

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

**ECE 3353B: Software Engineering for Human-Computer Interface Design
Course Outline 2021-2022**

Description: This course highlights specific material from Software Engineering and Cognitive Science with the purpose of designing and testing user interfaces for interactive visualization, or for supervisory control of complex systems. The course material is selected from recent papers in order to stay current with HCI developments and scientific research results. Although these research areas are broad, the topics covered have been selected so as to conform to emerging trends in HCI through the ACM and IEEE special interest groups. There is a final project which draws together additional lab demos, and allows the student to pursue a project that can potentially be tailored to their own research background. The course highlights the interplay between Software Engineering as an enterprise, and the importance of basic research on human perception and cognition to guide, inform, and inspire the development of innovative technology.

Instructor: Dr. Roy Eagleson, Ph.D., P.Eng.

Consultation can be arranged or resolved using email to: eagleson@uwo.ca

Academic Calendar Copy: “Design and testing of user interfaces for the supervisory control of complex systems. Interfaces for human input and methods for displaying complex data using advanced graphics, interactive visualization methods. Advanced UI development software.”

Contact Hours: 2 lecture hours, 4 hours lab/tutorial exercises which can be done independently on the students’ laptops in school or at home. 0.5 course.

Antirequisite: CS 4474a/b

Prerequisites:

Co-requisite: SE 33313a/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 50%, Engineering Design 50%.

Required Textbook: No textbook. Resources will be available on course OWL website.

Other Required References: None

Recommended References: Any Java textbook or online resource.

General Learning Objectives (CEAB Graduate Attributes)

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

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.

Course Topics and Specific Learning Outcomes	CEAB Graduate Attributes Indicators
<p>1. Introduction to Software Engineering for Human-Computer Interface Design</p> <p>At the end of this section, students will be able to:</p> <ul style="list-style-type: none"> a. Understand how the Design of Human-Computer Interface Software requires special consideration of the special capacities and constraints of the human Perceptual, Action, and Cognitive System. b. Understand and articulate how the constraints of the human action system impacts the set of computer-input devices. c. Understand and articulate how the constraints of the human perceptual system impacts the set of computer-output devices. d. Understand and articulate the foundational Design Guidelines for Human-Computer Interface Software. e. Understand how Software Engineering is conducted as an Engineering Enterprise, emphasizing the principals of Engineering, and especially Professionalism and Ethical considerations as being paramount. <p>2. Behavioural Representations of User Tasks for Software Design</p> <p>At the end of this section, students will be able to:</p> <ul style="list-style-type: none"> a. Understand how User Tasks are represented in the human cognitive system and how those tasks can be implemented by hierarchically nested sequences of human-computer interactions. b. Understand and be able to represent Human-Computer Interactions through informal functional requirements and articulate specific Use Cases with Usage Scenarios. 	<p>KB3</p> <p>KB2</p> <p>KB2</p> <p>KB4</p> <p>P1, P2, P3</p> <p>PA 1, PA 2</p> <p>PA2</p>

<ul style="list-style-type: none"> c. Understand and be able to derive behavioural representations from the User's perspective as Activity Diagrams, and transform to State Diagrams. 	PA2
3. Software Architectures for HCI At the end of this section, students will be able to: <ul style="list-style-type: none"> a. Understand and be able to derive structural representations of software architectures that are derived from constraints specified as informal requirements. b. Be able to integrate diagrammatic representations of the structure of HCI architectures, and diagrammatic representation of HCI function, into Hierarchical Harel Statecharts. c. Understand and be able to utilize APIs for Graphical User Interfaces (GUIs) and how these constrain the Architectural Design of HCI software. d. Understand and be able to implement HCI software using Design Patterns that are foundations for HCI Software Architectures. 	D1, D2 PA2 D3 D4
4. User Interface Evaluation and Human Performance Metrics At the end of this section, students will be able to: <ul style="list-style-type: none"> d. Understand and be able to articulate the foundations of human task performance analysis. e. Understand and be able to articulate the various approaches to evaluating User Interfaces. f. Understand and be able to design methodologies for testing and evaluating Human Performance while using Human-Computer Interfaces as tools to perform tasks. 	KB1 KB4, PA3 PA3

Evaluation

Course Component	Weight
Quizzes / online assignments	15 %
Online and in-person Participation	4 %
Midterm Examination / Evaluation	31 %
Final Examination / Evaluation	50 %

To obtain a passing grade in the course, a mark of 50% or more must be achieved on the final evaluation. A final examination or quiz/online mark < 50% will result in a final course grade of 48% or less.

Note: In the previous Pandemic year, where no 'in class' examination(s) could be held, these components were weighted as 33%, 5%, 31%, and 31%, respectively. If exams cannot be held 'in person' this year, it is likely that the course component weights will be adjusted accordingly.

Homework Lab Assignments: as assigned in class and noted on OWL

Quizzes: administered online using OWL

Participation: a Participation Mark will be assessed from a rank indexing of student interaction during online interactive sessions based on zoom chat logs, discussions via voice and/or video zoom interaction, responding to questions or polls during the online lectures, forums, participation in formative quizzes, and online attendance.

Midterm Test: as scheduled in class and noted using OWL

Final Examination: The final examination will be take place during the regular examination period, and administered online using OWL.

Late Submission Policy: The lab/assignments will have deadline date/times incorporated with each assignment, and the OWL dropbox system will timestamp the upload from each student. Late penalties will accrue at the daily rate of 5% of the weighted allocation of marks.

Assignment Submission Locker: not used. Upload to course dropbox on OWL.

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: A make-up evaluation will be scheduled as soon as possible after a missed evaluation. 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

Use of Electronic Devices: not permitted during examinations.

Use of Personal Response Devices (“Clickers”): will not be required for this course.

Use of Recordings: All of the remote learning sessions for this course may be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

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.