

**Western University
Faculty of Engineering
Department of Electrical and Computer Engineering**

ECE 4416a/b: Electrical/Computer Engineering Project

Course Outline 2019-20
September 2019 to April 2020

Description:

Students will work in teams on an engineering design project chosen based on and building upon undergraduate course material offered in Electrical Engineering program. Students are expected to achieve milestones in project including design problem statement and specification, engineering design analysis, testing, and demonstration, project documentation and oral presentation. Each team will be supervised by a faculty advisor with whom it will meet regularly. All submitted material will be reviewed by faculty advisor and course coordinator.

Coordinator:

Dr. Raveendra Rao, P.Eng.
ACEB-4457, 519-661-2111x88231, r Rao@uwo.ca

Consultation hours:

Friday: 3.30 to 5.30 PM, The instructor will be available for consultation by appointment through e-mail. All e-mail correspondence to coordinator should bear the Subject as ECE 4416: Project. Allow at least 2 working days for a response.

Academic Calendar Copy:

Selection and investigation of an engineering problem. Analytical and/or experimental work is carried out by individual students or project groups under the supervision of a faculty member. Progress reports and a final engineering report are prepared; each student must deliver a public lecture.

Contact Hours:

6 laboratory hours, 1.0 course.

Antirequisites:

CBE 4497, CEE 4441, MME 4499, SE 4450, ES 4499.

Prerequisites:

Completion of third year of the Electrical, Computer or Integrated Engineering program. Unless you have either the requisites 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.

CEAB Academic Units:

Engineering Design 100%.

Scheduled Lectures, Library Instruction, and Special Lectures

Scheduled course lectures are listed below:

| Lecture | Date | Time | Place |
|----------------|----------------------------|-----------------|--------------|
| First | Friday, September 13, 2019 | 3.30 to 5.30 PM | SEB 2202 |
| Second | Friday, February 7, 2020 | | |

Scheduled Library Instruction

| Lecture | Date | Time | Place |
|--|-----------------|---|--------------------------|
| Library Instruction By Shiyi Xie | October 4, 2019 | 3.30 to 4.30 PM Group 1 [#] | HSB 13 (Computer Lab) |
| | | 3.30 to 4.30 PM Group 1 [*] | |

Last names starting from A to M; *Last names starting from N to Z

All other course lectures and special lectures would be notified through course website as and when they are organized

Required Textbook:

None assigned. General instructions and guidelines relevant the course would be posted to the course website on OWL (<https://owl.uwo.ca>)

Recommended References:

None assigned. It is expected that students will undertake suitable literature search appropriate for their specific projects undertaken.

General Learning Objectives (CEAB Graduate Attributes)

| | | | | | |
|------------------|-----|--------------------------|-----|---------------------------------------|-----|
| Knowledge Base | 3/3 | Use of Engineering Tools | 3/2 | Impact on Society and the Environment | 2/1 |
| Problem Analysis | 3/3 | Individual and Team Work | 3/2 | Ethics and Equity | |
| Investigation | 3/2 | Communication Skills | 3/2 | Economics and Project Management | 2/1 |
| Design | 3/3 | Professionalism | 2/1 | Life-Long Learning | 3/2 |

Notation: x/y , where x is the cognitive level (1: Remember, 2: Understand, 3: Apply) at which the attribute is assessed and y is the academic level (1: Beginner, 2: Intermediate, 3: Advanced) at which the attribute is assessed.

Specific Learning Objectives:

By the end of this course, students should be able to apply sound engineering design principles and methodology in arriving at solution to an open-ended design problem. Also, they should be able to demonstrate good oral and written communication skills, and be able to work effectively in a team environment. Specifically, students should be able to:

- 1) Identify and define an engineering problem with significant component of design, analysis and synthesis and function in a professional manner with minimum supervision.
- 2) Conduct background research on existing and emerging technology relevant to chosen design problem.
- 3) Compare and contrast multiple possible solutions to design problem and choose the most practical or best among them.
- 4) Effectively evaluate alternatives before choosing the most practical or the best one.
- 5) Apply knowledge and tools from various engineering disciplines to perform appropriate analysis.
- 6) Validate engineering designs using mathematical modeling, simulation and prototype testing.
- 7) Plan, organize, schedule and manage design project using realistic budgeting and suitable Gantt chart for carrying out tasks of project and to adhere to deadlines.
- 8) Recognize and address environmental, legal, ethical and social implications of an engineering design project

- 9) Demonstrate an understanding of safety hazards by adhering to appropriate safety standards and procedures and engaging in circuit design and testing procedures that minimize safety risks.
- 10) Produce professional quality documentation of design project, including system diagrams, detailed drawings, circuit designs, software designs etc.
- 11) Effectively communicate thoughts, ideas, and project details in English language using written and oral forms.

Project Selection:

The project may be either suggested by team of students or selected from listing of group projects suggested by faculty advisor(s). It must be related to the area of Electrical Engineering with a significant amount of engineering design, analysis and synthesis. Most importantly, the project goal(s) must be clearly identified and must include design, analysis, experimental procedure to test goal(s). Project topics include but are not limited to: Wireless Communications (mandatory for wireless option), Power Engineering (mandatory for power option), Digital Signal Processing, Control, Robotics and Real Time Systems, Biomedical Engineering, Applied Electrostatics, Electromagnetics, Digital Systems, Microprocessors, and Networking. **The project selected must have the approval of course coordinator.**

Evaluation:

The project will be evaluated based on the following milestones on individual/team basis as follows:

| Milestones | Weight |
|------------------------------------|--------|
| Project Selection/Proposal | 10% |
| Midterm Progress Report | 15% |
| Design, Analysis, Test Plan Review | 15% |
| Project Demonstration | 15% |
| Project Oral Presentation | 10% |
| Project Report | 30% |
| Participation ** | 5% |

** includes scheduled course lectures, library instruction, special lectures, oral presentation, and project review

In order to pass the course, grades in project report and project demonstration must be at least 50% and overall course grade must be greater than or equal to 50. In addition, **component grades below 50% may result in immediate project termination and fail grade in course.** Team grades may be adjusted by up to 15% for each student based on self and peer evaluations

Students are expected to keep a project logbook and must be made available for periodic review by their advisor/coordinator. Grading information and due dates would be posted to course web site. Written reports are evaluated both by faculty advisor and course coordinator. Factors considered in evaluation of submissions include level of challenge involved in project, manner in which project is carried out, and clarity, presentation, and accuracy of submissions. In team projects, clear division of work must be identified as decided team by members of team and approved by faculty advisor. Team evaluation will include issues such as the degree of teamwork and individual assessment of work assigned and carried out by each team member. Unless alternative arrangements are made, students are required to return any components, equipment and documentation provided to them by Department/Faculty during the course of project to Electronics Shop. Failure to do so may result in withholding of grade in course.

Late Submission Policy: All submission of reports and deliverables are due by 4.30 PM on due dates. Late submission will incur a penalty of 10% per day of component mark and submission more than 5 days late will not be accepted. An email must be sent to the coordinator whenever late submission is done with date and time of submission.

Submission Locker: Locker 208 located on the second floor of TEB.

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.

Attendance: Attendance is mandatory in scheduled activities such as course lectures, library instruction, special lectures, design reviews, project demonstration, oral presentations etc. Students are required to meet with their faculty advisor regularly as scheduled.

Absence Due to Illness or Other Circumstances: 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 the attached “Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled”). 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, see the relevant section of the Academic Handbook:

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

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Cheating and Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. 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.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Policy on Repeating All Components of a Course: Students who are required to repeat an Engineering course 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 by the student for grading in subsequent years.

Internet and Electronic Mail: Students are responsible for regularly checking their Western e-mail and course website (<https://owl.uwo.ca/portal/>) and making themselves aware of all information posted to course website.

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 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services:

Office of the Registrar, <http://www.registrar.uwo.ca/> Student Development Centre, <http://www.sdc.uwo.ca/>

Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/> USC

Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.

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:

http://westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&Command=showCategory&Keywords=report&SubHeadingID=322&SelectedCalendar=Live&ArchiveID=#SubHeading_322

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.

Self-Reporting Absences:

http://westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=1&Command=showCategory&Keywords=report&SubHeadingID=322&SelectedCalendar=Live&ArchiveID=#SubHeading_322

Absences Due to Illness:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=#Page_78

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/forms/smc.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

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.

Add Deadlines:

| | |
|---|--------------------|
| 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 |

Drop Deadlines:

| | |
|--|-------------------|
| 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:

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