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ECE 606 Fall 2025

Algorithm Design and Analysis

Section 001

Class Schedule

Course	Meet Days	Meet Time	Location	Instructor(s)
ECE 606 001 [LEC]	**Tue, Thu** *Sep 3 - Dec 2*	08:30AM - 09:50AM	B1 271	Mahesh Tripunitara *tripunit@uwaterloo.ca*

schedule data automatically refreshed daily

Instructional Team

Instructor: Mahesh Tripunitara

Office: E7, 5432

Office hours:

- Tue, Thu 10-11:30am, E7-5432
- Or by appointment; email me or send me a (private) note on piazza

TA: while I may have a TA or two for the course, they simply do not have the bandwidth to interact with students. Consequently, please direct all your questions to me.

Course Description

Calendar Description for ECE 606

This is an introductory course on algorithms at the graduate level. It assumes familiarity with basic data structures such as lists, queues, trees and graphs, and emphasizes creativity in the design of algorithms, and rigorous analysis. Correctness (soundness and completeness) and efficiency (with respect to average-, best- and worst-case time and space) properties are considered in the context of algorithms for classes of problems such as optimization and decision problems. The course also gives insights into when a problem may be intractable, and how we may deal with intractability.

View requirements for ECE 606 (1)

Learning Outcomes

By the end of this course students should be able to:

Analyze algorithmic problems
Design algorithms
Choose the right data structures for an algorithm
Recognize when a polynomial-time algorithm is unlikely to exist

Tentative Class Plan

Week (1): Intro to the course; intro to Python 3; Expressing algorithms

Week (2): Data structures - graphs, trees, lists.

Week (3): Properties of algorithms: existence, correctness, efficiency

Week (4): Design strategy I: incremental

Week (5): Design strategy II: divide-n-conquer

Week (6): Design strategy III: greedy

Week (7): Design strategy IV: dynamic programming

Week (8): Randomization, Probabilistic and approximation algorithms

Week (9): Non-determinism; computational complexity; the class NP; other complexity classes

Week (10): Cook- and Karp-reductions; hardness and completeness for a complexity class

Week (11): NP-complete problems and reductions

Week (12): Machine learning — Probably Approximately Correct (PAC)

Required Materials & Technologies

Note: Any prices provided in course outlines are best estimates based on recent online prices and do not include shipping or taxes. Prices may vary between retailers.

This course has **no additional costs** for students.

Readings

Title / Name	Notes / Comments	Required	Used Versions Allowed	Price (CAD)
"ECE 606 – Algorithms", M. Tripunitara	Available on Learn	Required	Yes	0

Learn for textbook, assignment handouts and solutions and past final exams.

Piazza (for Q&A and discussions): self-signup. link: https://piazza.com/uwaterloo.c... (2)

Technology

Name of Technology	Notes / Comments	Required	URL (student access)	Price (CAD)
Learn		Required	learn.uwaterloo.ca	0
Piazza		Recommended	https://piazza.com/uwaterloo.c... (3)	0

Other Materials

Item	Notes / Comments	Required	Price (CAD)
Laptop/personal computer		Required	

Assessments & Activities

Component / Activity	Date or Due Date	Location / Submission Method	Weight (%)
Weekly assignments			50%
Final exam			50%

There will be assignments, one every week, for a total of 11 assignments across the course. Each comprises a few problems. There may be problems in the assignment that involve programming in Python 3; each such problem will be annotated with "[python3]." Assignments will be published by Thursday each week starting September 6. They are due by 11:59pm the following Thursday. Written solutions must be typeset, or written legibly and scanned, and uploaded to Crowdmark. Some subset of the problems on each assignment will be marked. This subset will not be announced beforehand.

Late / Missed Content

No late assignments accepted.

Assignment Screening

We may use plagiarism-detection software to check that your submissions are indeed original, and not plagiarized. Such software includes Turnitin, iThenticate and Moss.

Generative AI

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, **may be used** for assignments in this class with proper documentation, citation, and acknowledgement. Recommendations for how to cite GenAI in student work at the University of Waterloo may be found through the Library. (4)

Please be aware that generative AI is known to falsify references to other work and may fabricate facts and inaccurately express ideas. GenAI generates content based on the input of other human authors and may therefore contain inaccuracies or reflect biases.

To protect the privacy and security of any data entered, students should use the University's version of Co-Pilot (5) and login with their UW ID. Data entered into other systems can be added to training sets, monitored, geolocated and even reproduced as output which may share private personal information or result in intellectual property breaches.

In addition, you should be aware that the legal/copyright status of generative AI inputs and outputs is unclear. Exercise caution when using large portions of content from AI sources, especially images. More information is available from the Copyright Advisory Committee. (6)

You are accountable for the content and accuracy of all work you submit in this class, including any supported by generative AI. You should be able to readily demonstrate your knowledge of your submissions. To demonstrate your learning, you should keep your rough notes, including sources, research notes, brainstorming, drafting notes and prompts. You may be asked to submit these notes along with earlier drafts of your work, either through saved drafts or saved versions of a document.

Notice of Recording

Activities for this course involve recording, in partial fulfillment of the course learning outcomes. You will receive notification of recording via at least one of the following mechanisms: within the Learning Management System (LEARN), a message from your course instructor, course syllabus/website, or other means. Some technologies may also provide a recording indicator. Images, audio, text/chat messaging that have been recorded may be used and/or made available by the University to ***[insert to whom[1]]*** for the purpose of ***[insert purpose[2]]***. Recordings will be managed according to the University records classification scheme, WatClass (7), and will be securely destroyed when no longer needed by the University. Your personal information is protected in accordance with the Freedom of Information and Protection of Privacy Act (8), as well as University policies and guidelines (9) and may be subject to disclosure where required by law.

The University will use reasonable means to protect the security and confidentiality of the recorded information, but cannot provide a guarantee of such due to factors beyond the University's control, such as recordings being forwarded, copied, intercepted, circulated, disclosed, or stored without the University's knowledge or permission or the introduction of malware into computer system which could potentially damage or disrupt the computer, networks, and security settings. The University is not responsible for connectivity/technical difficulties or loss of data associated with your hardware, software or Internet connection.

By engaging in course activities that involve recording, you are consenting to the use of your appearance, image, text/chat messaging, and voice and/or likeness in the manner and under the conditions specified herein. (In the case of a live stream event, if you choose not to have your image or audio recorded, you may disable the audio and video functionality (10). Instructions to participate using a pseudonym instead of your real name are included where the feature exists; however, you must disclose the pseudonym to your instructor in advance in order to facilitate class participation.) If you choose not to be recorded, this notice serves as confirmation of your understanding that ***[indicate alternative action that students can take[3]]***.

You are not permitted to disclose the link to/URL of an event or an event session recording or copies of recording to anyone, for any reason. Recordings are available only to authorized individuals who have been directly provided the above instructions/link for their use. Recordings for personal use, required to facilitate your learning and preparation of personal course/lecture notes, should not be shared with others without the permission of the instructor or event coordinator. Review the University's guidelines for faculty, staff and students entering relationships with external organizations offering access to course materials (11) for more information on your obligations with respect to keeping copies of course materials. For more information about accessibility, connect with AccessAbility Services (12).

Administrative Policy

Audit: you are allowed to audit the course. To get AUD credit, you submit assignments and take the final exam just like any other student, and achieve a mark of at least 50 at the end.

Lateness policy on assignments: no late submissions accepted.

Collaboration policy: you may collaborate with your colleagues when working on your assignments in that you can discuss ideas with one another. However, your final submission must be your own. That is, when you sit down to write your solutions, you should do so on your own. Any sources you use, whether they are your colleagues, books, papers or online resources, should be appropriately credited in your submission. There is no penalty for utilizing such (re)sources, provided they are credited explicitly. Otherwise, it is regarded as plagiarism, and is an academic offence.

Use of ChatGPT and other LLMs: you are allowed to use those. But, you must credit them in your submission, and you are entirely responsible for your submission. In other words, "but that is what ChatGPT told me" is not valid grounds for getting marks for an incorrect submission. Of course, "that is what (insert name of brilliant person here) told me" is also not valid grounds.

Final Exam: The final exam will be in person, 2.5 hours long and scheduled by the university registrar during the final exam period, Dec. 6-19. Do *not* plan any trips till the registrar publishes the date for our final exam, which they usually do in the middle of the term. The final exam will be closed book, no other materials allowed. All you'll need is a pen or pencil. You are not allowed to collaborate with anyone during the final exam.

University Policy

Mental Health: At the University of Waterloo, we are dedicated to supporting your mental and emotional well-being. Our Counselling Services offer confidential support, including individual counselling, workshops, and crisis intervention. If you're struggling, please reach out for help at 519-888-4096 or visit their website [13] for more information.

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 [14] 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 [15]. 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 [16] 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 [17]. For typical penalties, check Guidelines for the Assessment of Penalties [18].

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances [19] (other than a petition) or Policy 71, Student Discipline [20] 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 [21].

Note for students with disabilities and disabling conditions: The University of Waterloo recognizes its obligations under the Ontario Human Rights Code to accommodate students with known or suspected disabilities and disabling conditions (e.g. medical conditions, injuries, impacts of trauma such as from violence or discrimination) to the point of undue hardship. To support this obligation, AccessAbility Services [22] (AAS) collaborates with all academic departments and schools to facilitate academic accommodations for students with disabilities and disabling conditions without compromising the academic integrity of the curriculum. If you believe you may require academic accommodations (e.g., testing accommodations, classroom accommodations), register with AAS as early in the term as possible by completing the online application [23]. Students already registered with AAS must activate their accommodations for each of their courses at the

beginning of each term using AAS' online system. If you require assistance, contact AAS by phone (519-888-4567 ext. 35082), email (access@uwaterloo.ca) or in-person (Needles Hall North, 1st Floor, Room 1401).

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.

Reference: Links from Document

1. https://acal.fast.uwaterloo.ca/course/1259/ECE/606
2. https://piazza.com/uwaterloo.ca/fall2024/ece606
3. https://piazza.com/uwaterloo.ca/fall2025/ece606
4. https://subjectguides.uwaterloo.ca/chatgpt_generative_ai
5. https://copilot.microsoft.com/
6. https://uwaterloo.ca/copyright-at-waterloo/teaching/generative-artificial-intelligence
7. https://uwaterloo.ca/records-management/records-classification-and-retention-schedules
8. https://www.ontario.ca/laws/statute/90f31
9. https://uwaterloo.ca/privacy/
10. https://uwaterloo.ca/student-it-services/
11. https://uwaterloo.ca/secretariat/faculty-staff-and-students-entering-relationships-external
12. https://uwaterloo.ca/accessability-services/
13. https://uwaterloo.ca/students/health-and-well-being/counselling-appointments
14. https://uwaterloo.ca/academic-integrity/
15. https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70
16. https://uwaterloo.ca/academic-integrity/
17. https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71
18. https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties
19. https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70
20. https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71
21. https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72
22. https://uwaterloo.ca/accessability-services/
23. https://uwaterloo.ca/accessability-services/students/applying-academic-accommodations/documentation-information-forms