COMP 445 Data Communications and Computer Networks

***Lectures*: 10:15am-11:30am Mon/Wed** ***Lecture Room:* ONLINE**
***Instructor*: Dr. Abdelwahab Elnaka** ***Office:* EV 3.233**
***Email:* abdelwahab.elnaka@concordia.ca** ***Office hours*: Thursday: 4:30-5:30pm, Friday 10:30-11:30am**

Calendar Course Description

Prerequisite: COMP 346. Network architectures: OSI and Internet models. Link layer: error detection, multiple access protocols, addressing. Local area networks: Ethernet, ATM, switches and hubs. Network layer: forwarding and routing, IP, routing algorithms, multicast. Transport layer: connectionless and connection-oriented transport, reliable data transport, congestion control, QoS, UDP and TCP. Application layer: DNS, the web and http, file transfer, and email. Introduction to network security, multimedia protocols and wireless networking. Lectures: three hours per week. Laboratory: two hours per week.

Learning Objectives

1. Introduce the basics of Data Communication, Information, Coding, and Transmission.
2. Understand the ISO OSI and Internet models and the role of layered protocols.
3. Understand and appreciate Networks, Protocols, Network-interconnection and Internet.

Generally, the course targets the coverage of the particulars related to the above subjects, which includes: Top-down view of Network applications, Internet, LAN/WAN architecture, Layered protocol model, The Application Layer (HTTP, FTP, SMTP, DNS, socket programming), The Transport Layer (Multiplexing, UDP, Reliable Data Transfer, TCP), The Network Layer, Virtual Circuit and Datagram networks, Routers, Routing algorithms, The Datalink layer, Error detection and correction, Local Area Networks, Ethernet, Point to point protocol,Wireless and Mobile Networks, Wireless links, Network Standards, Cellular architecture, Security in networks.

Textbooks

We will use the following book as the primary textbook throughout the course:

- Computer Networking; A Top-Down Approach by Jim Kurose and Keith Ross, Pearson Higher Education, 7th Edition, 2016. ISBN-13: 978-0-13-359414-0, ISBN-10: 0-13-359414-9.
- Other references may be needed/used.

Course Moodle Web Site

Amendments to this syllabus, if any, as well as other important information will be made available through the course's Moodle site. The Moodle site also provides additional reading material, labs, grades and method of communication with TAs.

Tutorials

The lab sections for this course (rooms subject to change) are:

- DI: Mo 1:15PM - 3:05PM Online
- DJ: Mo 5:45PM - 7:35PM Online
- DK: Mo 1:15PM - 3:05PM Online
- DL: Mo 5:45PM - 7:35PM Online
- DM: Tue 11:00AM - 12:50PM Online

Teaching assistants for the labs are:

- Cristian Rodriguez: bcdrodriguezcristian@gmail.com
- Rani Rafid: ranii.rafid@gmail.com
- Sebastien Bah: sebastien.bah@gmail.com

Communication

- All communications from the course's professors will be done through Moodle for any announcement or course related news.
- Questions to professors are to be asked during counselling hours. Professors might or might not answer questions through other means of communication as it will depend on how busy their schedule and other commitments are. So, always make sure to use the counselling office hours for this purpose.
- Students' questions to TAs regrading tutorials, labs or assignments are to be asked during labs or tutorial sessions. TAs are not expected to answer questions through emails or other means as the sessions are made specifically for this purpose.

Evaluation

40% Final Exam
30% Midterm
30% Lab Assignments

Final exam (40%): The exam is a closed-book exam. The final exam date will be set by the University Administration. The exam will cover material from the entire semester, including lectures, textbook, and assignments. Passing the final exam is necessary for passing the course. There is no substitution for a missed final exam.

Mid-term exam (30%): The exam is a closed-book exam, and will be conducted on a date determined by the instructor. In general, you will need to bring your own ENCS calculator; the same rule also applies to the final exam. Additionally, and as a general rule for exams, you need to show all your work (just the final result is not enough). There is no substitution for a missed exam. Midterm schedule will be announced at least one week beforehand.

Lab Assignments (30%): You will be required to develop some protocol software. There will be a total of 3-4 lab assignments. You must submit, and pass, at least 2 out of 3 assignments (or, 3 out of 4 assignments) in order to pass the course. You must follow the exact instructions in the lab regarding the tools to use, what is allowed and what is NOT allowed to use to develop your programs in terms of language, libraries, repositors, etc. Failure to do so will cost you significant marks. You can work on these assignments individually or in a team of two (teams cannot exceed 2 students). A team has to submit only one copy of the assignment by one of the members. Please see submission format below. A demo for about 10 minutes will take place with the marker. You (or both members, if groups are permitted) must attend the demo and be able to explain their program to the marker. Different marks may be assigned to teammates based on this demo. The schedule of the demos will be determined and announced by the markers, and students must contact the marker to reserve their time slot. Demos are mandatory. Failure to do your demo will entail a mark of zero for that assignment regardless of your submission. Missing your reserved demo time, will similarly result in a zero mark for the assignment regardless of your submission. There will be no substitution/replacement for a missed demo time.

Please note that all assignments will be placed on Moodle; no hardcopies of the assignments will be. All assignments must be submitted electronically.

Online Examination

All students are expected to do online, timed exams

a) Both midterm and final exams will be through Moodle Quiz using live-invigilation (Alternatively) Both midterm and final exams will be through Concordia Online Exam (COLE) platform using an auto-proctoring solution. Students are encouraged to visit practice exam site to become familiar with the system.

For live ZOOM based exams

Please note the following with respect to online live proctored exams:

- That the exams will take place during the exam period at the designated date and time set by the professor (midterm) or the Exams office (final). All exam times will be set to Eastern Standard Time.
- That your image, voice and screen activity may be recorded throughout the duration of the exam.
- That you must show your Concordia University Identification card to validate your identity. Alternative government-issued photo identification will be accepted, though it is not recommended. Only identification in English or French will be accepted.
- That any recording made (if one is made) will only be viewed by authorized university personnel (no external entity has authorization to review the recording).
- That you will be responsible for ensuring appropriate, properly functioning technology (webcam, a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).
- For your online examination(s), you will need to download the appropriate browser lockdown technology and use Zoom. Protocols for entering the examination will be provided by your professor.
- That you should enter the virtual test site and become familiar with the software that will be used for your exam before starting the exam.
- That you will need a quiet place within which to take the exam. Earplugs or noise-cancelling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.

For live auto-proctoring with COLE based exams

Please note the following with respect to online live proctored exams:

- That the exam will take place during the exam period at the designated date and time set by the professor (midterm) or the Exams office (final). All exam times will be set to Eastern Standard/Daylight Time.
- That your image, voice and screen activity will be recorded throughout the duration of the exam.
- That you must show your Concordia University Identification card to validate your identity. Alternative government-issued photo identification will be accepted, though it is not recommended. Only identification in English or French will be accepted.
- That any recording made will only be viewed by authorized university personnel (no external entity has authorization to review the recording).
- That you will be responsible for ensuring appropriate, properly functioning technology (webcam, a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).
- That you are very strongly recommended to enter the virtual test site found at the COLE website and become familiar with the software that will be used for your exam before starting the exam.

- That you will need a quiet place within which to take the exam. Earplugs or noise-cancelling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.

b) Course instructor reserves the right to conduct an individual oral examination to verify student's response to online exam questions

Submission format

All assignment-related submissions must be adequately archived in a ZIP file using your ID(s) and last name(s) as file name. The submission itself must also contain your name(s) and student ID(s). Use your "official" name only - no abbreviations or nick names; capitalize the usual "last" name. Inappropriate submissions will be heavily penalized. Only electronic submissions will be accepted. Students will have to submit their assignments (again only one copy per group) electronically. Assignments must be submitted in the right folder of the assignments. Assignments uploaded to an incorrect folder will not be marked and will evaluate to a zero mark. No resubmission will be allowed.

Grading Scheme

There is no standard relationship between percentages and letter grades assigned for this course. In order to pass the course you must receive at least 50% of the overall possible marks. Unless noted otherwise, all assignments are to be submitted electronically by midnight on the due date through Moodle. Late submissions will incur a penalty (see the course Moodle web site for details).

Should you fail to write or submit any of the course assessment components ***and*** you have a valid justification (e.g., doctor's note) then the weight of that component, at the instructor's sole discretion, will be either moved to another new assessment component or moved/distributed between other existing assessment components.

Note: It is your responsibility to adhere to the ***university's code of conduct*** as detailed in the calendar.

Graduate Attributes

This course emphasizes and develops the following CEAB graduate attributes:

Knowledge-base: Knowledge of network architectures: OSI and Internet models. Link layer: error detection, multiple access protocols, addressing. Local area networks: Ethernet, ATM, switches and hubs. Network layer: forwarding and routing, IP, routing algorithms, multicast. Transport layer: connectionless and connection - oriented transport, reliable data transport, congestion control, QoS, UDP and TCP. Application layer: DNS, the web and http, file transfer, and email. Introduction to network security, multimedia protocols and wireless networking. Indicators: Indicator 1.3: Knowledge-base in a specific domain.

Problem analysis: Use mathematical modeling to analyze networking characteristics such as bandwidth, throughput, delay, etc. Indicators: Indicator 2.2: Modeling.

Design: Develop simple system software applications related to the operation of computer networks, such as protocols, routing, security, etc. Indicators: Indicator 4.1: Problem identification and information gathering. Indicator 4.3: Architectural and detailed design. Indicator 4.4: Implementation and validation.

Use of Engineering Tools: Make educated choices as to what data structures and algorithms to use to solve problems following their respective strengths and constraints. Indicators: Indicator 5.1: Ability to use appropriate tools, techniques and resources.

The evaluation of these attributes will be based on: 1) Programming Assignments, 2) Midterm, and 2) Final exam questions. This evaluation will be used to indicate your proficiency in all of the attributes as per accreditation requirements.

Disclaimer

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change