

**Western University - Faculty of Engineering
Department of Civil and Environmental Engineering**

CEE 4441 - Civil Engineering Design Project - Course Outline 2017/2018

This course is the capstone design for the undergraduate program in the Department. The general objectives are for students to:

- Analyze and interpret data and information provided by others to determine project-specific design criteria and parameters.
- Perform an open-ended analysis of a civil engineering structure or system and make recommendations based on engineering principles and judgment including comparison of options.
- Gain experience functioning on multi-disciplinary teams that may include participating consulting engineers, architects and landscape architects.
- Understand professional and ethical responsibility through the refinement of the design to address the public needs.
- Develop the ability to carry out literature search to find information necessary for completing the project.
- Develop an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
- Improve communication skills by:
 - Meeting regularly with external and internal advisors.
 - Documenting design decisions in clear and concise calculations and notes.
 - Planning and preparing drawings, specifications, and a final report, including cost estimate, that completely describes the proposed design.
 - Presenting and defending the final design before peers and before the general public.
 - Keeping records of time spent on various aspects of the project.
 - Allotting the distribution of grades to the individual members of the design team.

Calendar Copy:

Students undertake a comprehensive engineering design project which involves the creative, interactive process of designing a structure/system to meet a specific need subject to economic, health, safety, and environmental constraints. Each student is required to write an engineering report and deliver a public lecture.

Prerequisites: Completion of Year III of the Civil Engineering Program

Antirequisites: CBE 4497, ECE 4416, MME 4499, SE 4450, ES 4499

Corequisites: None

Note: It is the **student's responsibility** to ensure that all prerequisite, corequisite and antirequisite conditions are met. Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustments to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Course Coordinator:

Dr. J. Southen, Ph.D, P.Eng. jsouthen@uwo.ca
Admin. Asst. SEB3005

City of London Project Coordinators:

Structural Project & Design Competition: Dr. D.J. Harman, P.Eng., djharman@rogers.com

Environmental Project: Dr. G. Nakhla, P.Eng., gnakhla@uwo.ca

Contact Hours:

1 lecture hour/week; 4 laboratory hours/week; meetings with advisors

Project Teams:

The maximum size of a project team is five students. Special permission is required for larger teams.

Teams with less than four members are **not** encouraged.

Lectures and Laboratory:

Students are expected to attend all lectures. Assigned laboratory time will be spent: attending special lectures, working on the project, meeting with advisors, making presentations, and carrying out activities related to the design.

Textbooks and References:

No specific textbooks are assigned. References include pertinent codes and standards, government publications and legislation and other technical references from Taylor Library. Students are encouraged to contact Shiyi Xie <sxie28@uwo.ca> at Taylor Library for any questions regarding literature and references.

Ms. Xie will give two same lectures on literature and information search in Taylor Library's Kellogg Room from 2:30 – 4:00 PM (lecture #1) and 4:00 – 5:30 PM (lecture #2) on October 20, 2017. You will be assigned by the course coordinator to attend one of these two lectures.

Computing:

Students are required to use personal computers running a Windows environment and other computing facilities available in the Civil Engineering Design Room (SEB 16), Don Smith Design Studio (TEB 454), and the Faculty of Engineering Computing Laboratories. SEB 16 can be booked through the Civil & Environmental Engineering Department office (SEB 3005). Students should not remove any materials from the room and should keep it in a clean and tidy condition.

Site Visit:

A site visit will be arranged during the laboratory time early in the course. Transportation will be provided; however, seating is limited. City of London engineers will be present during the site visit to provide background information about the projects. Students who wish to join the site visit must sign up at the Civil Office in SEB3005.

Units:

SI units will be used in lectures, tutorials, calculations and drawings.

Course Deadlines and Evaluation**(all submissions are due at 11:00 am in the Civil & Environmental Engineering Department Office, SEB 3005 unless noted otherwise):**

The deadlines are listed below and the final mark will be determined as follows:

	<u>Date</u>	<u>Mark</u>
<u>INDIVIDUAL WORK:</u>		
Logbook	07 Dec 2017	5%
Preliminary Calculations (as part of the Draft Final Design Portfolio)	07 Dec 2017	<u>15%</u>
		20%
<u>GROUP WORK:</u>		
Preliminary Proposal	18 Sep 2017	0%
Final Proposal	16 Oct 2017	5%
Draft of Final Design Portfolio (Design Brief & Drawings)	08 Dec 2017	10%
(Note: By 1 January 2018, 35% of course marks are awarded)		
Oral Presentation & Defence of Draft Portfolio	12 Jan 2018	5%
Review of Another Group's Draft Portfolio (Written Critique)	22 Jan 2018	5%
Project Presentation at CEE Presentation Day	16 Feb 2018	<u>5%</u>
		30%
<u>FINAL SUBMISSION:</u>		
Final Design Portfolio: March, 2017 (see note 6)		
Covering Letter & Final Design Brief		10%
Calculations		20%
Drawings		15%
Display Poster		<u>5%</u>
		50%*
		100%

NOTES:

1. Students who do not attend at least 10 weekly meetings with their Advisors shall not pass the course.
2. Students who do not achieve a passing grade on each of the three course components (individual work, group work, and final submission) shall not pass the course. They shall be assigned a mark of 48% or the aggregate mark whichever is less.
3. Criteria for the various submissions are described later in this document.
4. The penalty for late submission shall be 10% per day; thus, if any submission is more than 5 days late it cannot receive a passing grade.

5. The mark for the final group submission (the maximum indicated thus "*") shall be multiplied by the number of group members and the product allocated to the members in proportion to each member's contribution to the work. At the end of the course, group members must individually recommend in writing, with stated reasons, a suitable allocation to be used. A summary of the work done by each member with reference to the final report must be attached. If no such recommendations are provided, an equal distribution of marks will be used.
6. **The deadline for final submission is ONE WEEK after the City of London Design Competition. The date of the City of London Design Competition (either end of February or beginning of March) will be announced in January or February, 2018.**

Criteria and Evaluation of Course Submissions

1. Logbook

Each student shall keep a logbook listing at least the following:

- a) Details of meetings - date, time, duration, those present, and main topics.
- b) Details of CEE4441 lectures (including the lecture on literature and information search) attended - date, time, speaker, and topic.
- c) Details of work on the Design Project - date, duration, and *aspects of work done personally*.

2. Preliminary Proposal

The preliminary proposal should be made by email to the course coordinator (jsouthen@uwo.ca) and shall include:

- a) Group name.
- b) Names of Group Members.
- c) Name and e-mail of Group Leader, who will be responsible for regular reporting to the Faculty Advisor and Faculty Coordinators.
- d) Topic for the Design Project and corresponding proposed structure scheme: each group must have *two preferred choices* (e.g. 1st choice: cable-stayed bridge at Kiwanis Park over the CN Rail; 2nd choice: CPCI bridge at the Adelaide Street crossing). This requirement is only applicable to students in the structural stream. While all efforts will be made to ensure that teams receive their first choice of project, **the course coordinator reserves the right for the final assignment of the topic of the design project.**

3. Final Proposal (one hardcopy to be submitted)

The final design proposal shall indicate:

- a) Description of the project
- b) Work done by each group member to date.
- c) Identification of outstanding tasks (work still to be done including drawings and specifications).
- d) Assignment of outstanding tasks to group members.
- e) Proposed mechanism for coordination of the activities of each group member.
- f) Schedule for remaining work.

The evaluation of the final design proposal shall be based on content, layout, completeness, and the use of English. The marking rubric will be posted on Owl at the beginning of the course.

4. Preliminary Calculations and Draft of Final Design Portfolio (project approximately 80% complete) (four (4) hardcopies to be submitted)

A draft of Sections 6.1, 6.2 and 6.3 of the final design portfolio (see point 6., below) must be submitted on the date specified in the Course Deadlines section. **For this submission, neatly drawn hand sketches can replace CAD drawings**, though CAD drawings are preferred. **One copy shall be directly given to the student reviewers, and the other three copies shall be submitted to the Civil Office**, which will be provided to the Faculty Advisor of the team for marking, and the two Faculty Advisors who will be evaluating the presentation and oral defense of the team in January.

Between the draft submission and oral defense in January, the assigned student reviewing group and faculty advisors will formally review the draft of each final design portfolio. At the defense, the student review group and the faculty advisors will have the opportunity to ask questions.

Students are expected to improve their Portfolio between the oral defence and final submission. Topics of criticism that were not raised by either the students or the advisors at the oral defence, or provided in writing on the day of the defence, may not be used to reduce the final mark given to a Design Portfolio.

5. Review of Draft Final Design Portfolio by Others (Written Critique) (two hardcopies to be submitted)

Each group shall prepare a written critique of the Draft Portfolio assigned to them for review. This critique shall be submitted after the oral defense of the Project. The critique should be in the form of a written report summarizing the reviewing group's professional evaluation of the submitted draft design portfolio. The focus should be on providing benefit to the client by identifying deficiencies in the original design and recommendations for improvement. **One hardcopy shall be directly provided to the design group being reviewed, and the other copy shall be submitted to the Civil Office.** The marking rubric will be posted on Owl at the beginning of the course.

6. Final Design Portfolio

The final design portfolio consists of the cover letter, final design brief, calculations, drawings and display poster as described in detail below.

One electronic copy of the complete final design portfolio, including ALL of the above individual components, must be submitted along with two (2) hard copies.

6.1 Final Design Brief

The length of the final design brief shall not exceed 12 typed pages (font size 12, single-spaced). Suggested contents are: Executive Summary; Introduction, Design Criteria, Particulars of Design and Analysis, Cost Estimate, and Recommendations (or Conclusions). The Design Criteria would include the design standards and technical references used; the particular design criteria adopted also must be indicated succinctly. The particulars of design/analysis would summarize the rationale behind the various design decisions. The evaluation of the final design brief shall be based on the format, layout, completeness, technical content and use of English.

6.2 Calculations

Calculations must be well organized, clear, complete, and done on calculation paper. Each calculation page shall be dated, and shall indicate the names or initials of the persons who performed and checked the calculations. A final calculation set, which must be current, checked and indexed, shall be submitted with the final design brief. Students are expected to submit checked calculations to their advisors as the design progresses, so that errors of a fundamental nature will be caught and corrected. The evaluation of calculations will be based on their clarity, completeness, technical content, originality, and accuracy.

6.3 Drawings

The portfolio shall include a full set of drawings which fully describe the design. Each student is required to prepare at least one original drawing. Each drawing shall be dated, and shall indicate the name or initials of the person who did the drawing and the person who checked the drawing. The evaluation of drawings will be based on their technical content, clarity, completeness, and quality of drafting.

6.4 Display Poster

Each student group is required to create a display poster that provides a clear and concise overview of their design solutions to the specific project. **ONE** hardcopy of the poster is required. The size of the poster should be no larger than 900 mm × 600 mm.

7. Design Experience Survey

Each student is required to complete a design experience survey to reflect on the knowledge and skills gained during the course of the project. **The survey will be made available online after the submission of the final design portfolio.**

8. Design Competition

If a design competition is offered in connection with CEE 4441, no student or group of students is compelled to enter. Deadlines and requirements for the competition are separate from CEE4441 requirements.

STUDENTS ARE CAUTIONED TO ALLOCATE ADEQUATE TIME TO ALL COURSES; WINNING A COMPETITION WILL NOT OFFSET A POOR OR FAILING GRADE IN ANOTHER COURSE.

9. Use of English

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Note that student teams are responsible for any costs associated with printing. The Department will not reimburse groups for any costs incurred in producing the required submissions.

Plagiarism Checking:

The University of Western Ontario uses software for plagiarism checking. Students are required to submit their Laboratory Reports in electronic form to Turnitin.com for plagiarism checking. **Cheating:**

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

For more information on scholastic offenses, please

see: http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

Attendance:

Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Accessibility:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Conduct:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Late comers may be asked to wait

outside the classroom until being invited in by the Instructor. Please turn off your cell phone before coming to a class, tutorial, quiz or exam.

On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: <http://www.uwo.ca/univsec/board/code.pdf>

Sickness and Other Problems:

Students should immediately consult with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, please see:

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Notice:

Students are responsible for regularly checking their email and notices posted outside the Civil and Environmental Engineering Department Office

Consultation:

Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

Course Breakdown:

Engineering Design 100%

The document “INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR SUBMIT ASSIGNMENTS AS SCHEDULED” is part of this course outline.

General Learning Objectives

Knowledge Base	E	Individual and Team Work	E	Ethics and Equity	-
Problem Analysis	E	Communication	E	Economics and Project Management	E
Investigation	I	Professionalism	E	Life-Long Learning	E
Design	E	Impact on Society	E		
Engineering Tools	I				