

UNIVERSITY OF
Waterloo



**Department of Electrical and Computer
Engineering**

**ECE 358: Computer Networks
Course Outline**

Fall 2023

Scheduling and Contact

Instructors:

Name	Sections	Office	Email
Albert Wasef (coordinator)	LEC 001	EIT 4002	awasef@uwaterloo.ca
Abdalla Mohamed Hussein	LEC 002	EIT 4143	am3abdelaziz@uwaterloo.ca
Pin-Han Ho	LEC 003	EIT 4124	p4ho@uwaterloo.ca

Lab Instructor: Hamid Nafissi, email: hamidreza.nafissi@uwaterloo.ca

TAs:

	Duties	Name	Email
TA1	Tutorial	Hakim Abogharaf	ajabogha@uwaterloo.ca
TA2	Tutorial	Sapna Pandey	s37pande@uwaterloo.ca
TA3	Tutorial	Mohammad Abuyaghi	malhajal@uwaterloo.ca
TA4	Labs	Likhil Babu Pallati	lbpallat@uwaterloo.ca
TA5	Labs	Ararat Shaverdian	ashaverdian@uwaterloo.ca
TA6	Labs	Ursula Das	udas@uwaterloo.ca
TA7	Labs	TBA	

Lectures Schedule and Location:

Instructor	Section	Time	Location
Albert Wasef	LEC 001	05:00-06:20MF. Dr. Wasef will be out of the country for one or two weeks (the exact period will be announced in class). During this period, Dr. Wasef will deliver the lectures online via Teams.	E7 4053
Abdalla Mohamed Hussein	LEC 002	10:30-11:20TTh	E7 4053
Pin-Han Ho	LEC 003	03:00-04:20TW	E7 4053

Office Hour

Instructor	Section	Time and Location
Albert Wasef	LEC 001	Dr. Wasef is available after lectures to answer your questions
Abdalla Mohamed Hussein	LEC 002	Dr. Hussein is available after lectures to answer your questions
Pin-Han Ho	LEC 003	Dr. Ho is available after lectures to answer your questions

An online office hour with no show in the first 10 minutes will end for the day.

Tutorials

TUT	TA	Time	Location
101	Hakim Abogharaf	05:30-06:20Th	E7 4053
102	Sapna Pandey	11:30-12:20T	E7 4053
103	Mohammad Abuyaghi	04:30-05:20T	E7 4053

Labs:

- Labs will be delivered asynchronously. Lab videos will be posted at the beginning of each lab.
- In-person lab tutorials will be delivered weekly on Wednesdays 05:30-06:20 in E7 4053. The purpose of these lab tutorials is to answer lab-related questions.

Piazza:

- Piazza will be used to answer questions related to lectures, tutorials, and labs.
- Questions will be answered within 24 hours.
- Access code to sign up (if not already enrolled): ece358-f23

Key Dates

Week	Month	M	T	W	Th	F	Notes		
1	Sept.			6	7	8	No labs/tutorials		Lectures begin
2		11	12	13	14	15	No Lab	Tutorial - problem set 1	
3		18	19	20	21	22	LAB 1	Tutorial - problem set 1/2	
4		25	26	27	28	29	LAB 1	Tutorial - problem set 2/3	
5	Oct.	2	3	4	5	6	LAB 1	Tutorial - problem set 3	Lab1 due
x		9	10	11	12	13			Reading Week
6		16	17	18	19	20	LAB 2	Tutorial - problem set 3/4	
7		23	24	25	26	27	LAB 2	Tutorial - problem set 4	
8		20	31				LAB 2	Tutorial - problem set 4	
9	Nov.			1	2	3	LAB 2	Tutorial - problem set 4	
10		6	7	8	9	10	LAB 2	Tutorial - problem set 4	Lab2 Due
11		13	14	15	16	17	LAB 3	Tutorial - problem set 5	Lab2 Due
12		20	21	22	23	24	LAB 3	Tutorial - problem set 5	Lab3 Due
13	Dec.	27	28	29	30			Tutorial - problem set 5	
						1			
13		5							Lectures end

Course website: Any course announcements or material prepared for the lectures, tutorials and labs will be posted on LEARN.

Resources:

Textbook: Computer Networking, 8/e (7/e or 6/e are also acceptable), James F. Kurose, Keith W. Ross.

Course Content

Calendar description: This course is a comprehensive introduction to computer networks. The focus is on the concepts, the protocols, and the fundamental design principles that have contributed to the success of the Internet. Topics include: transmission media and technologies, switching and multiplexing, protocols and layering, LAN (wired and wireless), congestion/flow/error control, routing, addressing, internetworking (Internet) including TCP.

Course outcomes:

The two high-level course outcomes are:

1. Learn to think like a network engineer.
2. Become familiar with the main components of the Internet.

The lower-level outcomes are:

- i) Have a good understanding of protocols and networking design concepts.
- ii) Have a working knowledge of transport protocols with a special emphasis on TCP and retransmission protocols.
- iii) Have a good understanding of the IP layer (including routing, addressing,...).
- iv) Have the ability to describe different Local Area Networks technologies and the fundamentals of the underlying protocols (layer 2).
- v) Be competent with discrete-event simulation.
- vi) Be competent with basic network utilities.

Outline:

1. Introduction: Internet as a network of networks, standardization, digital transmission principles and technologies, switching and multiplexing technologies, design of network: the layered approach, its advantages and shortcomings, protocols, services, issues in Quality of Service.
2. A peek at the application layer (sockets, HTTP, DNS)
3. Transport layer: from congestion control principle to current protocols (TCP and UDP), reliable data transfer.
4. Internetworking: introduction, naming, addressing, IP: fragmentation, error handling.
5. Routing: fundamentals, Intra-domain routing (RIP, OSPF), Inter-domain routing (BGP)

6. Data link layer from an introduction to error detection to framing, Multiple Access protocols: Aloha, CSMA/CD and CSMA/CA. Example of LAN technologies: Ethernet, WiFi, and Switches.
7. Synthesis: a day in the life of a web request

Lab Description: There will be 3 labs that will be done in groups of two students:

- LAB1: Development of a simulator of a single transmission system.
- LAB 2: Socket Programming using Python.
- LAB 3: Encapsulation and network utility tools.

Course Evaluation

Examination

- The midterm and the final exams will be delivered in person.
- The midterm exam on Friday, October 27th, 8:30 pm - 9:45 pm in E7 4043, 4053, 4417, 4433, 5343, 5353.
- The final exam will be scheduled by UW. Final exam date TBD.

Marking scheme

- The marking scheme will be:
 - o Labs: (20% - Alpha)
 - o Midterm exam: 30%.
 - o Final exam: (50% + Alpha).
 - o The value of Alpha depends on your mark in the final exam as follows:

	Value of Alpha
100% \geq Your final exam mark \geq 65%	0
65% $>$ Your final exam mark \geq 60%	5
60% $>$ Your final exam mark \geq 55%	10
55% $>$ Your final exam mark \geq 50%	15
50% $>$ Your final exam mark	20

Course-wide contingencies:

Should a change in the pandemic situation makes the university to cancel in-person classes and direct instructors to pivot to remote teaching, the following changes, as applicable, will be made. Note that these alternative arrangements are subject to adjustment.

- Short-term (e.g., one-week) cancellation: In-person lectures, office hours, tutorials and labs affected by any short-term cancellations will be offered remotely.
- Long-term cancellation: In-person lectures, office hours, tutorials and lab presentations affected by the cancellation will be handled as described above under the short-term cancellation. Should the in-person midterm and/or final be affected, they will be handled as described below.
- Midterm and final: Affected in-person midterm and final will be conducted remotely via synchronous LEARN Quizzes.

Rules

- If you miss the midterm without a valid reason, that midterm earns a score of zero.
- If you miss the midterm for a valid reason, your final exam weight will be increased accordingly. There will be no “make up” midterm exams.
- The instructor determines whether or not a reason for missing a lab deadline or exam is deemed to be valid.
- The instructor reserves the right to change the grading scheme (and to curve the final grade) as long as no student would do worse with the new grading scheme.
- Due to COVID-19, dates, times and durations are subject to change. Also, alternate grading schemes, exam arrangements, or course deliverables may be necessary. These will be communicated when available.
- The instructor also reserves the right to use alternative grading schemes in special circumstances. For example, if an accommodation is necessary, an alternative grading scheme may be used for individual students

Problem Sets

- Problem sets will be divided into sets delivered during the tutorials and sets for the students to practice. Both sets will be posted on LEARN. The onus is on you to attempt them.
- Partial/full solutions for these problem sets will be posted on the course website.

Labs

- *Labs are an essential component of the course and all labs must be completed and all deliverables submitted to pass the course. Failure to do so will result in an incomplete grade.*
- Labs will be performed in groups of two students. You can select your partner from any section in the course. You and your lab partner need to join the same group on LEARN by going to “connect -> groups -> labs -> join” on LEARN.

Lab marking and reports submissions

- There are 3 lab modules weighted as follows:
 - Lab 1: Due on Oct. 6th at 11:59 pm. Lab 1 has a weight of 40% of the total lab marks.

- Lab 2: Due on Nov. 10th at 11:59 pm. Lab 2 has a weight of 40% of the total lab marks.
- Lab 3: Due on Nov. 24th at 11:59 pm. Lab 3 has a weight of 20% of the total lab marks.
- See the course web page on LEARN for more details about labs including lab manuals.
- All the lab submissions will be online to the drop boxes on LEARN. The programming code (with proper comments) and the report (in PDF format) of a lab must be submitted to the corresponding drop box on LEARN. Follow the instructions in the lab manuals. **The code files must be submitted as individual files (not an archive).** If LEARN does not accept your file types, you can add “.txt” to the filename to change your files extensions to let LEARN accept your files.
- Late lab reports will be scored a zero unless prior arrangements are made or a valid reason is presented. In no case will a lab report be accepted more than a week past the deadline. If a valid reason exists for being unable to hand in the lab within the week following the deadline, then the lab will be assigned a weight of zero and the remaining labs will be reweighted accordingly.
- Only one set of deliverables per lab is required per group.
- **Under any circumstances, students are not allowed to access, in any form, ECE358 lab reports or answers or results from previous terms. Such access will be treated as an academic offence under Policy 71.**
- **Turnitin.com: Text matching software (Turnitin®) will be used to screen assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin®. In the first week of the term, details will be provided about arrangements and alternatives for the use of Turnitin® in this course.**
- This course includes the independent development and practice of specific skills, such as discrete-event simulation. 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
- If you have any concern regarding your lab mark, contact your marking TA as follows:

Group Number	Marker	Email
1 - 59	Likhil Babu Pallati	lbpallat@uwaterloo.ca
60 - 119	Ararat Shaverdian	ashaverdian@uwaterloo.ca
120 - 179	Ursula Das	udas@uwaterloo.ca
> 180	TBA	

Relevant University Policies

The following statements are a required part of every course outline.

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. For more information, check

<https://uwaterloo.ca/engineering/current-undergraduate-students/academic-support/academic-integrity>

Grievances: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4,

<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>

When in doubt, contact your academic advisor.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing academic offenses and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the undergraduate associate dean. For information on categories of offenses and types of penalties, students should refer to Policy 71, Student Discipline,

<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>

For typical penalties check Guidelines for the Assessment of Penalties,

<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-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 he/she has a ground for an appeal should refer to Policy 72, Student Appeals,

<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>

Disabilities: The Office for Persons with Disabilities (OPD), 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 the AccessAbility Services at the beginning of each academic term.