



## Course Outline

### Instructor

- Ekram Hossain, P.Eng.  
E1-552 EITC  
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- Amine Mezghani  
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### Office Hours

- By appointment

### Teaching Assistant

- Angelo Vera Rivera  
verariva@myumanitoba.ca

### Contact Hours

- 4 credit hours
- Lectures:  
3 hours x 13 weeks = 39 hours
- Laboratories:  
3 hours x 5 weeks = 15 hours

### Prerequisites:

- COMP 2140 Data Structures and Algorithms

## ECE 3700 – Telecommunication Network Engineering Winter 2024

### Course Objectives

The goal of this course is to provide an introduction to networking concepts, and emphasizes the following: Overview of network architectures, application layer and network programming, transport layer, network layer issues and protocols, routing algorithms, congestion control, data link layer and its protocols, error-detection and correction, local area networks, Ethernet, bridges and switches, and wireless networks. Examples will be drawn primarily from the Internet protocol suite. This course also requires the students to learn or know Java.

### Course Content

The following topics will be covered:

- Introduction to computer networks: Access networks, network core, network edge, delay, loss, throughput, protocols layers, history of Internet
- Application layer: principles, web, HTTP, FTP, SMTP, DNS, P2P applications, socket programming
- Transport layer: UDP, reliable data transfer, TCP, congestion control
- Network layer: Virtual circuit and datagram networks, routers, IP, ICMP, DHCP, NAT, routing algorithms, multicasting, broadcasting
- Data link layer: Error detection and correction, MAC protocols, Ethernet, ARP, PPP, link layer switches

### Textbook

*Computer Networking, A Top-Down Approach*, J.F. Kurose and K.W. Ross, 7<sup>th</sup> Edition, Addison-Wesley, 2017. (website: <https://www.pearsonhighered.com/program/Kurose-Computer-Networking-A-Top-Down-Approach-7th-Edition/PGM1101673.html>)

### Other Resources

*Communication Networks: Fundamental Concepts and Key Architectures*, A. Leon-Garcia and I. Widjaja, McGraw-Hill, 2nd Ed., 2004.

*Computer Networks, A Systems Approach*, Larry Peterson and Bruce Davie, 2nd Edition, Morgan Kaufmann, 2000.

*Computer Networks*, A. S. Tanenbaum and D. J. Wetherall, 5th Edition, Prentice Hall, 2010.

*Computer Networking with Internet Protocols and Technologies*, William Stallings, Prentice Hall, ISBN: 0-13-141098-9.

In addition, a reference book for Java could be useful.

### Learning Outcomes

1. Understanding the principles of communication networking
2. Understanding the layered structure of the protocols
3. Learning, understanding, and designing application layer, transport layer, routing layer, and link layer protocols
4. Learning socket programming
5. Learning how to simulate Internet protocols.

### Traditional Territories Acknowledgement

*The University of Manitoba campuses and the Department of Electrical and Computer Engineering are located on original lands of the Anishinaabeg, Cree, Ojibwe-Cree, Dakota, and Dene peoples, and on the homeland of the Red River Métis.*

*We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of Reconciliation and collaboration.*

## Important Dates

- **Term Test**  
Tuesday, March 5<sup>th</sup>, 2024  
6:00PM – 7:30PM
- **Voluntary Withdrawal Deadline**  
March 20<sup>th</sup>, 2024
- **Louis Riel Day**  
February 19<sup>th</sup>, 2024  
No classes or examinations
- **Spring Break**  
February 20<sup>th</sup> – 23<sup>rd</sup>, 2024  
No classes or examinations
- **Good Friday**  
March 29<sup>th</sup>, 2024  
No classes or examinations

## Accreditation Details

### Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 0%
- Engineering Science: 60%
- Engineering Design: 40%

### Graduate Attributes

KB: A knowledge base for engineering  
 PA: Problem analysis  
 IN: Investigation  
 DE: Design  
 ET: Use of engineering tools  
 IT: Individual and team work  
 CS: Communication skills  
 PR: Professionalism  
 IE: Impact of engineering on society/  
 environment  
 EE: Ethics and equity  
 EP: Economics and project  
 management  
 LL: Life-long learning

### Competency Levels

I - Introduced (Introductory)  
 D - Developed (Intermediate)  
 A - Applied (Advanced)

## Expected Competency Levels

Outcome	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1	I	I	I	I	I				I			
2	I	D	D	D	D							
3	I	D	D	D	D							
4	I	D	D	D	D							
5	I	D	D	A	D							

## CEAB Graduate Attributes Assessed

- KB.4 – Recalls and defines, and/or comprehends and applies, first principles and concepts in specialized engineering science.
- ET.1A – Uses analytical tools to complete engineering activities.

## Evaluation

The final course grade is determined by the student's performance on quizzes, in laboratories, in the term test, and the final examination. Students must complete all the laboratories and pass all components of the course in order to be eligible to receive a passing grade.

Component	Value (%)	Method of Feedback	Learning Outcomes Evaluated
Quizzes	20	S	1, 2, 3, 4
Laboratories	20	F, S	1, 2, 3, 4, 5
Term Test	20	F, S	1, 2, 3, 5
Final Examination	40	S	1, 2, 3, 4, 5

\* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

## Student Absences

Attendance in lectures, tutorials, and laboratories is mandatory. For short-term absences due to illness or other extenuating circumstances of 120 hours (5 days) or less, students are required to complete a *Self-Declaration Form for Brief or Temporary Absence* available on the University website. This form must be submitted to the course instructor within 48 hours of the absence. (No additional documentation is required.)  
 Note that students are responsible to complete any missed work and must consult with the instructor to make appropriate arrangements.  
 For absences longer than 120 hours, students must contact the instructor and ECE Undergraduate Advisor, Tammy Holowachuk (Tammy.Holowachuk@umanitoba.ca) for further instructions.

## Deferred Final Examinations

Students who miss the regular scheduled writing of a final examination, for valid medical or compassionate reasons, may be given the opportunity to write a deferred examination, subject to approval by the Associate Dean (Undergraduate). All requests for a deferred examination must be made within 48 hours of the missed examination, and must follow the procedure described on the Faculty website, without exception. Course instructors do not have the discretion to grant deferred final examinations.  
<https://umanitoba.ca/engineering/student-experience#engineering-student-policies>

## Copyright Notice

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## Grading Scale

Letter	Mark
A+	95–100
A	85–94
B+	80–84
B	70–79
C+	65–69
C	55–64
D	45–54
F	< 45

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

## Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the *General Academic Regulations on Academic Integrity*, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

## Requirements/Regulations

- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a passing final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University's *General Academic Regulations*, as well as Section 3 of the Faculty of Engineering *Academic Regulations* dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, smart watches, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.
- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

 [Supplemental Resources](#)

## Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.