THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number: ACS-3911-001
Course Name: Computer Networks

Instructor Information

Instructor: Philemon Pak
E-mail: p.pak@uwinnipeg.ca
Office Hours: Monday: 11:00 - 12:00 (Via Zoom)
Class Meeting Time: Monday and Wednesday: 13:00 – 14:15 (Via Zoom)
Note: All class time and office hours will be posted on the Nexus course calendar.
Course Web Page: https://nexus.uwinnipeg.ca/d2l/home/34049

Important Dates

First Class: January 6, 2021
Midterm Exam: February 22, 2021
Reading Week: February 14 - February 20, 2021
Final Withdrawal Date w/o academic penalty: March 16, 2021
(A minimum of 20% of the work on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date)
Last Class: April 5, 2021
Final Exam: ***TBD***
University closures: Louis Riel Day   February 15, 2021
                              Good Friday   April 2, 2021

Course Objectives/Learning Outcomes

This course is an introduction to fundamental concepts in computer networks. It covers the principles, technologies, protocols, and algorithms of computer networks. The layers of the network stack are discussed, with focus on the internet network stack following a top-down approach. Topics of discussion include network technologies, simple and sliding window protocols, routing and routing algorithms, congestion controls, quality of service, security, and network applications

Remote Learning

Lectures will be delivered live during the scheduled times via Zoom (Zoom meeting request can be found in the Nexus calendar). All lecture sessions will be recorded and posted in Nexus when it becomes available.

All course material including lecture notes, slides and recorded lecture videos, assignment details (see evaluation criteria section) will be available in Nexus.

Both midterm test and final exam will be delivered online through Nexus. Midterm test will be conducted at class time through Nexus and Zoom (see important date section). Final exam date and time will be announced later in class, and will be delivered through Nexus and Zoom.

Students must be available via Zoom during the lecture times.
- Students must display their real/full name
- Use of Video is optional.
- Participants must be muted when not speaking
- Students may interact via chat, voice or gestures

Students can find answers to frequently asked questions related to remote learning here: https://www.uwinnipeg.ca/covid-19/remote-learning-faq.html.

Note: A permitted or necessary change in mode of delivery may require adjustments to important aspects of course outlines, like class schedule and the number, nature, and weighting of assignments and/or exams.

Evaluation Criteria For ACS-3911 Students

Assignments: 20%
- There will be 4 assignments each worth 5% each.
- Due at 11:59:59 pm on the assignment indicated due date.
- All assignments include any or a combination of the following:
  - Theory, analysis, labs or programming exercises,
- No late or handwritten assignment will be accepted. Only under special circumstances e.g. medical, death in a family, and etc., and subject to approval before late assignment will be accepted with a 20% penalty off for each late day.
- Assignments are to be submitted through Nexus and should be in PDF (Portable Document Format) format only.
- When submitting your assignment files, please name the file with your name, student ID and the assignment number, e.g. *John Doe – 12345 – Assignment 1*. So for PDF file it should be *John Doe – 12345 – Assignment 1.pdf.*

- Assignments that do not meet all the requirements, including those for the submissions, may not be accepted or a portion of the marks will be deducted. Marks will be deducted for not following the file submission format, file naming format and instruction in the assignment.
- **Assignment could be very time consuming.** So please start early. Students are responsible for maintaining backups of their work. Students are responsible to review their assignments before submission to make sure the correct files are submitted. All assignments are to be completed individually.
- Multiple submissions are permitted but will only be accepting the last submission as official and be marked. Students may submit a partially completed assignment, and will receive credit for those attempted problems. Students are responsible for backing up and protecting their assignment work.
- Tools use for lab assignments
  - Wireshark v2.6.4+

Midterm Exam: 30%
- During regular class time
- Midterm exam administer through Nexus and proctor through Zoom.
- 1 hours 15 minutes duration

Final Exam: 50%
- The final exam covers all material discussed in the course.
- Final exam administer through Nexus and proctor through Zoom.
- 3 hours duration.

Note: _Students should contact the instructor as soon as possible_ if extenuating circumstances require missing an assignment, test, or examination. A medical certificate from a practicing physician may be required before any adjustments are considered.

Final Letter Grade Assignment

Historically, numerical percentages have been converted to letter grades using the following scale. However, instructors can deviate from these values based on pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

A+	90+ - 100%	B+	75 - 79%	C	60 - 64%
A	85 - 90%	B	70 - 74%	D	50 - 59%
A-	80 - 84%	C+	65 - 69%	F	below 50%

Test/Exam Requirements

- Photo ID is required for the final exam.
- Midterm and final exams will be delivered via Nexus. Students must have video capability and be prepared to present their student ID.
- Midterm and final exams is open book.
    - Students are permitted to view only the following authorized course material:
        - Class notes, slides, recordings, sample code, assignment descriptions and solutions posted by the instructor
        - Course textbook
        - Student's own course notes and assignment submissions
    - Students may use an external tool such as a text editor or IDE to write answers to questions before entering them into the exam
    - Students may contact the instructor to ask questions
    - External resources (or any material not listed above) are NOT PERMITTED
    - External website other than Nexus during midterm and final exam are NOT PERMITTED
    - Communication with others (except the instructor) is NOT PERMITTED
    - All work must be entirely the students' own. Collaboration or sharing of work is NOT PERMITTED.

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 204-786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential. https://www.uwinnipeg.ca/accessibility-services.

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make up work examinations without penalty. A list of religious holidays can be found in the 2020-21 Undergraduate Academic Calendar online at http://uwinnipeg.ca/academics/calendar/docs/important-notes.pdf

Prerequisite and Restriction Information*

(This information can be found in the UW General calendar)

- Requisite Courses: A grade of at least C in ACS-2909(3) and ACS-2913(3) (or the
- former ACS-2911(3) and ACS-2912(3)).

*Make sure that you have the necessary prerequisites to take this course. If you have not successfully completed the above listed course(s), it is in your interest to go to student registration office and officially drop the course.

Regulations, Policies, and Academic Integrity

Academic dishonesty is a very serious offense and will be dealt in accordance with the University's policies.

Avoiding Academic Misconduct: Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at: https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf
Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals) and 10 (Grade Appeals). Please note, in particular, the subsection of Student Discipline pertaining to plagiarism and other forms of cheating.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf
- UW Library video tutorial "Avoiding Plagiarism" https://www.youtube.com/watch?v=UvFdxRU9a8g

Uploading essays and other assignments to essay vendor or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves "aiding and abetting" plagiarism. Students who do this can be charged with Academic Misconduct.

Non-academic misconduct. Students are expected to conduct themselves in a respectful manner on campus and in the learning environment irrespective of platform being used. Behaviour, communication, or acts that are inconsistent with a number of UW policies could be considered "non-academic" misconduct. More detailed information can be found here:

- Respectful Working and Learning Environment Policy https://www.uwinnipeg.ca/respect/respect-policy.html,
- Acceptable Use of Information Technology Policy https://www.uwinnipeg.ca/institutional-analysis/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-procedures.pdf.

Copyright and Intellectual Property. Course materials are the property of the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides—irrespective of format. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor/presenter before, for example, photographing, recording, or taking screenshots of slides, presentations, lectures, and notes on the board. Students found to be in violation of an instructor's intellectual property rights could face serious consequences pursuant to the Academic Misconduct or Non-Academic Misconduct Policy; such consequences could possibly involve legal sanction under the Copyright Policy
https://copyright.uwinnipeg.ca/docs/copyright_policy_2017.pdf

Privacy

Students have rights in relation of the collecting of personal data the University of Winnipeg: https://www.uwinnipeg.ca/privacy/admissions-privacy-notice.html.

More information:

- Zoom and Privacy: https://www.uwinnipeg.ca/privacy/zoom-privacy-notice.html
- Testing/Proctoring: https://www.uwinnipeg.ca/privacy/zoom-test-and-exam-proctoring.html.

Email Communication Requirements, Class Cancellation, Correspondence from and with Students and Withdrawing from Course

Emails from accounts at uwinnipeg.ca are usually not filtered by the UofW email filter. Thereby it is strongly recommended electronic communication used for the course utilize a UofW email account to minimize the risk of filtering. The use of an external email address maybe block and filter by the anti-spam system, e.g. Gmail.

When emailing the instructor, you are to use the UofW Webmail system, i.e. *webmail.uwinnipeg.ca* to communicate with the instructor. **Do not** use the Nexus email system, i.e. mail.nexus.uwinnipeg.ca, Nexus mailbox are not monitored on a regular basis.

The email sent to the instructor must include your full name, your student #, and the COURSE # and SECTION # (like ACS-3911-001) in the subject line of your email. A respectful manner is also expected in the email communications.

When it is necessary to cancel a class due to exceptional circumstances, the course instructor will make every effort to inform students via uwinnipeg email and Nexus.

Students are reminded that they have a responsibility to regularly check their uwinnipeg e-mail addresses to ensure timely receipt of correspondence from the University and/or the course instructor.

Please let course instructor know if you plan on withdrawing from the course. Note that withdrawing before the VW date does not necessarily result in a fee refund.

Required Text Book(s)/Reading List

Computer Networking: A Top-Down Approach
Kurose J.F. & Ross K.W.
Pearson, 7th Edition, 2017
ISBN-13: 978-0-13-359414-0
ISBN-10: 0-13-359414-9

Course Outline (Tentative)

I. Introduction
- Computer networks: overview of topics, protocol layers.

II. Core Layers
- Application layer: network applications, HTTP, FTP, DNS.
- Transport layer: multiplexing/de-multiplexing, UDP, TCP, congestion control.
- Network layer: routing algorithms, virtual circuit and datagram, IP.
- Link layer: error detection/correction.

III. Selected Network Topics (as time permit)
- Wireless networks: wireless characteristics, CDMA.
- Multimedia networking: applications, streaming, VOIP, real time protocols.
- Security: cryptography, digital signatures, authentication, secure applications.
- Network Management: infrastructure, internet-standard management framework.

Note that all topics listed may not be covered and may be offered in a slightly different time order.