Course Outline

Instructor
• Prof. Ekram Hossain, P.Eng.
  E1–552 EITC
  (204) 474–8908
  Ekram.Hossain@umanitoba.ca

Office Hours
• By appointment

Teaching Assistant
• Shermila Ranadheera
  ranadhes@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

Course Website:
http://umanitoba.ca/umlearn

ECE 3700 – Telecommunication Network Engineering  Winter 2019

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
• Wireless and mobile networks: CDMA, wireless LAN, cellular Internet access, Mobile IP.

Textbook
Addison-Wesley, 2017. (website: https://www.pearsonhighered.com/program/Kurose-

Other Resources
Communication Networks: Fundamental Concepts and Key Architectures, A. Leon-Garcia and
Computer Networks, A Systems Approach, Larry Peterson and Bruce Davie, 2nd Edition,
Computer Networking with Internet Protocols and Technologies, William Stallings, Prentice
In addition, a reference book for Java could be useful.

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.

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.
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.

Expected Competency Levels

<table>
<thead>
<tr>
<th>Outcome</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
<th>A8</th>
<th>A9</th>
<th>A10</th>
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<th>A12</th>
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Evaluation
The final course grade is determined by the student’s performance on quizzes, 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.

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Method of Feedback</th>
<th>Learning Outcomes Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>10</td>
<td>S</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>Laboratories</td>
<td>20</td>
<td>F, S</td>
<td>1, 2, 3, 4, 5</td>
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<tr>
<td>Term Test</td>
<td>20</td>
<td>F, S</td>
<td>1, 2, 3, 5</td>
</tr>
<tr>
<td>Final Examination</td>
<td>50</td>
<td>S</td>
<td>1, 2, 3, 4, 5</td>
</tr>
</tbody>
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* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

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 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.

Accreditation Details

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

Attributes
A1: A knowledge base for engineering
A2: Problem analysis
A3: Investigation
A4: Design
A5: Use of engineering tools
A6: Individual and team work
A7: Communication skills
A8: Professionalism
A9: Impact of engineering on society/environment
A10: Ethics and equity
A11: Economics and project management
A12: Life-long learning

Competency Levels
1 - Knowledge (Able to recall information)
2 - Comprehension (Ability rephrase information)
3 - Application (Ability to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships.)
5 - Synthesis (Able to combine separate elements into a whole)
6 - Evaluation (Able to judge the worth of something)

Grading Scale

<table>
<thead>
<tr>
<th>Letter</th>
<th>Mark</th>
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<tbody>
<tr>
<td>A+</td>
<td>95–100</td>
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<tr>
<td>A</td>
<td>85–94</td>
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<tr>
<td>B+</td>
<td>80–84</td>
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<tr>
<td>B</td>
<td>70–79</td>
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<tr>
<td>C+</td>
<td>65–69</td>
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<tr>
<td>C</td>
<td>55–64</td>
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<tr>
<td>D</td>
<td>45–54</td>
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<tr>
<td>F</td>
<td>&lt;45</td>
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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.