

## MME 4499 - Mechanical Engineering Design Project

### COURSE OUTLINE – 2019-2020

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**CALENDAR DESCRIPTION:** Students will develop and practice engineering design skills by working on a team-based project. Students will experience all phases of the design process, including: problem definition, generation and evaluation of concepts, engineering analysis and testing, and preparation of design documentation. Project management and communications skills will also be emphasized.

**COURSE INFORMATION:**

Course coordinator	Prof. Paul Kurowski	<a href="mailto:pkurows@uwo.ca">pkurows@uwo.ca</a>
Course instructors (project advisors)	Prof. Chris DeGroot	<a href="mailto:cdegroo5@uwo.ca">cdegroo5@uwo.ca</a>
	Prof. Paul Kurowski	<a href="mailto:pkurows@uwo.ca">pkurows@uwo.ca</a>
	Prof. Kamran Siddiqui	<a href="mailto:ksiddiq@uwo.ca">ksiddiq@uwo.ca</a>
	Prof. John Makaran	<a href="mailto:jmakaran@uwo.ca">jmakaran@uwo.ca</a>
Lectures	M. 5:30 – 6:30pm, SEB2100	
Tutorials (team meeting/advising)	Th. 5:30 – 8:30pm, SEB2100	

**PREREQUISITES:** Completion of third year of the Mechanical Engineering Program.

Unless you have either the prerequisites for this course or written special permission from your Dean to enroll 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 adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

**ANTIREQUISITES:** CBE 4497, CEE 4441, ECE 4416, ES 4499, SE 4450

**ACCREDITATION UNITS:** Complementary Studies = 25%, Engineering Design = 75%

**TOPICS:** Students work in teams on a major design project. Suitable design projects may be defined by students, faculty, or industry sponsors. In addition, all students are required to attend the scheduled course lectures.

**LEARNING OUTCOMES:** The primary objective of this course is to provide students with a structured engineering design experience to build on the knowledge that they have accumulated during the prior years of the undergraduate program. Engineering design is a complex and creative human activity that integrates elements of basic sciences, mathematics, engineering sciences, as well as other skills in developing components and systems to meet specific needs. Furthermore, engineering design is an iterative, open-ended process whose result is subjected to a number of project-specific constraints that are formulated to address economic, health, safety, environmental, social, or other pertinent interdisciplinary factors.

To address the considerations above, the course is intended to provide students with an opportunity to learn and practice the design methodology and associated soft skills by seeking an engineering solution to a real-life problem. At the end of the course, students will be able to:

- Systematically generate an engineering solution that satisfies the constraints imposed by the design beneficiary

- Apply and justify the steps involved in the engineering design process by demonstrating critical thinking about the design and design decisions:
  - Define the scope and the objectives of the design problem
  - Collect, analyze and evaluate relevant design solutions that were previously developed to address similar and/or related problems
  - Investigate and evaluate candidate design concepts from functional, structural, safety, environmental, manufacturing, and economic perspectives
  - Apply previously acquired engineering knowledge to identify the optimal candidate solution to the open-ended design problem
  - Generate complete embodiments of the selected design solution through the application of the relevant engineering standards, codes and design practices
  - Validate the selected design through virtual prototypes, including mathematical models and computer-aided engineering (CAE) tools
  - Assess the functional and economic feasibility of a physical prototype
  - Validate the final design solution by means of a functional physical prototype
- Prepare professional-quality design documentation to include sketches, detail and assembly drawings, bills of materials, schematics, etc.
- Apply communication skills to effectively communicate engineering ideas verbally and in writing
- Manage and apply the principles of effective team interaction: organization, management, and motivation
- Apply design-related skills to include project management as well as the assessment of environmental, legal, ethical and social implications of the developed design solution

**CONTACT HOURS:** 1 lecture hour, 3 laboratory/tutorial hours, full course.

**TEXT:** No textbook will be assigned.

**REFERENCES:** Dependent upon choice of project. Use of engineering books and design codes and standards will be required. Detailed information will be available on the OWL course website.

**COMPUTING:** CAD, analysis and simulation software will be used as appropriate to the project.

**UNITS:** SI units are encouraged. However, the use of English units is permitted, if justified and approved by the project advisor.

**TEAM WORK:** Students will be working in design teams, typically of four members. Students will be required to present reports orally and in writing at various times during the year.

**EVALUATION:** Course milestones will be carried out according to the following tentative schedule:

Milestone	Weight	Due date
Team formation and project selection		Sep. 13, 2019

Interim project report I: problem statement, state-of-the-art review, design specifications	10%	Oct. 7, 2019
Interim project report II: conceptual design	10%	Nov. 1, 2019
Interim project report III: detailed design, physical prototype feasibility	20%	Dec. 5, 2019
Interim project report IV: prototyping, testing, design iterations	20%	Mar. 9, 2020
Project presentation and prototype demo	25%	Mar. 27, 2020
Final project report	5%	Apr. 9, 2020
Participation and professionalism (lectures and meetings)	10%	

Please note that:

- The deliverables in the table above are assigned to teams
- While the default assumption for team submissions is that all team members have contributed equally and hence they should receive identical marks for team deliverables, the project advisor can discretionarily adjust the marks depending on individual contributions brought to the team effort.
- Design teams will be formed around approved project topics to be determined early in the course. A dedicated OWL enrolment feature will be used for team signup. The opening of the team signup feature will be announced through OWL.
- Design teams can be formed by a minimum of 3 and a maximum of 4 members. No exceptions from this rule will be allowed.
- At the latitude of the project advisor, extensively prolonged unsatisfactory assessment and/or project progress may result in immediate project termination and course failure.
- All team members are expected to contribute equally to team's efforts. This will be periodically verified by project advisors. At the latitude of the project advisor students who demonstrate insufficient contribution may be removed from team resulting in course failure
- Project topics could be proposed by: i) project advisors; ii) external to the course faculty members; iii) students enrolled in the course; iv) third party/industry partners. Since certain conditions are to be met by a particular design problem in order to become an approved project topic in the course, those interested to propose projects falling under the last two categories are encouraged to contact the course coordinator as early as possible.
- Tutorial time should be interpreted as the time set aside to meet with the faculty advisor as well as to hold weekly team meetings. This means that tutorials are mandatory unless agreed otherwise with the project advisor. Permissions to not attend the tutorial are to be granted by the project advisor solely and they are only valid for a particular week. If the tutorial room will prove to be inadequate to host all team/advisor meetings concurrently, alternate meeting locations can be identified at the latitude of project advisors.

- Professional-level deliverables are expected in the course, regardless of their format (*e.g.* written or oral). Please keep this in mind while preparing your submissions and make sure to allocate enough time for this step.

**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 final examinations, 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.

**ATTENDANCE:** Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, 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 examination in the course.

**CHEATING:** University policy states that cheating, including plagiarism, is a scholastic offense. The commission of a scholastic offence is attended by academic penalties which might include expulsion from the program. If you are caught cheating, there will be no second warning. (see Scholastic Offence Policy in the Western Academic Calendar)

**SSD:** 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.

Students that are in emotional/mental distress should refer to Mental Health@Western, <http://www.uwo.ca/uwocom/mentalhealth/>, for a complete list of options about how to obtain help.

**NOTE:** The above topics and outline are subject to adjustments and changes as needed. Students who have failed an Engineering course (*i.e.*, <50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.

**INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED**

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

**NEW: Requests for Academic Consideration using the Self-Reported Absence Form**

If you experience an unexpected illness or injury or an extenuating circumstance (48 hours or less) that is sufficiently severe to temporarily render you unable to meet academic requirements (e.g., attending lectures or labs, writing tests or midterm exams, completing and submitting assignments, participating in presentations) you should self-declare using the online Self-Reported Absence portal. This option should be used in situations where you expect to resume academic responsibilities within 48 hours or less.

Each student will be allowed a maximum of two self-reported absences between September and April and one self-reported absence between May and August. Self-reporting may not be used for final exams or assessments (e.g. midterm exams, tests, reports, presentations, or essays) worth more than 30% of any given course.

For full instructions about the Self-Reporting System refer to the Academic Calendar link [here](#).

**A. GENERAL REGULATIONS & PROCEDURES (other than self-reported absences)**

1. All first year students will report to the Undergraduate Services Office, SEB 2097, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination that is worth LESS THAN 10% of your mark, you should report to your department office to request relief. If your course work is worth MORE THAN 10% of your final grade, you will report to the Undergraduate Services Office, SEB 2097.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

**B. TERM/MIDTERM TESTS (other than self-reported absences)**

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, you should report to your department office to request relief. If the test is worth MORE THAN 10% of your final grade you will report to the Undergraduate Services Office, SEB 2097 to request relief.
3. Be prepared to provide supporting documentation to the Department Chair and/or the Undergraduate Services Office (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

**C. FINAL EXAMINATIONS (cannot be self-reported)**

1. If you are unable to write a final examination, contact the Undergraduate Services Office **PRIOR TO THE SCHEDULED EXAMINATION TIME** to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

**PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.**

**D. LATE ASSIGNMENTS**

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
  - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.
  - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

**E. SHORT ABSENCES**

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

**F. EXTENDED ABSENCES**

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

**G. DOCUMENTATION**

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

**In Case of Serious Illness of a Family Member:** Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

**In Case of a Death:** Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

**For Other Extenuating Circumstances:** If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

**Note:** Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

## H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

**Calendar References:** Check these regulations in your 2019 Western Academic Calendar available at [www.westerncalendar.uwo.ca](http://www.westerncalendar.uwo.ca).

[Self-Reporting Absences](#)  
[Absences Due to Illness](#)  
[Academic Accommodations for Students with Disabilities](#)  
[Academic Accommodations for Religious or Holy Days](#)  
[Course Withdrawals](#)  
[Examinations](#)  
[Scheduling of Term Assignments](#)  
[Scholastic Offences](#)  
[Student Medical Certificate](#)  
[Engineering Academic Regulations](#)

**Note:** These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

<b><u>Add Deadlines:</u></b>	First term half course (i.e. “A” or “F”)	September 13, 2019
	Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 13, 2019
	Second term half course (i.e. “B” or “G”)	January 14, 2020

<b><u>Drop Deadlines:</u></b>	First term half course (i.e. “A” or “F”)	November 12, 2019
	Full courses and full-year half courses (i.e. “E”, “Y” or no suffix)	November 30, 2019
	Second term half or second term full course (i.e. “B” or “G”)	March 7, 2020

### **Contact Information:**

Undergraduate Services Office	SEB 2097 Phone: 519-661-2130	E-mail: <a href="mailto:engugrad@uwo.ca">engugrad@uwo.ca</a>
Chemical & Green Process Engineering	TEB 477 Phone: 519-661-2131	E-mail: <a href="mailto:cbeugrad@uwo.ca">cbeugrad@uwo.ca</a>
Civil Engineering:	SEB 3005 Phone: 519-661-2139	E-mail: <a href="mailto:civil@uwo.ca">civil@uwo.ca</a>
Computer, Electrical, Mechatronic Systems & Software Engineering	TEB 279 Phone: 519-661-3758	E-mail: <a href="mailto:eceugrad@uwo.ca">eceugrad@uwo.ca</a>
Integrated Engineering	ACEB 2410 Phone: 519-661-6725	E-mail: <a href="mailto:engceli@uwo.ca">engceli@uwo.ca</a>
Mechanical Engineering	SEB 3002 Phone: 519-661-4122	E-mail: <a href="mailto:mmeundergraduate@uwo.ca">mmeundergraduate@uwo.ca</a>

Revised 08/01/19