Course Outline (F2021)

COE768: Computer Networks

Instructor(s)	Khalid Abdel Hafeez [Coordinator] Office: Online Phone: TBA Email: kabdelha@ryerson.ca Office Hours: Thursday 4-5pm
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 635
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	**Theory** | Theory	
Midterm Exam	25 %
Final Exam	50 %
Laboratory	
Lab Assignments	9 %
Lab Project	16 %
TOTAL:	100 % | **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 8, 120 minutes. Final exam, during exam period, three hours.
Other Evaluation Information	Project Demonstration and Report Lab assignments
Teaching Methods	Three hours online synchronous teaching lecture using Zoom. Two hours online lab, synchronous using Zoom. The ZOOM links will be provided later.
Other Information	None

Course Content

Week	Hours	Chapters / Section	Topic, description
2	3	Chapter 1	Introduction: OSI and TCP/IP layer architecture models. The Transport Layer: TCP and UDP.

3	3	Section 3.1	Framing and clock synchronization: HDLC, USB and Ethernet.
4	3	Section 3.3	Error Detection Coding and Error-Control service.
5	3	Section 3.4	Error Control Protocols: Stop-and-Wait Protocol, Go-back-n Protocol Selective Repeat Protocol, HDLC.
6	3	-	Thanksgiving
7	3	Section 4.3	LAN Switching and Spanning Tree Protocol.
8	2		Mid-term Test (2 hours).
9	3	Section 4.8	Local Area Networks (LANs): CSMA/CD, Ethernet.
10	3	Section 4.4	Virtual LAN. Wireless LAN.
11	3	Sections 5.5.1, 5.5.2, 5.6.1 and 5.6.2	IP: IP datagram format and IP addressing.
12	3	Section 5.6.2	Subnetting and supernetting.
13	3	Sections 5.6.3, 5.6.4 7.1	IP related protocols: ARP, DNS, IPv6.

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

Week	L/T/A	Description
2	On-line	Lab 1: Setting up the VM environment o Study of basic network communications o Study of interactions between virtual and physical networks
3	On-line	Lab 2: Study of the concepts of Layer Architecture o Traffic analysis using Wireshark o Study of network encapsulation Demonstration of Lab 1
4	On-line	Lab 3: 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 2
5	On-line	Lab 4: File download application based on TCP Demonstration of Lab 3
6	On-line	Lab 5: UDP server implementation Demonstration of Lab 4
7	on-line	Project: Peer-to-Peer application Demonstration of Lab 5
8-11	On-line	Continuation of the project
12	On-line	Demonstration of the project Final date to submit the project report: Friday, week 12

Policies & Important Information:

Students must be reminded that they are required to adhere to all relevant university policies found in their online course shell in D2L and/or on the following URL: http://ryerson.ca/senate/course-outline-policies

1. Students are required to obtain and maintain a Ryerson e-mail account for timely communications between the instructor and the students;
2. Any changes in the course outline, test dates, marking or evaluation will be discussed in class prior to being implemented;
3. Assignments, projects, reports and other deadline-bound course assessment components handed in past the due date will receive a mark of ZERO, unless otherwise stated. Marking information will be made available at the time when such course assessment components are announced.
4. Ryerson senate policy 157 requires that any electronic communication by students to Ryerson faculty or staff be sent from their official Ryerson email account.
5. Familiarize yourself with the tools you will need to use for remote learning. The Continuity of Learning Guide for students includes guides to completing quizzes or exams in D2L or Respondus, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.
6. The University has issued a minimum technology requirement for remote learning. Details can be found at: https://www.ryerson.ca/covid-19/students/minimum-technology-requirements-remote-learning. Please ensure you meet the minimum technology requirements as specified in the above link.
7. Ryerson COVID-19 Information and Updates (available https://www.ryerson.ca/covid-19/students) for Students summarizes the variety of resources available to students during the pandemic.
8. Refer to our **Departmental FAQ** page for information on common questions and issues at the following link: https://www.ee.ryerson.ca/guides/Student.Academic.FAQ.html.

Missed Classes and/or Evaluations

When possible, students are required to inform their instructors of any situation which arises during the semester which may have an adverse effect upon their academic performance, and must request any consideration and accommodation according to the relevant policies as far in advance as possible. Failure to do so may jeopardize any academic appeals.

1. **Academic Consideration Requests for missed work** (e.g. missing tests, labs, etc) - According to Ryerson Senate Policy 134, sections 1.2.3, if you miss any exams, quizzes, tests, labs, and/or assignments for helth or compassionate reasons you need to inform your instructor(s) (via email whenever possible) in advance when you will be missing an exam, test or assignment deadline. When circumstances do not permit this, you must inform the instructor(s) as soon as reasonably possible "*In the case of illness, a Ryerson Student Health Certificate, or a letter on letterhead from an appropriate regulated health professional with the student declaration portion of the Student Health Certificate attached. For reasons other than illness, proper documentation is also required (e.g. death certificate, police report, TTC report). **ALL supporting documentation for illness or compassionate grounds MUST be submitted within three (3) working days of the missed work.**"* **NOTE: You are required to submit all of your pertinent documentation through Ryerson's online Academic Consideration Request system at the following link:** prod.apps.ccs.ryerson.ca/senateapps/acadconsform.
2. *Religious, Aboriginal and Spiritual observance* - If a student needs accommodation because of religious, Aboriginal or spiritual observance, they must submit a Request for Accommodation of Student Religious, Aboriginal and Spiritual Observance AND an Academic Consideration Request form within the first 2 weeks of the class or, for a final examination, within 2 weeks of the posting of the examination schedule. If the requested absence occurs within the first 2 weeks of classes, or the dates are not known well in advance as they are linked to other conditions, these forms should be submitted with as much lead time as possible in advance of the absence. Both documents are available at www.ryerson.ca/senate/forms/relobservforminstr.pdf. **If you are a full-time or part-time degree student, then you submit the forms to your own program department or school;**
3. *Academic Accommodation Support* - Before the first graded work is due, students registered with the Academic Accommodation Support office (AAS - www.ryerson.ca/studentlearningsupport/academic-accommodation-support) should provide their instructors with an Academic Accommodation letter that describes their academic accommodation plan.

Virtual Proctoring Information (if used in this course)

Online exam(s) within this course may use a virtual proctoring system. Please note that your completion of any such virtually proctored exam may be recorded via the virtual platform and subsequently reviewed by your instructor. The virtual proctoring system provides recording of flags where possible indications of suspicious behaviour are identified only. Recordings will be held for a limited period of time in order to ensure academic integrity is maintained and then will be deleted.

Access to a computer that can support remote recording is your responsibility as a student. The computer should have the latest operating system, at a minimum Windows (10, 8, 7) or Mac (OS X 10.10 or higher) and web browser Google Chrome or Mozilla

Firefox. You will need to ensure that you can complete the exam using a reliable computer with a webcam and microphone available, as well as a typical high-speed internet connection. Please note that you will be required to show your Ryerson OneCard prior to beginning to write the exam. In cases where you do not have a Ryerson OneCard, government issued ID is permitted.

Information will be provided prior to the exam date by your instructor who may provide an opportunity to test your set-up or provide additional information about online proctoring. Since videos of you and your environment will be recorded while writing the exam, please consider preparing the background (room / walls) so that personal details are not visible, or move to a room that you are comfortable showing on camera.

Turnitin (if used in this course)

Turnitin.com is a plagiarism prevention and detection service to which Ryerson subscribes. It is a tool to assist instructors in determining the similarity between students' work and the work of other students who have submitted papers to the site (at any university), internet sources, and a wide range of books, journals and other publications. While it does not contain all possible sources, it gives instructors some assurance that students' work is their own. No decisions are made by the service; it generates an "originality report," which instructors must evaluate to judge if something is plagiarized.

Students agree by taking this course that their written work will be subject to submission for textual similarity review to Turnitin.com. Instructors can opt to have student's papers included in the Turnitin.com database or not. Use of the Turnitin.com service is subject to the terms-of-use agreement posted on the Turnitin.com website. Students who do not want their work submitted to this plagiarism detection service must, by the end of the second week of class, consult with their instructor to make alternate arrangements.

Even when an instructor has not indicated that a plagiarism detection service will be used, or when a student has opted out of the plagiarism detection service, if the instructor has reason to suspect that an individual piece of work has been plagiarized, the instructor is permitted to submit that work in a non-identifying way to any plagiarism detection service.

Academic Integrity

Ryerson's Policy 60 (the Academic Integrity policy) applies to all students at the University. Forms of academic misconduct include plagiarism, cheating, supplying false information to the University, and other acts. The most common form of academic misconduct is plagiarism - a serious academic offence, with potentially severe penalties and other consequences. It is expected, therefore, that all examinations and work submitted for evaluation and course credit will be the product of each student's individual effort (or an authorized group of students). Submitting the same work for credit to more than one course, without instructor approval, can also be considered a form of plagiarism.

Suspicions of academic misconduct may be referred to the Academic Integrity Office (AIO). Students who are found to have committed academic misconduct will have a Disciplinary Notation (DN) placed on their academic record (not on their transcript) and will normally be assigned one or more of the following penalties:

1. A grade reduction for the work, ranging up to an including a zero on the work (minimum penalty for graduate work is a zero on the work);
2. A grade reduction in the course greater than a zero on the work. (Note that this penalty can only be applied to course components worth 10% or less, and any additional penalty cannot exceed 10% of the final course grade. Students must be given prior notice that such a penalty will be assigned (e.g. in the course outline or on the assignment handout);
3. An F in the course;
4. More serious penalties up to and including expulsion from the University.

The unauthorized use of intellectual property of others, including your professor, for distribution, sale, or profit is expressly prohibited, in accordance with Policy 60 (Sections 2.8 and 2.10). Intellectual property includes, but is not limited to:

1. Slides
2. Lecture notes
3. Presentation materials used in and outside of class
4. Lab manuals
5. Course packs
6. Exams

For more detailed information on these issues, please refer to the [Academic Integrity policy](https://www.ryerson.ca/senate/policies/pol60.pdf)(https://www.ryerson.ca/senate/policies/pol60.pdf) and to the Academic Integrity Office website (https://www.ryerson.ca/academicintegrity/).

Academic Accommodation Support

Ryerson University acknowledges that students have diverse learning styles and a variety of academic needs. If you have a diagnosed disability that impacts your academic experience, connect with Academic Accommodation Support (AAS). Visit the [AAS website](#) or contact aasadmin@ryerson.ca for more information.

Note: All communication with AAS is voluntary and confidential, and will not appear on your transcript.

Important Resources Available at Ryerson

1. [The Library](https://library.ryerson.ca/) (https://library.ryerson.ca/) provides research workshops and individual assistance. Inquire at the Reference Desk on the second floor of the library, or go to library.ryerson.ca/guides/workshops
2. [Student Learning Support](https://www.ryerson.ca/studentlearningsupport)(https://www.ryerson.ca/studentlearningsupport) 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 (https://www.ryerson.ca/studentlearningsupport/online-resources/).
3. You can submit an Academic Consideration Request (https://prod.apps.ccs.ryerson.ca/senateapps/acadconsform) when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill and academic requirement. You may always visit the Senate website (https://www.ryerson.ca/senate/) and select the blue radial button on the top right hand side entitled: Academic Consideration Request (ACR). COVID 19 specific statement for Fall 2020 related to academic considertion has been built into the on-line academic consideration system and is also on the senate website.
4. At Ryerson, 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. Below are resources we encourage all Ryerson community members to access to ensure support is reachable. https://www.ryerson.ca/mental-health-wellbeing.**If support is needed immediately, you can 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)
5. Ryerson COVID-19 Information and Updates for Students (https://www.ryerson.ca/covid-19/students/) summarizes the variety of resources available to students during the pandemic.
6. Familiarize yourself with the tools you will need to use for remote learning. The Continuity of Learning Guide (https://www.ryerson.ca/centre-for-excellence-in-learning-and-teaching/learning-guide/) for students includes guides to completing quizzes or exams in D2L or Respondus, using D2L Brightspace, joining online meetings or lectures, and collaborating with the Google Suite.