CS 656, Computer Networks provides an introduction to the fundamentals of network architectures and protocols. Emphasis is placed on protocols used in the Internet.

When: TTh 11:30AM - 12:50AM (LEC002), 01:00PM - 02:20PM (LEC001)

Where: PHY 145 (LEC001 & LEC002)

Instructor: Prof. Mohammad Ali Salahuddin

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Office Hours: Monday 9:00AM - 10:00AM on MS Teams (CS 456/CS 656 Spring 2022), or by appointment (email)

Teaching Assistants:
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Required Text:
Computer Networking: A Top-Down Approach, James Kurose & Keith Ross, Pearson, 8th Edition (7th Edition will also be fine)

You can purchase the textbook from the vendor of your choice.

To access the Pearson eText Kurose/Ross - Computer Networking, 8/e:

1. Enter your Course Invite Link: https://console.pearson.com/enrollment/j5yjbk
2. Sign in or create an account from the "Sign in" button on the top-right corner (If you have used a Pearson product before, you will have a Pearson account.)
3. Select your access option
    a. Redeem the access code you purchased from the bookstore
    b. Purchase materials online with a credit card or PayPal account
    c. Get 3-day temporary access if you're waiting on financial aid or want to try the product first
4. After steps 1-3, you can log in from http://console.pearson.com

You may want to download the free eText app to learn at your convenience. You can do your readings offline, highlight and notetake on-the-go, search for keywords and study anytime, anywhere. Available on the App Store and Google Play.

Course Objectives
This course provides an overview of computer networks featuring the Internet, covering aspects ranging from transmitting frames on a comm. link and routing packets in a network to the design of network applications.

Course Topics
We will take a 'top-down' approach to networking to explain how networking principles are put into practice in support of widely-used networked applications and systems.

I. Overall Picture of Computer Networking
Circuit Switching vs. Packet Switching, Access Networks, Physical Media, Network Delays, Protocol Layering, Internet architecture.

II. Application layer protocols
World Wide Web (HTTP), File Transfer (FTP), Electronic Mail (SMTP), Domain Name System (DNS), Socket Programming.

III. Transport layer protocols
Design Issues, Connectionless UDP, Principles of Reliable Data Transfer, Connection-oriented Transport TCP, Flow Control, Congestion Control.

IV. & V. Network layer and routing
Routing approaches, routing in the Internet, Internet Protocol, multicast routing, IPv6, tunnelling, router design, control/data plane, SDN.

VI. Data link layer
Multiple access protocols and LAN's, address resolution protocol, wireless LAN's.

Course Requirements
It is expected that students attend all classes and complete the required assignments. Any material presented in class will be examinable unless specifically noted.

Course Resources
Primary electronic material for the course is available on **Waterloo Learn**.

Course Discussion Forum
We will use Piazza for course-related discussions. The system is highly catered to getting you fast and efficient help from classmates, the TAs, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza.

You can sign up at: https://piazza.com/uwaterloo.ca/spring2022/cs456656

Course Prerequisites
CS 350 or 354; Computer Science students only

Antirequisites: CS 436, ECE 358, ECE 428, CS 755

Grading Policy
CS 656
Assignments: 3 programming assignments, a total of 10%
Midterm Exam: 25%
Final Exam: 35%
Project (Research Paper): 20%
Quizzes: 10% (4 out of 5 in total, all in-class)

Assignments are to be returned by the provided due dates. In the case of illness or extraordinary circumstances, a 10% penalty will apply for each 24 hours late submission up to a maximum of 72 hours of assignment deadline. No further extension will be granted.

Midterm and final have to be passed, in the aggregate, in order to pass the course; i.e.,:
[(Midterm*25) + (Final*35)] / 60 >= 50%

All examinations are closed books.

In the case of a **missed** exam, a medical certificate or doctor's note must be uploaded to the university's online portal. The certificate or doctor's note MUST include the statement "This Student is unable to write the test on (date) for (medical reasons)". Documentation MUST show that the physician was consulted before or on the day of the exam. Only ORIGINAL copies can be accepted. A statement merely confirming a report of illness made by the student is NOT acceptable.

Doctor's note will not be accepted for a missed quiz or assignment.

Continuity of Education Plan
Reduced weights for Midterm and Final exams if they are to be conducted online:

Midterm Exam: 20%
Final Exam: 25%

Note that if any exam has to be scheduled online, the remaining portion of the grade for the online exam will be proportionally spread across the remaining components (i.e., assignments, quizzes, and projects, where applicable).

Schedule
Midterm Exam - Friday, June 24th 4:30 - 6:00pm (90 mins) - STC 1012

Final Exam - TBD

Assignment 1 Release (Tentative) - May 27th 2022 (2 weeks)
Assignment 2 Release (Tentative) - June 24th 2022 (2 weeks)
Assignment 3 Release (Tentative) - July 15th 2022 (2 weeks)

Quizzes (at the end of a chapter)

CS656 Project Proposal Due - June 1st 2022
CS656 Project Progress Report Due - July 1st 2022
CS656 Project Final Report Due - August 5th 2022

FALSE STATEMENTS AND/OR DOCUMENTATION WILL BE TREATED AS ACADEMIC OFFENCES AND HANDLED ACCORDINGLY.

Plagiarism
A programming assignment is an individual creative process. Individuals must reach their own understanding of the problem and discover a path to its solution. During this time, discussions with friends are encouraged. However, when the time comes to write the code that solves the problem, such discussions are no longer appropriate; the program must be your own work.

Do not, under any circumstances, copy another person's program. This includes relevant web sources. Writing code for use by another or using another's code in any form is academic fraud and will be dealt with harshly. You are also responsible for ensuring that the code you write for the assignments is not readable by others.

Appeals
Assignment appeals should be directed to the TA who marked the assignment. Exam appeals need to be submitted in writing to the instructor. The whole exam will be remarked.

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. All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. The Office of Academic Integrity's website contains detailed information on UW policy for students and faculty. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in — and out — of the classroom.

Grievance
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/

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. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. 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/

Avoiding Academic Offenses
Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offenses and how to avoid them, students should refer to the Faculty of Mathematics Cheating and Student Academic Discipline Policy,
https://uwaterloo.ca/math/academic-matters/academic-integrity

Appeals
A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a

petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals, https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72/

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.