

UNIVERSITY OF
Waterloo



**Department of Electrical and Computer
Engineering**

**ECE 358: Computer Networks
Course Outline**

Winter 2021

Dr. Albert Wasef

Scheduling and Contact

Instructor: Dr. Albert Wasef: EIT-4012, ext. 31723, awasef@uwaterloo.ca
Office hours: Weekly as indicated below.

Lab Instructor: Ms. Tiuley Alguindigue, tiuley.alguindigue@uwaterloo.ca

TAs:

	Duties	Name	Email
TA1	Tutorial	Amr Salaheldin Hashem Matar	asmatar@uwaterloo.ca
TA2	Labs	Md Rubayatur Rahim Bhuyian	mrrbhuyi@uwaterloo.ca
TA3	Labs	Maham Bhatti	m7bhatti@uwaterloo.ca

Lectures Schedule and Location:

Lectures	Lectures will be delivered asynchronously. Lecture videos will be posted on LEARN.
Lectures office hours	Thursdays 05:30-6:20pm (UTC-04:00) - Eastern Time (US & Canada). This is mainly to answer the students questions related to lectures. If no one shows up during the first 15 minutes, I will end the office hours. These office hours will not be recorded.
Tutorials	Live on Mondays 07:00-07:50pm (UTC-04:00) - Eastern Time (US & Canada)
Labs	Labs will be delivered asynchronously. Lab videos will be posted on LEARN.

Online Course delivery :

- All lectures' office hours and tutorials will be delivered live online on LEARN via Virtual Classroom.
- You can access Virtual Classroom under LEARN by going to Connect -> Virtual Classroom. You will find links for all the upcoming lectures' office hours and tutorials.
- Every effort will be made to record all live tutorial deliveries and post them on LEARN.
- In Virtual Classroom, you can send your questions to the presenter using the chat tool or you could talk on your mic. If you are not using your mic, please mute it.
- Lecture videos will be posted the beginning of each week.
- Lab videos will be posted at the beginning of each lab.
- Piazza will be used to answer questions related to lectures, tutorials, or labs.

Key Dates

Week	Month	M	T	W	Th	F	Notes			
1	Jan.	11	12	13	14	15	Office Hours	No labs/tutorials		
2		18	19	20	21	22	Office Hours	LAB 1	Tutorial - problem set 1	
3		25	26	27	28	29	Office Hours	LAB 1	Tutorial - problem set 1	
4	Feb.	1	2	3	4	5	Office Hours	LAB 1	Tutorial - problem set 2	Lab1 due
5		8	9	10	11	12	Office Hours	LAB 2	Tutorial - problem set 2	
x		15	16	17	18	19				Reading Week
x		22	23	24	25	26				Midterm week
6	Mar.	1	2	3	4	5	Office Hours	LAB 2	Tutorial - problem set 2	
7		8	9	10	11	12	Office Hours	LAB 2	Tutorial - problem set 3	
8		15	16	17	18	19	Office Hours	LAB 2	Tutorial - problem set 3	Lab2 Due
9		22	23	24	25	26	Office Hours	LAB 3	Tutorial - problem set 3	
10		29	30	31					Tutorial - problem set 3/4	
11	Apr.				1	2	Office Hours	LAB 3		
11		5	6	7	8	9	Office Hours	LAB 3	Tutorial - problem set 4	Lab3 Due
12		12	13	14				No lab	Tutorial - problem set 4	

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

Resources:

Textbook: Computer Networking, 6/e, James F. Kurose, Keith W. Ross, ISBN: 0-13-607967-9.

Lecture notes: I will post some of the slides that I will present (not necessarily all of them).



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: history of the Internet, 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. 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.
3. Internetworking: introduction, naming, addressing, IP: fragmentation, error handling.
4. Routing: fundamentals, Intra-domain routing (RIP, OSPF), Inter-domain routing (BGP)
5. Transport layer: from congestion control principle to current protocols (TCP and UDP), reliable data transfer.
6. 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: Carrier sense multiple access.
- LAB 3: Encapsulation and network utility tools.



Course Evaluation

Online Examination

- The midterm and the final exams will be delivered via online Quizzes on LEARN.
- The midterm exam will be delivered synchronously. Once the exam starts, you will have the allocated time for the exam, e.g., 100 min., to finish and submit the exam.
- The final exam will be scheduled by UW.
- The final exam will be delivered synchronously. Once the exam starts, you will have the allocated time for the exam, e.g., 150 min., to finish and submit the exam.
- If you are located at a different time zone at the time of writing the exam and the exam time is not entirely within the period 9:00am-10:00pm your local time, please contact me one week before the exam and I will provide suitable accommodation. **Any false claims will be penalized 15% of the course overall mark.**

Marking scheme

- The marking scheme will be:
 - o Labs: (20% - Alpha)
 - o Midterm exam: 30%. Midterm exam will be on Feb. 26 at 10:30am. The exam duration is 100 minutes (Exam is 75 minutes + 25 minutes for technology usage)
 - o Final exam: (50% + Alpha). Final exam date TBD.
 - 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 75%	0
75% $>$ Your final exam mark \geq 70%	5
70% $>$ Your final exam mark \geq 60%	10
60% $>$ Your final exam mark \geq 50%	15
50% $>$ Your final exam mark	20

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.



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 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 Feb. 5th at 11:59 pm. Lab 1 has a weight of 35% of the total lab marks.
 - Lab 2: Due on Mar. 19th at 11:59 pm. Lab 2 has a weight of 50% of the total lab marks.
 - Lab 3: Due on Apr. 9th at 11:59 pm. Lab 3 has a weight of 15% 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.**

- If you have any concern regarding your lab mark, contact your marking TA as follows:

Group Number	Marker	Email
1 - 38	Md Rubayatur Rahim Bhuyian	mrrbhuyi@uwaterloo.ca
> 38	Maham Bhatti	m7bhatti@uwaterloo.ca



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.