UNIVERSITY OF LOUISVILLE

CERTIFICATE PRE-PROPOSAL FORM

Institution: University of Louisville

Program Name

Certificate in Structural Engineering

Degree Level ***(Select)***

Undergraduate	***Graduate*** ***(select one of the following):***		
○ Pre-Baccalaureate	◉ Post-Baccalaureate	○ Post-Master's	○ Post-Professional

Classification of Instructional Program (CIP) (2-digit) Code ***(Select One)***

14-ENGINEERING.

(CIP) Area of Study

To Be Assigned by Provost Office

Proposed Implementation Date: ***(Semester and Year)***

Spring 2017

Institutional Contact Information

Name: J.P. Mohsen, Ph.D.
(First and Last Name)

Title: Professor and Chair

Email: jpm@lousiville.edu **Work Phone: (502) 852 - 4596**

2a. Provide a Brief Description of the Program.

The Certificate program is designed for students seeking to gain knowledge in the field of structural engineering. Courses in the proposed program are currently being offered in the existing Master of Science in Civil Engineering and Master of Engineering in Civil Engineering program. We are proposing to allow students in the certificate program to take four courses (12 hours) from the existing curriculum, and earn a certificate. Students must complete three required courses, and one elective to complete the program (outlined in question 4 below).

The certificate provides a gateway for students (UofL alumni, and new students) with a B.S. to gain expertise in a specific area in civil engineering. We believe that this will also

open a new pool of potential recruits for our master's level programs in the Civil and Environmental Engineering (CEE) Department.

Also, by diversifying the offerings at the graduate level, potential students will now have an additional option to choose from, which may suit their time commitment, and educational needs more adequately. We believe the program has a demand in the region and amongst the commonwealth's structural engineering community. The online courses will also bring in new students regionally and nationwide.

2b. What are the objectives of the proposed program?

There are three major objectives for offering a certificate program.

1. To provide an alternative option for students who do not wish to complete a full master's degree.
2. To provide students the focused technical knowledge in their field.
3. To Align with Industry Initiatives.

Providing an alternative option for students who do not wish to complete a full master's degree.

In the past, graduates of the CEE program received an accredited degree, only if they completed the Master of Engineering (MEng) program. In 2013, all degree programs in the Speed School became dual-accredited by ABET at both the undergraduate, and graduate level. Since graduates now receive an accredited degree at the bachelor's level, we have seen a reduction in the total number of students choosing to stay for their master's degree.

Feedback from the CEE undergraduate advisor helped to identify the top reasons why students choose to leave after completing their bachelor's degree. These reasons are, the additional time needed to earn a master's degree, and the additional cost to earn a master's.

The certificate program will provide a less expensive alternative, and take less time to complete (refer to table 1 for a cost comparison).

Providing students the focused technical knowledge in their field.

By offering courses specific to structures engineering, students can gain expertise specific to their area of interest. The generalization of knowledge at the undergraduate level means

that graduates typically gain experience on the job, through a master's degree, or possibly a certificate program (although currently few certificates exist). Most employers require that their new hires have education beyond a bachelor's degree in the field of structures engineering (for more details refer to section 8a under Market Conditions). Therefore, the certificate program creates a stepping stone for those who need more education that will be applicable to their career, and those who wish to change careers into the field.

Aligning with Industry Initiatives.

The American Society of Civil Engineers currently has an initiative called "raise the bar," which proposes that by the year 2020 any civil engineer desiring to become a licensed engineer must have a BS degree plus an additional 30 credit hours of course work or "equivalent." This requirement can be achieved, of course by completing a master's degree or completing what is considered as equivalent to those 30 credit hours. The proposed Certificate in Structures can be counted as a substantial part of this equivalent part. Having this certificate program established, will place the University of Louisville Civil Engineering in the forefront of fulfilling this need by 2020.

2c. Explain how the objectives support the institutional mission and strategic priorities, the statewide postsecondary education strategic agenda, and the statewide strategic implementation plan.

The structural engineering certificate program aligns with the four strategic goals of the J.B. Speed School and University of Louisville strategic plans. These goals include educational excellence; research, scholarship and creative activity; community engagement; and diversity and opportunity. Below is a summary of how this certificate aligns with each of these goals.

Educational Excellence

The certificate will be offered both online and on-campus, and can be completed virtually or in a hybrid format. The CEE Department is continuously adding new courses that are relevant to the field, and to society. Also, the fact that the program is available to student's world-wide, through online instruction, will allow the university to attract top-level professionals regardless of their location.

Research, Scholarship and Creative Activity

The certificate program increases the visibility of the University and Speed School due to the fact that there are very few institutions offering engineering certificates. The addition of this certificate program in engineering shows the innovation and creative endeavors in which the Speed School is involved. Although the addition of an online certificate is not directly related to research, the addition of these programs will generate funds to the department that may be able to use to assist with research projects.

Community Engagement

The Certificate program will give the CEE department the opportunity to work with local companies that require their employees to pursue advanced training, and professional development. With the availability of courses online, it will also give UofL, and Speed School alumni, who wish to gain graduate level knowledge, to do so while being able to maintain their careers. The certificate also better prepares those currently in the field of engineering who want to change their career paths.

Diversity and Opportunity
When completed online, the certificate program is open to anyone worldwide, which means that the target audience is highly diverse. Also, the lower price point of a certificate compared to a full master's level program makes it more affordable. (See question 2b above for a cost comparison)

2d. Is an approval letter from Education Professional Standards Board (EPSB) ? *(Education Proposals Only)*

☐ Yes ☑ No

If yes, please attach and send the approval letter from EPSB with this form.

3. The admission, retention, and completion standards designed to encourage high quality. Provide projected enrollment and graduates for a five-year period.

The current recruiting, admission, and advising processes for the existing master's degree program will also apply to this new certificate program.

- Undergraduate Degree in Civil Engineering or technically related field
- Graduate application and application fee
- Minimum GPA of 2.75 in previous degree

Students will receive assistance from a dedicated recruitment coordinator prior to enrollment. The recruitment coordinator for campus programs in the Civil Engineering department is Ify Whitfill. Mrs. Whitfill is currently employed by the Civil Engineering department, and assisted by student workers (hired through the Speed School Work Scholarship Program). Mrs. Whitfill is also supported by staff in the Speed School Office of Academic Affairs in special circumstances such as her absence from the office, processing of documents, etc. For online programs the Delphi's Center's Office of Online Learning has dedicated recruitment coordinators who have developed a plan to convert leads to applicants.

An estimate of enrollments for the first five years is included below:

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Total Enrollment	4	6	6	8	10

The numbers above reflect our conservative projections for enrollments. We will accept as many students that apply, as long as it does not exceed the capacity of each course, which varies depending on the course.

4. The program curriculum and any options; indicate total number of credit hours required for degree completion.

- CEE 522-Fundamentals of Prestressed Concrete
- CEE 626- Masonry Design
- CEE 523 Timber design

For the remaining courses, students will choose one of the following four electives.

- CEE 623 Advanced Structural Engineering
- CEE 665 Pavement Design
- EM 525 Project Management
- CEE 694 Building Information Modeling

Graduation Requirements: Students must complete a minimum of nine credit hours of required courses and three credit hours of elective courses. Students must complete the 12-credit certificate program with a GPA of at least 3.0.

5. The library resources available to support this program. Provide a letter from the appropriate University Library verifying available resources.

Please refer to the attached letter from the Dean of Libraries.

6a. What are the intended learning outcomes of the proposed program?

The program's learning outcomes will be based on the student learning outcomes used for ABET accreditation of the CEE program. Please refer to the appendix with the ABET attachment for a full description of the related outcomes (A-K), and assessment criteria.

CEE 522-Fundamentals of Prestressed Concrete: ABET outcomes D & I

CEE 626- Masonry Design : ABET outcomes A &D

CEE 523 Timber Design: ABET outcomes A &D

CEE 623 Advanced Structural Engineering: ABET outcomes A,I,J, & K

CEE 665 Pavement Design: ABET outcomes A,D, H, I, & J

A. *Develop in students an ability to apply knowledge from math, science, and engineering.*

D. *Provide experience and guidance in working on teams having a diverse technical makeup.*

H. *Provide a breadth of course work and perspectives that create an understanding of the impact of engineering in society, both local and global.*

I. *Create an awareness in students of the need for life-long learning, whether through formal education or via many other means.*

J. *Expose students to contemporary issues pertinent to the practice of civil engineering.*

K. *Through both instruction and practice, develop in students an ability to use the techniques, skills and modern engineering tools commonly used in civil engineering practice.*

6b. Identify both the direct and indirect methods by which the intended student learning outcomes will be assessed.

Indirect assessments can be found in the appendix.

7a. Will this be a 100% distance learning program? *(Select One)*

☑ Yes ☐ No

7b. Will this program utilize alternative learning formats (e.g. distance learning, technology-enhanced instruction, evening/weekend classes, accelerated courses) *(Please select all that apply)*

☑ Distance learning

☑ Courses that combine various modes of interaction, such as face-to-face, videoconferencing, audio-conferencing, mail, telephone, fax, email, interactive television or World Wide Web.

☑ Technology-enhanced instruction

☐ Evening/weekend/early morning classes

☐ Accelerated Courses

☐ Instruction at nontraditional locations, such as employer worksite

☐ Courses with multiple entry, exit, and reentry points

☐ Courses with "rolling" entrance and completion times, based on self-pacing

☐ Modularized courses

8a. Provide justification and evidence to support the need and demand for this proposed program. Include any data or student demand; career opportunities at the regional, state, and national levels; and any changes or trends in the discipline(s) that necessitate a new program.

PROGRAM NEED:

The program need was assessed in a qualitative basis:

Target Audience	Description	Benefit of gaining a certificate
CE Professionals with BSCE	Those with a BS in Civil Engineering can work in any area, in civil engineering, upon completing their degree. Although new graduates don't tend to have an issue finding jobs, those who have been in the industry for some time may have difficulty when trying to change their career field (for example, structures to transportation).	Provides a stepping stone for those with a BS to gain additional education in their area of interest.
CE Professional with Masters in an area other the Structural Engineering	These professionals do not have a background in structural engineering, so they need to complete courses in the field if they plan to practice in that specific area.	Provide knowledge in the specific to structural engineering giving them the competence to possibly open opportunities in their career

	Similar to the same situation as CE professionals with a BSCE these professionals need to gain expertise in the field in order to be attractive for employment.	
International University Needs	During a visit by Dr. J.P. Mohsen (UofL CEE Chair) to the University of Sharjah in UAE, the head of the continuing education department at the university explicitly expressed interest in promoting a certificate program to his students. Dr. Mohsen was told that applicants from the UAE would find the certificate more desirable than the master's degree.	

PROGRAM DEMAND:

Career Opportunities:

In general civil engineering careers are poised for growth of 8% from 2014-2024. This growth is mainly due to the need for an aging domestic infrastructure (BLS.gov). It is more important to note that currently there are few engineering certificate programs offered online The Bureau of labor Statistics states that new standards known collectively as the Body of Knowledge (as outlined by The American Society of Civil Engineers) are growing in importance within civil engineering, and this development is likely to result in a heightened need for a graduate education. Therefore those who enter the occupation with a graduate degree will likely have better prospects.

Research from Burning Glass, a company specializing in tracking job outlooks, showed that there were 8,657 (6,719-structural design, 709-Bridge Design, and 690- Bridge Engineering, 539-Masonry) nationwide job posting where employers were looking to hire structural engineers, analysts, and managers specifically in the field of civil engineering.

8b. Specify any distinctive qualities of the proposed program.

- The program is offered 100% online and are delivered in an asynchronous format.
- Curriculum structure allows students to complete the program as quickly as one year, if they so choose.
- All instructors of online courses in the certificate program are graduates of Delphi University. They have received professional training by experts in the area of distance education.

8c. Does the proposed program serve a different student population (e.g. students in a different geographic area, non-traditional students, etc.) from existing programs? *(Select One)*

☑ Yes ☐ No

If yes, please explain:

The program will attract students from various parts of the world through the online program.

9a. How will the program support or be supported by other programs within the institution?

☑ Yes ☐ No

If yes, please explain:

The certificate program will be supported by the current MEng and MS in Civil Engineering curriculum due to shared courses**.** Also, selected Civil Engineering courses have been designated as available courses to the UofL interdisciplinary graduate degree program in sustainability.

9b. Will this program replace or enhance any existing program(s) or track(s), concentration(s), or specialization(s) within an existing program?

☑ Yes ☐ No

If yes, please explain:

The program will enhance the current master's level programs. It will now allow students interested in attaining a MS or MEng in Civil Engineering to earn a specialized certificate. It will also give students and prospects an alternative to earn a certificate if it is more relative to their career goals. Those individuals who choose to pursue a career after completing their BS degree, will now have an opportunity to gain advanced knowledge in a specific concentration within civil engineering, without having to pursue a full master's degree.

A graduate of the BS program can enroll in the certificate program, and be more effective as a structural engineer, due to the additional knowledge they gain from the certificate courses.

10. Relationship with programs at other institutions (if applicable)

None

11a. Faculty qualifications and resources - List the faculty supporting the new program and indicate the percentage of time each will devote to the proposed program. Submit curriculum vitae of full-time faculty members and adjunct/part-time faculty who will launch the program.

Full-time faculty:
Dr. Mark McGinley
Dr. Young-Hoon Kim
Dr. Zhihui Sun

Across the board, the average number of students in each of the required courses has been 5 students. With this in mind, we believe that in the next 5 years we can expect courses to have additional students per course. Currently there is built in capacity to handle up to 25 students per course. . Considering these numbers, no reallocation of faculty responsibility deems necessary.

11b. If additional faculty *(including graduate assistants)* will be required within the next five years, indicate the number and role of each new faculty member.

At some point in the future, we see the growth of the certificate program to be such that we will need a part-time lecturer employed on a permanent basis to help teach courses. Also, depending on the workload of the faculty, a student assistant may be hired. The Student Assistant will be paid on an hourly basis. The duties will be to assist in course material preparation, prepare PowerPoint slides, and be available to support with teaching activities as needed.

12a. Preliminary cost estimates - The resource requirements and planned sources of funding of the proposed program must be detailed in order to insure the adequacy of the resources to support a quality program. Will this program require additional resources?

☑ Yes ☐ No

If yes, provide a brief summary of additional resources that will be needed to implement this program over the next five years.

Since the proposed certificate program will include existing courses already delivered in the MS in Civil Engineering, there are no additional expenses that will be incurred by offering those courses. Identifiable additional costs that we foresee, are marketing expenses, hiring of a student assistant and the possible need for Software/licenses. Funding for marketing and the software/licenses will be generated from online learning revenue.

12b. Will this program impact existing programs and/or organizational units?

☑ Yes ☐ No

If yes, please describe the impact on existing programs, will resources be allocated (i.e. reassign faculty or staff, change course offerings, reduction in students served?)

The addition of the certificate will complement, help to advertise, and promote the existing master's programs. The success of this new certificate program, and its related courses, will help increase the department's online enrollments, registrations, and tuition revenues.

Financial Aid for Certificate Programs

Students enrolled in stand-alone certificate program are not eligible for federal financial aid. The university elected on 6.30.2012 to opt out of participation with the Department of Education (DOE). To qualify for federal aid, the law requires that most for-profit programs and certificate programs at nonprofit and public institutions prepare students for gainful employment in a recognized occupation. UofL students must be enrolled in a degree granting program in conjunction with the certificate program to receive federal aid.

APPENDIX

ABET Student Learning Outcomes:

A. *Develop in students an ability to apply knowledge from math, science, and engineering.*

B1. *Develop an ability to organize and conduct laboratory and field work.*

B2. *Develop an ability to analyze and interpret data.*

C. *Develop student competence in the design of systems, components, and processes to meet specific needs.*

D. *Provide experience and guidance in working on teams having a diverse technical makeup.*

E. *Train students to identify, formulate, and solve engineering problems.*

F. *Instill in students an understanding of professional and ethical responsibilities, both in education and in practice.*

G1. *Develop and practice effective oral communication.*

G2. *Develop and practice effective written and graphic communication.*

H. *Provide a breadth of course work and perspectives that create an understanding of the impact of engineering in society, both local and global.*

I. *Create an awareness in students of the need for life-long learning, whether through formal education or via many other means.*

J. *Expose students to contemporary issues pertinent to the practice of civil engineering.*

K. *Through both instruction and practice, develop in students an ability to use the techniques, skills and modern engineering tools commonly used in civil engineering practice.*

Assessment Methodology of ABET Student Learning Outcomes:

***Student Outcome A**: Ability to Apply Knowledge from Math, Science, and Engineering.*

Curriculum Displays: Selected practitioners and the course instructor(s) will evaluate the Capstone Design term project.

The average overall rating for the project is to be 3 or higher on the following scale.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

***Student Outcome A:** Ability to Apply Knowledge from Math, Science, and Engineering.*

Fundamentals of Engineering Exam: CEE students taking the FE exam have an average score equal or better than the national average score for the morning part of the exam.

***Student Outcome B1**: An ability to organize and conduct laboratory and fieldwork.*

Curriculum Displays: Instructors' evaluation from the following courses:

CEE 530 Construction Materials
CEE 451 Geomechanics Lab
CEE 371 Hydraulics Lab
CEE 261 Field Measurements Lab
CEE 255 Mechanics of Materials Lab

At least 80% of students receive a rating of 3 or higher from instructor on the following scale on their effectiveness in lab and fieldwork. An evaluation form will be used to assess and document effectiveness of each student in lab or field related activities of each course.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

***Student Outcome B1:** An ability to organize and conduct laboratory and field work.*

Student Advisory Committee: An average rating of 3.5 or higher is given in response to the following statement using the scale shown.

The CEE program offers a positive opportunity for students to function effectively in laboratory and field work.

[----------5----------4----------3----------2----------1----------]

Strongly Agree Agree Strongly Disagree

Student Outcome B2: *Ability to Analyze and Interpret Data.*

Fundamentals of Engineering Exam: The afternoon score average should be at least equal to the national average for all CEE students taking the exam.

Student Program Outcome B2: *Ability to Analyze and Interpret Data.*

Co-op reports: At least 80% of students should receive a rating of 3 or higher from the co-op employer on the following scale in response to questions concerning the ability to analyze and interpret data.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable	No Basis For Review
4	3	2	1	N

Student Outcome C*: Competence in the design of systems, components, and processes to meet specific needs.*

Curriculum Displays: A panel of practitioners/ faculty members will evaluate representative assignments from the following courses:

CEE 421 Fundamentals of Concrete Design
CEE 422 Fundamentals of Steel Design
CEE 460 Transportation Systems Design
CEE 452 Foundation Engineering
CEE 480 Capstone (BSCE)
CEE 571 Applied Hydrology (MEng)*
CEE 572 Open Channel Hydraulics (MEng)**
CEE 680 Capstone (MEng)*

Reviewed material should show evidence of student competence in the Civil Engineering design process. A rating of 3.5 or higher is required, using the following scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome C: *Competence in the design of systems, components, and processes to meet specific needs.*

Advisory Council: A panel of practitioners selected from the Advisory Council members and the course instructor(s) will evaluate the Capstone Design term project.

The average overall rating for the project is to be 3 or higher on the following scale.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome D: *An Ability to function on teams.*

Co-op Employer Survey: At least 80% of the students should receive a score of 3 or higher on the following scale (on the co-op student appraisal form):

Understands the Company's (employers) concept of teamwork and contributes to its goals.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable	No Basis For Review
4	3	2	1	N

Student Outcome D: *An Ability to function on teams.*

Curriculum Displays: A panel of practitioners/ faculty members will evaluate representative assignments from the following courses:

CEE 480 Capstone (BSCE)
CEE 680 Capstone (MEng)*

Student Outcome D: *An Ability to function on teams.*

Advisory Council: Selected members of the Advisory Council will assess effectiveness, interaction, and performance of group members in Capstone Design as part of a team with diverse backgrounds. At least 80% of the students should receive a score of 3 or higher on the following scale.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome E: *Identify, Formulate, and Solve Engineering Problems.*

Focus Assignments: A selected group of practitioners and the instructor(s) will review specific reports and projects in the following designated courses to assess demonstrated abilities of students to identify, formulate, and solve engineering problems. The average rating should be at least 3 using the following scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

CEE 421 (Structures)
CEE 452 Geotechnical)
CEE 471 (Water Resources)
CEE 480 Capstone (BSCE)
CEE 560 Traffic Engineering (MEng)*
CEE 571 Applied Hydrology (MEng)*
CEE 572 Open Channel Hydraulics (MEng)*
CEE 680 Capstone (MEng)*

Student Outcome E: *Identify, Formulate, and Solve Engineering Problems.*

Advisory Council: A selected group of practitioners and the instructor(s) will review term projects from the Capstone Design course to assess demonstrated abilities of students to identify, formulate, and solve engineering problems. The average rating should be at least 3 using the following scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome F: *Understanding of Professional and Ethical Responsibility.*

Alumni Survey: At least 75% of the respondents rate their understanding of professional and ethical responsibilities high.

Student Outcome F: *Understanding of Professional and Ethical Responsibility.*

Fundamentals of Engineering Exam: Average score of 75% of CEE students taking the FE exam should be at least equal to the national average for the Ethics section of the exam.

Student Outcome G1: *Effective Oral Communication.*

Advisory Council: Presentations made by students in Capstone Design will be evaluated by selected members of the Advisory Council. At least 80% of the student's oral presentations should be rated 3 or better on the following rating scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome G1: *Effective Oral Communication.*

Student Advisory Committee: Student Advisory Committee members agree that the CEE program provides ample opportunity to develop proper oral communication skills. A rating of at least 3.5 is expected using the following rating scale:

[----------5----------4----------3----------2----------1----------]

Strongly Agree Agree Strongly Disagree

Student Outcome G1: *Effective Oral Communication.*

Curriculum Displays: A panel of practitioners/ faculty members will evaluate representative assignments from the following courses:

CEE 480 Capstone (BSCE)
CEE 680 Capstone (MEng)*

Student Outcome G2: *Develop and Practice Effective Written and Graphic Communication.*

Curriculum Displays: Faculty to evaluate curriculum displays from the following courses to assess writing competence of students.

CEE 260 CE Field Measurements
CEE 370 Engineering Hydraulics
CEE 530 Construction Materials

At least 80% of students should receive higher than a 3 rating on the following scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome G2: *Develop and Practice Effective Written and Graphic Communication.*

Co-op Reports: Writing competence of students will be assessed using the following scale; with at least 80% receiving a rating of 3 or higher.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable	No Basis for Review
4	3	2	1	N

Student Outcome H: *Understanding of the Impact of Civil Engineering Solutions in a Global and Societal Context.*

Alumni Surveys: Affirmative responses from at least 80% of respondents. (i.e., the graduates feel they have developed an understanding of the impact of civil engineering solutions in a global and societal context.)

Student Outcome H: *Understanding of the Impact of Civil Engineering Solutions in a Global and Societal Context.*

Focus Assignments: Assignments in CEE 401 Professional Practice will be evaluated by the instructor to assess student understanding of the impact of civil engineering solutions in a global and societal context. The rating on a scale shown on the next page should be greater than 3.0.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome I: *Awareness of the Need for Life-Long Learning.*

Exit Interviews: At least 80% of respondents (graduating students) should be student chapter members of professional organizations such as KSPE or ASCE.

Student Outcome I: *Awareness of the Need for Life-Long Learning.*

Career Surveys: At least 70% of the respondents document participation in continuing education courses within two years after graduation.

Student Outcome J: *Knowledge of Contemporary Issues in the Practice of Civil Engineering.*

Curriculum Displays: Semester project reports in CEE 401 and CEE 530 will be evaluated by the instructor(s) for contemporary issues content. At least 80% of the reports should be rated at 3 or better on the following rating scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome J: *Knowledge of Contemporary Issues in the Practice of Civil Engineering.*

Advisory Council: A selected group of practitioners and the instructor(s) will review term projects from the Capstone Design course to assess demonstrated knowledge of contemporary issues in the practice of Civil Engineering. The average rating should be at least 3 using the following scale:

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable
4	3	2	1

Student Outcome K: *Ability to use Modern Civil Engineering Tools and Techniques.*

Co-op Reports: Employers rate demonstrated ability of the student to use modern civil engineering tools and techniques, with at least 80% of the students receiving a rating of 3 or higher.

Exceeds Expectation	Meets Expectation	Needs Improvement	Unacceptable	No Basis For Review
4	3	2	1	N

Student Outcome K: *Ability to use modern civil engineering tools and techniques.*

Placement Data: Within six months of graduation, at least 80% of program graduates receive job offers, seek higher studies, or otherwise enter the CEE profession.

Table 1

The cost comparison for the certificate program vs. the full master's degree can be seen in the chart below:

Type	Online Total	Campus FT (Resident)	Campus FT (Non-resident)
MEng	22,470	10,542	24,848
Certificate	8,988	7,788	12,424
Difference	$ 13,482	$ 2,754	$ 12,424
MS	22,470	11,664	26,974
Certificate	8,988	7,788	*12,424
Difference	$ 3,482	$ 3,876	$ 14,550

**International students on an F1 visa are not eligible for admission to the certificate program unless pursuing another full degree program.*

NOTE NUMBERS ARE BASED ON TUITION RATES FROM 2016