ECE650: Methods and Tools for Software Engineering
Course Outline

Title:	Methods and Tools for Software Engineering
Course ID:	ECE 650 Section 001
LEARN:	`https://learn.uwaterloo.ca`
Piazza:	TBA
Lectures:	TTh 5:30 – 6:50 PM EST
Instructor:	Dr. Albert Wasef, `awasef@uwaterloo.ca`
TA:	TBA ,

Course Calendar Description

Software Systems - Systems programming and operating systems, scripting, system calls, libraries, compilers and interpreters. Mathematical logic - propositional & predicate logic, and some higher-order logics, syntax, semantics, entailment, deduction, use of logic in software. Data structures - lists, stacks, queues, heaps, trees, graphs, and algorithms to manipulate such data structures.

Course Contents

- **Software Systems ($\sim$ 40% of the course contents):** systems programming and operating systems, scripting, system calls, libraries, compilers, $\cdots$
- **Mathematical Logic ($\sim$ 15% of the course contents):** propositional logic, syntax semantics, entailment deduction and the use of logic in software, $\cdots$
- **Algorithms and Data Structure ($\sim$ 45% of the course contents):** stacks, heaps, trees, graphs, algorithms to manipulate them, $\cdots$

Textbook

No textbooks are required

The lecture slides will be based on:

- Advanced Linux Programming
- Introduction to Algorithms, Cormen et al.,2nd edition `http://lib.uwaterloo.ca/`
- Logic for Computer Scientists `https://link.springer.com/book/10.1007/978-0-8176-4763-6`

Add `proxy.lib.uwaterloo.ca`to domain name to access! Or use: `https://uwaterloo.ca/library/make-link`

Course Style

- This course is hands-on and will require a lot discussions with your course instructor , TAs, and peers.
- There are reading materials that you will have to do on your own.
- You will need to do significant work and learning on your own outside the lecture.

What is this course is "NOT"

- **Not a course on programming** but there is a large, complex, multi-part programming assignment / project
- **Not a course on operating systems** but the assignments require and help develop intimate understanding of processes, threads, inter-process communication, and systems' programming
- **Not a course on mathematical logic** but the assignments requires modeling a problem in logic and using a decision procedure (SAT) to solve it
- **Not a course in data-structures and algorithms** but the assignment will require using and understanding common algorithms (sorting, searching, parsing) and data structures (graph, list, map)

Assessment

- Assignments: 40%
- Project: 10%
- Final Exam: 50%

There are 4 Assignments and a Final Project that are a mix of Python and C++ programming as follows:

- one assignment is purely in Python
- one assignment is purely in C / C++
- the rest of assignments and a project require using both languages

The Programming assignments will lead towards the final project.

Policy on Late Assignments

You have 2 days of lateness for assignments that you can use throughout the term These are TWO days for the term. Not for each assignment!

Each day the assignment is late consumes one day of lateness

Marking of Assignments

- Marking of the assignments is automated via scripts that will test your assignment against some test cases.
- If your assignment passes a test case, you will get the full mark for this case, otherwise, you get zero, i.e., no partial marks.
- Your assignment code has to follow the requirements to the word. For example, if it is required in the assignment that you print numbers with two digits after the decimal number and you chose to print three digits after the decimal point, your code will fail the test case in the grading script and you will get zero for this test case.
- You have one week after the grades are released to request a regrade of your assignment. After that, your mark will be final.

Administrative Policy

Missing a final exam: Students that miss the final exam due to a reported illness will receive and INC grade.

Statement regarding travel and the final exam period: Student travel plans are not considered acceptable grounds for granting an alternative exam time. Refer to the Registrar's website for additional information regarding final exams.

Attendance and participation: If you anticipate missing a deliverable deadline or an exam for a non-medical reason, you should contact your course coordinator as soon as you are aware of

the issue. Given sufficient notice, alternate arrangements may be possible. Alternate arrangements are rare and subject to the discretion of the course instructor.

Self-declared verification of illness form (VIF) on Quest: Students feeling ill should complete the self-declared Verification of Illness Form (VIF) on Quest. This system sends an automated VIF message to instructors about expected absences. For more information, refer to "How do I self-declare my illness or isolation? — Quest – Student Information System —— University of Waterloo (uwaterloo.ca)".

COVID tracking within our UW community: If you have tested positive for COVID-19 or need advice, complete the Campus Wellness Form at "COVID-19 Support and Advice — Campus Wellness — University of Waterloo (uwaterloo.ca)".

Fair contingencies for emergency remote teaching: We are facing unusual and challenging times. The course outline presents the instructors' intentions for course assessments, their weights, and due dates in Fall 2024. As best as possible, we will keep to the specified assessments, weights, and dates. To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weights and/or deadlines with due notice to students. In the event of further challenges, the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.

Compassionate consideration: If you are facing challenges that are affecting more than one course, please contact your Associate Chair or Director of your program. They will review your case and coordinate a reasonable and fair plan in consultation with appropriate others (for example: Instructors, Department Undergraduate Studies Committee, Chair, AccessAbility Services, Engineering Counselling services, Registrar's Office).

Wellness support and contact information: We all need a support system. We encourage you to seek out mental health supports when they are needed. Please reach out to Campus Wellness and Counselling Services. We understand that these circumstances can be troubling, and you may need to speak with someone for emotional support. Good2Talk is a post-secondary student helpline based in Ontario, Canada that is available to all students including outside Ontario. MATES is a one-to-one student peer support program offered by the Waterloo Undergraduate Student Association in consultation with Campus Wellness. MATES provides support to students who are hoping to build social skills, or are experiencing personal or academic concerns or low-level mental health and wellness difficulties.

Religious observances: As per the memo from the Provost on April 4, 2022, the University of Waterloo is prepared to support individuals who are celebrating or marking religious observances. If you will miss a class activity or deadline for a religious observance, please let your instructor know as soon as possible. The University of Waterloo is committed to creating a campus where everyone belongs, where we all work toward equity, and strive for a culture of authentic inclusion. If you need support or guidance on religious accommodation or observance, please reach out to our Equity, Diversity, Inclusion and Anti-racism Office using their web form.

Anti-racism statement: The University of Waterloo does not tolerate racism or any other form of discrimination and expects campus community members to contribute to a culture where all members feel safe and valued. Any member of the campus community who has experienced racism or discrimination at the University is encouraged to review available processes for addressing their concerns under Policy 33 – Ethical Behaviour and to seek guidance from the Equity Office via email at equity@uwaterloo.ca or through their website: uwaterloo.ca/human-rights-equity-inclusion/about/equity-office

Online course materials: All the course materials will be provided using LEARN. If you encounter any difficulties accessing the materials on LEARN, e-mail your course instructor. To use LEARN, go to the LEARN website and enter your university e-mail address and password. Due to

circumstances beyond the control of the teaching team, LEARN, Piazza, and other websites may, on occasion, be offline for system maintenance.

Intellectual property: Students should be aware that this course contains the intellectual property of their instructors, TAs, and/or the University of Waterloo. Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, labs, exams); and
- Work protected by copyright (e.g., any work authored by the instructors or TAs or used by the instructors or TAs with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructors, TAs, and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructors, TAs, or the University of Waterloo is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. Doing so without permission is considered a violation of intellectual property rights.

Please alert the instructors if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know.

Generative AI

This course includes the independent development and practice of specific skills, such as code development for assignments and the project. Therefore, the use of Generative artificial intelligence (GenAI) trained using large language models (LLM) or other methods to produce text, images, music, or code, like Chat GPT, DALL-E, or GitHub CoPilot, is not permitted in this class. Unauthorized use in this course, such as running course materials through GenAI or using GenAI to complete a course assessment is considered a violation of Policy 71 (plagiarism or unauthorized aids or assistance). Work produced with the assistance of AI tools does not represent the author's original work and is therefore in violation of the fundamental values of academic integrity including honesty, trust, respect, fairness, responsibility and courage (ICAI, n.d.).

You should be prepared to show your work. To demonstrate your learning, you should keep your rough notes, including research notes, brainstorming, and drafting notes. You may be asked to submit these notes along with earlier drafts of their work, either through saved drafts or saved versions of a document. If the use of GenAI is suspected where not permitted, you may be asked to meet with your instructor or TA to provide explanations to support the submitted material as being your original work. Through this process, if you have not sufficiently supported your work, academic misconduct allegations may be brought to the Associate Dean.

In addition, you should be aware that the legal/copyright status of generative AI inputs and outputs is unclear. More information is available from the Copyright Advisory Committee: `https://uwaterloo.ca/copyright-at-waterloo/teaching/generative-artificial-intelligence`

Students are encouraged to reach out to campus supports if they need help with their coursework including:

- Student Success Office for help with skills like notetaking and time management

- Writing and Communication Centre for assignments with writing or presentations
- AccessAbility Services for documented accommodations
- Library for research-based assignments

University Policy

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.