ECE 3700 – Telecommunication Network Engineering  Winter 2021

IMPORTANT NOTICE – Mandatory Requirement to Report

This course will be conducted using remote instruction. Students who are accessing the course from outside of Canada or the USA must notify the instructor and indicate in which country they are located. Access to software may be restricted from some countries and failure to comply with these restrictions may result in criminal prosecution.

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


Other Resources


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.
Expected Competency Levels

<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>15</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>
</tr>
<tr>
<td>Term Test</td>
<td>25</td>
<td>F, S</td>
<td>1, 2, 3, 5</td>
</tr>
<tr>
<td>Final Examination</td>
<td>40</td>
<td>S</td>
<td>1, 2, 3, 4, 5</td>
</tr>
</tbody>
</table>

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

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, 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 Information

Accreditation Details

Accreditation Units

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

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

1 - Knowledge (Able to recall information)
2 - Comprehension (Ability to 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>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95–100</td>
</tr>
<tr>
<td>A</td>
<td>85–94</td>
</tr>
<tr>
<td>B+</td>
<td>80–84</td>
</tr>
<tr>
<td>B</td>
<td>70–79</td>
</tr>
<tr>
<td>C+</td>
<td>65–69</td>
</tr>
<tr>
<td>C</td>
<td>55–64</td>
</tr>
<tr>
<td>D</td>
<td>45–54</td>
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<tr>
<td>F</td>
<td>&lt;45</td>
</tr>
</tbody>
</table>

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.
Copyright Notice

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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.