Toronto Metropolitan University

Department of Electrical, Computer, & Biomedical Engineering
Faculty of Engineering & Architectural Science

Course Outline (F2024)

COE768: Computer Networks

Instructor(s)	Dr. Truman Yang [Coordinator] Office: ENG435 Phone: (416) 979-5000 x 554175 Email: cungang@torontomu.ca Office Hours: By Appointment Khalid Abdel Hafeez Office: Online Phone: TBA Email: kabdelha@torontomu.ca Office Hours: Tuesday 10-11am
Calendar Description	This is an introductory course in computer networks. In particular, it concentrates on the Internet technology. It first introduces the OSI and TCP/IP network architecture models. It then studies the implementation principles and design issues at each layer of these models. Lecture topics include: OSI and TCP/IP models, data transmission basics, data-link protocols, local area networks, wide-area networks, Internet structures, TCP/IP protocol suite, and application Layer protocols. Laboratory work focuses on the implementation of stop-and-wait protocol based on the BSD socket. In addition, students will gain practical experience by building and studying a physical network using network devices such as switches and routers.
Prerequisites	(COE 538 or ELE 538) and ELE 532
Antirequisites	None
Corerequisites	None
Compulsory Text(s):	1. "Computer Networks", 5th edition, by Tanenbaum and Wetherall, Prentice Hall, 2011. ISBN-13: 978-0- 13-212695- 3
Reference Text(s):	1. Computer Networking, a Top-Down Approach by Kurose and Ross, 7th edition, 2016
Learning Objectives (Indicators)	At the end of this course, the successful student will be able to: 1. Uses analytical models to predict and control and networking components and processes behaviors. (**1b**) 2. Uses engineering knowledge to solve real world open-ended engineering problems. Uses the specialized core engineering knowledge in the field of computer networks to understand and design a various types of communication links and networks. (**1c**) 3. Uses the specialized core engineering knowledge in the field of computer networks to understand and design a various types of communication links and networks. (**1d**) 4. Generate solutions for complex engineering design problems. (**4b**) 5. Demonstrates iterative design process in complex engineering projects. (**4c**)

	6. Writes and revises documents using appropriate discipline specific conventions. (**7a**) 7. Demonstrates confidence in oral communications and explains and interprets results clearly. (**7b**) **NOTE:***Numbers in parentheses refer to the graduate attributes required by the Canadian Engineering Accreditation Board (CEAB).*
Course Organization	3.0 hours of lecture per week for 13 weeks 2.0 hours of lab per week for 12 weeks 0.0 hours of tutorial per week for 12 weeks
Teaching Assistants	TBA
Course Evaluation	<table><tr><th colspan="2">Theory</th></tr><tr><td>Midterm Exam</td><td>25 %</td></tr><tr><td>Final Exam</td><td>45 %</td></tr><tr><th colspan="2">Laboratory</th></tr><tr><td>Lab Assignments</td><td>12 %</td></tr><tr><td>Project</td><td>18 %</td></tr><tr><td>TOTAL:</td><td>100 %</td></tr></table> **Note:** In order for a student to pass a course, a minimum overall course mark of 50% must be obtained. In addition, for courses that have both **"Theory and Laboratory"** components, the student must pass the Laboratory and Theory portions separately by achieving a minimum of 50% in the combined Laboratory components and 50% in the combined Theory components. Please refer to the **"Course Evaluation"** section above for details on the Theory and Laboratory components (if applicable).
Examinations	Midterm exam, week 7, close book. Final exam, during exam period, close book, three hours.
Other Evaluation Information	Project demonstration and report Lab demonstration All 4 Lab assignments have to be done individually. The project is a group project (2 students per group). Source codes of each lab assignment should be submitted to D2L 24 hours before the beginning of next lab. Late source code submission or late demonstrations will not be accepted and will receive a mark of 0.
Teaching Methods	Three hours lecture each week Two hours lab per week
Other Information	None

Course Content

Week	Hours	Chapters / Section	Topic, description
1-2	6	Chapter 1, 6.1, 6.2	OSI and TCP/IP layer architecture models. Introduction of TCP and UDP. Socket programming
3	3	Section 3.1	Overview of link layer and framing
4	3	Section 3.2.2, 3.3	Error detection coding and framing
5	3	Section 4.3	Local Area Networks (LANs): CSMA/CD, Ethernet
6	3	Sections 4.4	Wireless LAN, VLAN.
7			Midterm Exam
8	3	Sections 4.8	LAN Switching and Spanning Tree Protocol
9	3	Section 5.1,5.5.1,5.5.2, 5.6.1 and 5.6.2	IP: IP diagram format and IP addressing
10	3	Section 5.6.2	Subnetting and supernetting
11	3	Section 5.6.3, 5.6.4, 7.1	IP related protocols: ARP, DNS, IPv6

12	3	Section 3.4	Sliding Window Protocols: Go-back-N protocol, Selective Repeat Protocol
13	3	Section 6.4.1, 6.5.1-6.5.9	UDP and TCP protocols and Final Review

Laboratory(L)/Tutorials(T)/Activity(A) Schedule

Week	L/T/A	Description
2-3	Lab	Lab 1: Study of the concepts of Layer Architecture o Traffic analysis using Wireshark o Study of network encapsulation
4	Lab	Lab 2: Study of the characteristics of server running on TCP o TCP connection establishment and termination o Server concurrency o Socket program structure Demonstration of Lab 1
5	Lab	Lab 3: File download application based on TCP Demonstration of Lab 2
6-7	Lab	Lab 4: UDP server implementation Demonstration of Lab 3 on week 6
8	Lab	Demonstration of Lab 4 Project: Peer-to-Peer application
9-12	Lab	Continuation of the project
13	Lab	Demonstration of the project. Submit source code of project to D2L before your demonstration. Final date to submit the project report: Friday, week 13

University Policies & Important Information

Students are reminded that they are required to adhere to all relevant university policies found in their online course shell in D2L and/or on the Senate website

Refer to the Departmental FAQ page for furhter information on common questions.

Important Resources Available at Toronto Metropolitan University

- The Library provides research workshops and individual assistance. If the University is open, there is a Research Help desk on the second floor of the library, or students can use the Library's virtual research help service to speak with a librarian.
- Student Life and Learning Support offers group-based and individual help with writing, math, study skills, and transition support, as well as resources and checklists to support students as online learners.
- You can submit an Academic Consideration Request when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill an academic requirement. You may always visit the Senate website and select the blue radio button on the top right hand side entitled: **Academic Consideration Request (ACR)** to submit this request.

  For Extenuating Circumstances, Policy 167: Academic Consideration allows for a once per semester ACR request without supporting documentation if the absence is less than 3 days in duration and is not for a final exam/final assessment. Absences more than 3 days in duration and those that involve a final exam/final assessment, require documentation. Students must notify their instructor once a request for academic consideration is submitted. See Senate Policy 167: Academic Consideration.
- If taking a remote course, familiarize yourself with the tools you will need to use for remote learning. The Remote Learning Guide for students includes guides to completing quizzes or exams in D2L Brightspace, with or without Respondus LockDown Browser and Monitor, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.
- Information on Copyright for Faculty and students.

Accessibility

- Similar to an accessibility statement, use this section to describe your commitment to making this course accessible to students with disabilities. Improving the accessibility of your course helps minimize the need for accommodation.
- Outline any technologies used in this course and any known accessibility features or barriers (if applicable).
- Describe how a student should contact you if they discover an accessibility barrier with any course materials or technologies.

Academic Accommodation Support

Academic Accommodation Support (AAS) is the university's disability services office. AAS works directly with incoming and returning students looking for help with their academic accommodations. AAS works with any student who requires academic accommodation regardless of program or course load.

- Learn more about Academic Accommodation Support.
- Learn how to register with AAS.

Academic Accommodations (for students with disabilities) and Academic Consideration (for students faced with extenuating circumstances that can include short-term health issues) are governed by two different university policies. Learn more about Academic Accommodations versus Academic Consideration and how to access each.

Wellbeing Support

At Toronto Metropolitan University, we recognize that things can come up throughout the term that may interfere with a student's ability to succeed in their coursework. These circumstances are outside of one's control and can have a serious impact on physical and mental well-being. Seeking help can be a challenge, especially in those times of crisis.

If you are experiencing a mental health crisis, please call 911 and go to the nearest hospital emergency room. You can also access these outside resources at anytime:

- **Distress Line:**24/7 line for if you are in crisis, feeling suicidal or in need of emotional support (phone: 416-408-4357)
- **Good2Talk:**24/7-hour line for postsecondary students (phone: 1-866-925-5454)
- **Keep.meSAFE:** 24/7 access to confidential support through counsellors via My SSP app or 1-844-451-9700

If non-crisis support is needed, you can access these campus resources:

- **Centre for Student Development and Counselling:** 416-979-5195 or email csdc@torontomu.ca
- **Consent Comes First - Office of Sexual Violence Support and Education:** 416-919-5000 ext 3596 or email osvse@torontomu.ca
- **Medical Centre:** call (416) 979-5070 to book an appointment

We encourage all Toronto Metropolitan University community members to access available resources to ensure support is reachable. You can find more resources available through the Toronto Metropolitan University Mental Health and Wellbeing website.