Western Engineering

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEEING

SE 4450 – SOFTWARE ENGINEERING DESING II

Course Outline 2024-2025

COURSE DESCRIPTION:

Design and implementation of a large software engineering project. Design, coding, testing and implementation are carried out in groups under the supervision of a faculty member. Project proposal and walkthrough, spring planning, deliverables, demos, and a project retrospective report are prepared; each student must give a publicly available lecture on the work performed.

There is more to producing software than just writing programs. It is now widely recognized that the engineering of software systems has a pivotal role to play in the production of quality software systems that are produced on time, to budget, and to correct level of reliability. Software is the secret elixir that transforms electronic devices into interactive tools capable of real magic. That puts software designers in the driver's seat of the high-tech revolution. The aim of this course is to emphasize the idea of what makes a good design as a key aspect within software engineering.

The course encourages teamwork and hones your creative and entrepreneurial skills while putting the methods and techniques learned in past courses into real practice. The project involves forming four-person teams to analyze, design, build, test, and evaluate a software system to meet the requirements of a real independent user. The main objective of this course is the development of a new generation of innovators.

ACADEMIC CALENDAR:
https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_015930_1&SelectedCalendar=Live&ArchiveID=

Design and implementation of a large software engineering project. Design, coding, testing and implementation are 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 on the work performed.

PRE OR COREQUISITES: Completion of Third Year of the Software Engineering Program. Unless you have either the requisites for this course or written special permission from the 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: ECE 4416, CBE 4497, CEE 4441, MME 4499, ES 4499.

COREQUISITES: SE 4452A/B, SE4455A/B.

CEAB ACADEMIC UNITS: Engineering Design (ED): 100%

INSTRUCTOR INFORMATION:

Luiz Fernando Capretz
Office: TEB 345
Email: lcapretz@uwo.ca

CONTACT HOURS:

Timetable information is available at https://draftmyschedule.uwo.ca/.

Lecture hours, 6 laboratory hours, both terms, 1.0 course.

Lectures occur per schedule. Laboratory sessions occur weekly starting first week of September.

LECTURE:	WEDNESDAYS, 15:30 – 17:30, at SEB 1059
LAB:	DURATION/FREQUENCY- (6 hours, every week)
TUTORIAL:	None

RECOMMENDED/REQUIRED TEXT:

C.W. Dawson, Projects in Computing and Information Systems, 2nd edition, published by Addison-Wesley, ISBN 978-0-273-72131-4, 2009.

RECOMMENDED/ REQUIRED SOFTWARE:

Installed in Software Engineering Labs.

RECOMMENDED RESOURCES/REFERENCES:

Course notes and supplementary material will be available at the Course Web site.

GENERAL LEARNING OBJECTIVES (CEAB GRADUATE ATTRIBUTES)

Knowledge Base		Engineering Tools	**A**	Impact on Society & Environ.	
Problem Analysis	**A**	Individual & Teamwork	**A**	Ethics and Equity	**A**
Investigation		Communication	**A**	Economics and Project Mgmt.	**A**
Design	**A**	Professionalism		Life-Long Learning	**A**

Notation: x represents the content level code as defined by the CEAB. blank = not applicable; I = introduced (introductory); D = developed (intermediate) and A = applied (advanced).

Rating: I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before. D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course. A – It is expected that the student can apply the knowledge without prompting (e. g. no review).

COURSE MATERIALS: Weekly content and guides for the laboratories will be available on the course OWL site. The material for this course will be taught in both lectures and labs; therefore, it is imperative that you attend each scheduled mandatory lecture and lab.

UNITS: SI

OBJECTIVES AND SPECIFIC LEARNING OUTCOMES:

Software, as an engineering discipline, strives to optimally create software systems of high quality and usefulness. This course will use a variety of design considerations relevant to the development of software systems. Students will apply knowledge and skills from previous courses to allow them to adopt a holistic approach to software engineering design.

The following table summarizes the course learning outcomes along with CEAB GAIs where the GAIs in bold indicate ones to be measured and reported annually.

COURSE TOPICS AND SPECIFIC LEARNING OUTCOMES	**CEAB GA Indicators**
At the end of the course, students will be able to use modern methods, technologies, languages, principles and practices that make it possible to conceive, design, create, test, document, and present sizeable software systems.	
1. Create an Engineering Project Proposal	
At the end of this section, students will be able to:	
a. Write a project proposal to define an engineering problem (Software System)	**PA1**
b. Manage time for the project (Gantt Chart, Burndown Chart)	**EPM2**
c. Manage human resources for the project (Matrix of Responsibilities)	EPM1
2. Software development models	
At the end of this section, students will be to:	
a. Frame a scope for a complex, open ended software system (Requirements, User Stories, Sprint Backlog)	**PA2**
b. Formulate a strategy to create the software (Architecture)	**DE1**
c. Ability to incorporate change management (with Github)	**EPM4**
d. Consider myriad software development processes to be create software	I3
e. Choose the development model that suites their project and their team	DE2
f. Release version 1.0 with partial implementation of features	**DE3**
g. Implement the chosen model throughout the project until completion	**DE4,** P1
h. Release version 2.0 with most features and demonstration to peers	**DE4**
i. Ability to reach substantiated conclusions (Deliverables)	**PA3**
3. Prototyping	
At the end of this section, students will be to:	
a. Recognize the benefits of prototyping for requirements capture, explore the concepts of the proposed system and explore the technical feasibility of the requirements of the system (Demo-1)	**DE3**

b. Apply incremental development during the life cycle of their projects (Demo-2)	**DE4**
c. Demonstrate the ability to identify and select the appropriate technology and tools to develop the system (Walkthrough)	**ET1**
d. Create two detailed Sprint plans	**EPM2**
4. Individual and Teamwork	
At the end of this section, students will be to:	
a. Ability to assume responsibility and perform individual (Github commits/contribution)	**ITW1**
b. Ability to contribute to team goals (Poker Game in 2 Sprints)	**ITW2**
c. Ability to evaluate peer and self-performance based on team effectiveness (Engagement Survey)	**ITW3**
d. Demonstrate knowledge of professional ethics in software development (ACM code of ethics)	**EE1**
e. Awareness of diversity and equity in software development (Forums)	**EE4**
5. Communications Skills	
At the end of this section, students will be to:	
a. Present the project orally using appropriate material, language, non-verbal communication and effective graphical tools (Demo-1)	**CS2**
b. Ability to articulate ideas in writing using appropriate language and effective graphical tools (Retrospective)	**CS3**
6. Lifelong Learning	
At the end of this section, students will be to:	
a. Lessons learned front the project (Retrospective)	**LL1**
b. Recognize gaps in the knowledge and pursue knowledge independently	LL2

EVALUATION:

Name	% Worth	Assigned	Due Date	GAs ASSESSED
Project Proposal	5%	September 18	October 9	PA1, EPM1, EPM2
Walkthrough	5%	September 18	November 6	PA2, ET1, DE1
Two Sprints Plans	15%	September 18	November 6	ITW1, ITW2
Demo-1 of Release-1	10%	September 18	December 4	DE3, EPM4
Final Demo	20%	September 18	March 19	DE4, PA3
Public Presentation	10%	September 18	March 19	CS2
Retrospective/Wrap-up	10%	September 18	March 26	CS3
Attend/Engage/Vote/Forums	25%	September 18	Along the course	ITW3, EE1, EE4, LL1
*Bonus: Best project	Up to 5%		End of course	

Note that the dates listed above are **tentative** and may be adjusted if needed. Marks will be assigned on the basis of method of analysis and presentation, correctness of solution, clarity and neatness.

In order to pass the course, a student must obtain a passing grade in each component. A student who fails any component shall receive a final grade not greater than 48%.

A student must design and implement a large software engineering project. Design, coding and testing are carried out by individual students or by teams. In case of team projects, a clear division of the work should be identified as suggested by the team members and approved by the faculty advisor. Progress reports during the course and a final engineering report should be prepared. Factors considered in the evaluation of the reports include the level of challenge involved in the project, the manner in which the project is carried out, and the clarity and accuracy of the reports. Each student must deliver a public lecture on the work performed. The reports must be submitted electronically through OWL.

We will vehemently deny any cross-discipline project, i.e. SE4450 students should team up with their peers in SE4450 only.

COURSE POLICIES - VERY IMPORTANT:

All work submitted must be of professional quality in the requested format. Material that is handed in dirty, illegible, disorganized, or in an unapproved format will be returned to the student for resubmission and the late submission penalty will take effect. An additional penalty of 10% may be deducted for poor grammar, incoherence, or lack of flow in the written reports.

Team Project Grades:

When working on team projects, all individuals will normally receive the same grade. If students feel that another team member is not a positive contributor, students are requested to resolve matters professionally and respectfully. If after drawing someone's attention to their ineffective contribution their behavior continues, students may discuss concerns with the instructor. Each student will be asked to specify the contribution made by each member of the team, including themself. Team gradesmay be adjusted by up to 30% for each student based on self and peer evaluation. After consulting with the concerned students and considering any impact of a student's behavior on the team's performance, the instructor may adjust course grades for any or all individuals in the team. If there is unbalance in the workload among group members, marks will accordingly adjusted to reflect each member's effort put into the project.

Attendance Policy:

Any student who, in the opinion of the instructor, is absent too frequently from mandatory lectures will be reported to the Associate Dean office (after due warning has been given). Attendance does not mean participation. Students should immediately consult with the instructor if they have any problems that could affect their performance in the course. The student should seek advice from the instructor regarding how best to deal with the problem. Failure to notify the instructor immediately (or as soon as possible thereafter) will have a negative effect on any appeal. Students are required to meet regularly with their faculty advisor, at least once a month, and keep a log of their work.

Cheating and Plagiarism Policy:

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; it is zero tolerance.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for 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 Western University and Turnitin.com (http://www.turnitin.com). MOSS system will be used to detect program similarity.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, can be found at:

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

LATE SUBMISSION POLICY:

There will be strict deadlines for the project components. Since one of the requirements of a professional engineer is on-time delivery, severe penalties are assessed for overdue submissions: penalties of 50% after 1 day, 100% after two or more days. There will be no rescheduling of tasks.

Advise the instructor if you are having problems completing the assignment on time prior to the due date of the assignment and be prepared to submit an Academic Consideration Request and provide documentation if requested by the instructor at:
https://www.eng.uwo.ca/undergraduate/academic-consideration-for-absences.html

The assignment deadlines can be found above in the course outline. For each assignment, students are expected to submit the assignment by the deadline listed. Should illness or extenuating circumstances arise, students are permitted to submit their assignment up to 72 hours past the deadline without academic penalty. Should students submit their assessment beyond 72 hours past the deadline, a late penalty of 50% per day will be subtracted from the assessed grade. If you have a long-term academic consideration or an accommodation for disability that allows greater flexibility than provided here, please reach out to your instructor at least one week prior to the posted deadline.

ABSENCE FROM MANDATORY COURSE COMMITMENTS:

Students must familiarize themselves with the Policy on **Academic Consideration for Absences:** https://www.eng.uwo.ca/undergraduate/academic-consideration-for-absences.html

I. Missed/Late Accommodation Policy

1. The Academic Consideration Request Form is available through the STUDENT ABSENCE PORTAL.
2. Documentation must be provided as soon as possible. Requests for academic consideration must include the following components:
   a. Indication of the course(s) and assessment(s) affected by the request
   b. Medical note, and
   c. Additional supporting documentation as relevant
3. Requests for academic consideration without a medical note or other supporting documentation may be accepted once per term, per course.
4. Undocumented absences cannot be used for examinations scheduled by the Office of the Registrar during official examination periods (including take-home final exams and December mid-year exams for full courses) and practical laboratory and performance tests typically scheduled in the last week of the term. Undocumented absences also cannot be used for the "designated assessment" in each course. When flexibility in assessment exists and is clearly stated on the course outline, both undocumented absences and academic consideration requests with documentation may be denied.
5. Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence.

II. Exam Accommodation

1. If you are unable to write a final examination, report your absence using the Academic Consideration Request Form through STUDENT ABSENCE PORTAL.
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 submit an the Academic Consideration Request Form through STUDENT ABSENCE PORTAL.
   PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

III. LATE ASSIGNMENTS

IV. Medical Accommodation

1. Requests for Academic Consideration Request Form through STUDENT ABSENCE PORTAL.
2. Requests for academic consideration must include the following components:
   a. Self-attestation signed by the student (*This is only accepted for the first/one absence*)
   b. Medical note. Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence.
   c. Indication of the course(s) and assessment(s) affected by the request
   d. Supporting documentation as relevant
3. Requests without supporting documentation are limited to one per term per course.
4. **Students must request academic consideration as soon as possible and no later than 48 hours after the missed assessment.**
5. Once the request and supporting documents have been received and reviewed, appropriate academic consideration, if granted, shall be determined by the instructor in consultation with the academic advisor,

in a manner consistent with the course outline.

Academic consideration may include extension of deadlines, waiver of attendance requirements for classes/labs/tutorials, or re-weighting of course requirements. Some forms of academic consideration, such as arranging Special Examinations, assigning a grade of Incomplete, or granting late withdrawals without academic penalty, may only be granted by the Academic Advising office of the Faculty of Registration.

6. **An instructor may deny academic consideration for any assessment that is not required in the calculation of the final grade** (e.g., "8 of 10 quizzes"). Assessment flexibility must be indicated on the course outline.
7. **An instructor may deny academic consideration relating to the timeframe submission of work where there is already flexibility in the submission timeframe** (e.g., 72-hour submission window). This assessment flexibility must be indicated on the course outline.

V. Religious Accommodation

When scheduling unavoidably conflicts with religious holidays, which (a) require an absence from the University or (b) prohibit or require certain activities (i.e., activities that would make it impossible for the student to satisfy the academic requirements scheduled on the day(s) involved), no student will be penalized for absence because of religious reasons, and alternative means will be sought for satisfying the academic requirements involved. If a suitable arrangement cannot be worked out between the student and instructor involved, they should consult the appropriate Department Chair and, if necessary, the student's Dean.

It is the responsibility of such students to inform themselves concerning the work done in classes from which they are absent and to take appropriate action.

VI. Academic Integrity

In the Faculty of Engineering, we encourage students to create a culture of honesty, trust, fairness, respect, responsibility, and courage, befitting the professional degree you are pursuing.

Please visit Academic Integrity Western Engineering for more information

VII. Academic Offences

Plagiarism means using another's work without giving credit. The university has rules against plagiarism and other scholastic offences. Western Engineering has a zero-tolerance policy on plagiarism. The minimum penalty is zero on the course work and a repeat offence will earn you zero on the course. A third offence may lead to expulsion from the university.
Scholastic Discipline for Undergraduate Students & Cheating, Plagiarism and Unauthorized Collaboration: What Students Need to Know

Students must write their reports, 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

VIII. Faculty of Engineering AI Policy

The use of generative Artificial intelligence (GenAI) tools won't be discouraged in the Faculty of Engineering. As we pride ourselves on building the future we can't hide from the use of GenAI tools to contribute to the understanding of the course materials. However, the use of GenAI tools in any assignment or contribution during the course will have to be disclosed, as a resource.

GenAI tools use won't be permitted in any type of examination or other assessments where the faculty have prohibited their use. If use of GenAI tools is detected by the instructor in these instances, academic offences penalties might be imposed against the student.

IX. Use of English Policy

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 except for 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.

X. Accessibility

Western is committed to achieving barrier free accessibility for persons with disabilities studying, visiting and working at Western. As part of this commitment, there are a variety of services, groups and committees on campus devoted to promoting accessibility and to ensuring that individuals have equitable access to services and facilities. To help provide the best experience to all members of the campus community, please visit the Accessibility Western University for information on accessibility-related resources available at Western.

Students with disabilities may arrange for academic accommodation at Western. For a more detailed explanation, please visit Academic Support & Engagement -Academic Accommodation.

XI. Inclusivity, Diversity, and Respect

The Faculty of Engineering at Western University is committed to creating equitable and inclusive learning environments that value diverse perspectives and experiences. We recognize that university courses often marginalize students based on social identity characteristics such as, but not limited to, Indigeneity, race, ethnicity, nationality, ability, gender identity, gender expression, sexuality, age, language, religion, and socioeconomic status. Understanding this, we strive to facilitate equitable experiences and inclusion within the classroom by respecting and integrating multiple ways of knowing, being, and doing. Please visit the Office of Equity, Diversity and Inclusion.

XII. Health and Well-Being

- Health & Wellness Services – Students - Offers appointment-based medical clinic for all registered part-time and full-time students.
- Mental Health Support - Provides professional and confidential services, free of charge, to students needing assistance to meet their personal, social and academic goals. Services include consultation,

referral, groups and workshops, as well as brief, change-oriented psychotherapy.

- Crisis Support - For immediate assistant, please visit Thames Hall Room 2170 or call 519-661-3030. The crisis clinic operates between 11:00 am - 4:30 pm. For after-hours crisis support, click here.
- Gender-Based Violence and Survivor Support - Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, here. To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Important Contacts

Engineering Undergraduate Services	SEB 2097	519-661-2130	engugrad@uwo.ca
Electrical and Computer Engineering	TEB 279	519-661-2111 x86264	eceugrad@uwo.ca
Office of the Registrar/Student Central	WSSB 1120	519-661-2100	

Important Links

- WESTERN ACADEMIC CALENDAR
- ACADEMIC RIGHTS AND RESPONSIBILITIES
- ENGINEERING PROGRESSION REQUIREMENTS AND ACADEMIC REGULATIONS
- UNIVERSITY STUDENTS' COUNCIL (USC) - SERVICES
- IMPORTANT DATES AND DEADLINES
- ACADEMIC CONSIDERATION FOR MEDICAL ILLNESS - UNDERGRADUATE STUDENTS
- ACCOMMODATIONS FOR RELIGIOUS HOLIDAYS
- SCHEDULING OF ASSIGNMENTS, TESTS, AND EXAMINATIONS
- STUDENT FORMS
- OFFICE OF THE REGISTRAR
- RETENTION OF ELECTRONIC VERSION OF COURSE OUTLINES (SYLLABI)
- ACADEMIC APPEALS
- STUDENT ABSENCE PORTAL