courses and student learning outcomes are summarized in Table 3. 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 3. Relationship between Program Courses and Student Learning Outcomes.

Course	Student Learning Outcomes							
	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7	Outcome 8
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 Mechanics		A	A	A	I	A	A	
CE 225 Num Methds Geot Engr		A	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	R	A	A	R		R	
CE 235 Finite Elmt Anal		A			A	A		
CE 236 Reinf Masonry Ther & Desgn		A	A	A	A			
CE 237 Dynamics of Struct		A			A	A	R	
CE 239 Adv Reinf Conc Theory		A	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			R		R	
CE 245 Geoenv Engr	A	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.

Assessment

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. The use of alumni surveys after graduation, employer surveys, and Advisory Council surveys is planned in the future. The assessment activities are summarized as follows:

Direct Measures:

1. **Students' scores on specific final exam questions in specific MSCE 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, Employer Surveys, Advisory Council Surveys (summative)***

Students' scores on specific final exam questions

Outcomes 1 through 6, which assess ethics (Outcome 1) and technical knowledge and skills (Outcomes 2-6), are assessed by statistical analysis of student scores on one (or more) questions on final exams that every student is required to answer. Efforts will be made to locate these questions at the front of exam and to use the same or similar question in future exams when possible. Outcomes 1 through 6 are rotated in pairs each year (identified with a check mark). Outcomes 7 and 8, which assess written and oral communication skills, respectively, are assessed every year. Since all these courses are offered either, once a year or once every three semesters, the aggregate of student results is used for assessment. Outcomes assessed in past years or expected to be assessed in the in current assessment year are identified by pattern fill in the box.

The MSCE curriculum currently includes four clearly defined areas of specialization within civil engineering, namely: environmental/ water resources, geotechnical, geomatics, and structural. Students graduating with the MSCE degree will have a level of preparation that is unique to the individual area of concentration and thus not all MSCE students will take all the courses that are designated as assessment instruments. The courses used for outcomes assessment in the various specializations within the program are shown in Table 4, along with an implementation schedule.

Students' performance in writing and in oral presentations

The writing component of course CE 210 *Research Methods* is the primary instrument used for determining whether or not a student passes the Graduate Writing Requirement, which is a required for Advancement to Candidacy. At present the Program Qualifying Exam requirement is automatically met when the student passes the Graduate Writing Requirement. The two main objectives of this course 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. 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, as indicated in the CE 210 syllabus. The communication skills component of CE 210, in writing, graphical, and oral presentations, is strong, and the overall performance of students in the writing and oral presentation components are used for assessment purposes. The rubrics to assess the writing component are given in the syllabus of the CE 210 course. Assessment is conducted annually each time the course CE 210 is taught.

Table 4. Implementation schedule for formative assessment via student scores on final exam questions.

Course	Area of Specialization				Implementation Schedule ^{1, 2}														
	Environmental & Water Resources	Geotechnical	Geomatics	Structures	2011-12				2012-13				2013-14						
					Taught? ³	Outcomes				Taught? ³					Taught? ³				
						3	4	7	8		5	6	7	8		1	2	7	8
CE 205 Comp in Engr Analysis		X	X	X	Y					Y	√	√					√		
CE 206 Engr Env Impact	X						√			Y							√		
CE 210 Research Methods	Note 4				Y			•••	√	Y		√	√	√				√	√
CE 220 Adv Found Engr		X		X		√	√	√			√	√	√					√	
CE 223 Adv Soil Mechnics		X					√			Y	√	√	√				√	√	
CE 232 Prestressed Conc				X	Y	•••	•••												
CE 233 Adv Beh & Des Steel Structures				X	Y	√	√	√			√		√				√	√	√
CE 240 Engr Hydrology	X				Y					Y	√	√						√	
CE 242 Urban & Indust. Water Syst.	X									Y	√		√				√	√	√
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 Outcomes that are not measured occur due to the course not being offered during the year shown or due to extenuating circumstances.

³ A blank box indicates that the course was not taught during the academic year indicated.

⁴ Area depends on topic selected by student.

Students' performance in the culminating experience

The MSCE program offers three culminating experience plans to complete the program, namely: (A) Thesis, (B) 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. The rubrics used to evaluate and score projects can be found in Appendix A. Initially only Outcomes 7 and 8 will be assessed, based on the total score from Rubric I (written report) and Rubric II (oral presentation), respectively. 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. A set of rubrics for CE 299 Thesis has not been developed and some members of the graduate faculty think that one is not necessary; this topic will be discussed further within the MSCE Program.

Exit Surveys

All students graduating from the MSCE program are asked to complete a program exit survey (on a voluntary basis), and that may occur either at the end of fall or spring semesters. For students completing a thesis or project in the summer semester, the survey is administered in the spring immediately preceding the graduating summer. The exit survey is shown in Figure 1. In addition to the program-administered exit survey, the campus Office of Institutional Effectiveness collects survey data from graduating students and, when data specific to the MSCE program can be identified, the data is requested for use in assessment.

Alumni, Employer, and Advisory Council Surveys

Surveys of prior graduates of the MSCE Program, 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 are surveys for employers of program graduates and the Civil Engineering Advisory.

Timeline and Responsibilities

Timelines and responsibilities for collecting assessment data are summarized in Table 5.

MSCE Program
Graduating Student Feedback

Date _____ Graduation: Spring [] Fall [] Summer [] Year: _____

Under which plan did you complete the MSCE Thesis [] Project [] Comp. Exam []

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

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

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

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

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

Based on your experience through the MSCE program, provide your assessment as how the program fulfills its goals as follows:

(Use a numerical rating from 1 through 4, where 1.0 = inadequately and 4.0 = excellently)

Goal	Scale 1.0 through 4.0
Did the MSCE program help you to better understand, beyond the undergraduate level, of the scientific principles involved in the analysis of, or mapping of, the built environment, including, structures, water supply and water treatment facilities, and geotechnical structures (as applicable in your area)?	[]
Did the MSCE program help you to know the methodologies for the design of the built infrastructure or know how to map and measure it (as applicable in your area)?	[]
Did the MSCE program help you to know advanced techniques of analysis, including mathematical analysis and modeling, numerical techniques, and know the use of professional software for analysis and design in civil or geomatics engineering (as applicable in your area)?	[]
Did the MSCE program help you to have excellent communication skills in writing, oral, graphical, and public speaking?	[]
Did the MSCE program help you to understand and adopt principles of professional ethics, personal responsibility, and environmental stewardship?	[]

Figure 1. MSCE Program Student Exit Survey form.

Table 5. Assessment time table and action plan.

Assessment Activity	How Often	Who	How	
Student scores on final exam problems in selected MSCE courses	In accordance with Table 4	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	After each time the course is taught	Course instructor provides summary of results to Graduate Coordinator	Graduate coordinator compiles information and summarizes it every year	
Student performance in culminating experience	After each student presentation	Advisor provides summary of results to Graduate Coordinator	Graduate coordinator compiles information and prepares a summary every year	
Exit Surveys	At graduation of each student	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 Surveys	Continuous solicitation from alumni (<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 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.

**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).

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).

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 _____ %