Western University
Faculty of Engineering
Department of Electrical and Computer Engineering

SE2251B: Software Design for Systems Engineering

Course Outline 2022-03

Description: SE 2251 is a group project illustrating the design and implementation the software engineering design concepts. It covers the integration with third-party applications and big data sources. Real-time and distributed systems, architectural design will be briefly covered.

Instructor: Dr. Shaimaa Ali, P.Eng.
TEB 251, 519-661-2111 ext.81268, sali242@uwo.ca
Consultation hours: TBA

Academic Calendar Copy:

SE 2251 is a group project illustrating the design and implementation the software engineering design concepts. It covers the integration with third-party applications and big data sources. Real-time and distributed systems, architectural design will be briefly covered.

Contact Hours: 3 lecture hours, 3 laboratory hours, 0.5 course.

Antirequisite: SE 2203A/B, Computer Science 2212A/B/Y

Prerequisites: Engineering Science 1036A/B or Computer Science 1026A/B, Software Engineering 2205A/B.

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 Science 25%, Engineering Design 75%.

Recommended References:

1. Chip Huyen, *"Designing Machine Learning Systems: An Iterative Process for Production-Ready Applications"*, O'Reilly Media; 1st edition, 2022, ISBN-10: 1098107969, ISBN-13:978-1098107963.
2. Paul Deitel and Harvey M. Deitel, *"Intro to Python for Computer Science and Data Science: Learning to Program with AI, Big Data and The Cloud"*, Pearson,1st edition, 2019, ASIN:B089N35YXY.
3. Noah Gift and Alfredo Deza, *"Practical MLOps: Operationalizing Machine Learning Models"*, O'Reilly Media; 1st edition, 2021, ISBN-10:1098103017, ISBN-13:978-1098103019

General Learning Objectives (CEAB Graduate Attributes)

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

Notation*: where x be I: Introductory, D: Intermediate, A: Advanced, or empty*. 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 Topics and Specific Learning Outcomes	**CEAB GA Indicators**
1. Understanding Machine Learning System	**KB4**
At the end of this section, students will be able to: **a.** Recognize the components of a ML System **b.** Differentiate between a ML system and a traditional software system.	
2. Data Engineering Fundamentals	**KB4, ET2, D4**
At the end of this section, students will be able to: **a.** Recognize and connect to various data sources. **b.** Recognize and work with popular data formats. **c.** Pass data between different databases and/or services. **d.** Distinguish between batch processing and stream processing.	
3. Fundamentals of MLOps	**KB4, ET2, D4**
At the end of this section, students will be able to: **a.** Distinguish between DevOps and MLOps. **b.** Utilize Git, GitHub in system development. **c.** Build MLOps Pipeline.	
4. Software Design Principles	**KB4, D3, D4**
At the end of this section, students will be able to: **a.** Recognize the software development life cycle. **b.** Recognize and implement distributed systems designs. **c.** Read and create UML models. **d.** Recognize and implement OOP design principles. **e.** Refactor poorly designed code to enhance it.	
5. Collaborating in a group project	**ITW1, ITW3**
At the end of this section, students will be able to: a. Contribute responsibly to a teamwork. b. Evaluate the performance of self and teammate. c. Implement a software system from end-to-end.	

Evaluation

Course Component	Weight
Project	50%
Review Questions	5%
In class activities	5%
Laboratory	20%
Midterm Test	20%

To obtain a passing grade in the course, a mark of **50% or more must be achieved on each evaluation component**. A mark < 50% in **any evaluation component** will result in a final course grade of 48% or less.

Late Submission Policy: Late submissions will be allowed for up-to 3 days after the due date with 10% late penalty for each day.

Accommodation Requests:
Requests for accommodations must be approved by the accommodations center. Course components with a weight **less than 10% will not be accommodated**.

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: 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, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

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

Missed Midterm Examinations: If a student misses a midterm examination, she or he must follow the Instructions for Students Unable to Write Tests and provide documentation to Undergraduate Services Office within 24 hours of the missed test. If accommodation is granted, the department will decide whether to provide a make-up test or allow reweighting of the test, where reweighting means the marks normally allotted for the midterm will be added to the final exam. If no reasonable justification for missing the test can be found, then the student will receive a mark of zero for the test.

If a student is going to miss the midterm examination for religious reasons, they must inform the instructor in writing within 48 hours of the announcement of the exam date or they will be required to write the exam.

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 the course web site (https://owl.uwo.ca/portal/) and making themselves aware of any information that is posted about 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 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.