THE UNIVERSITY OF WESTERN ONTARIO

DEPARTMENT OF COMPUTER SCIENCE
LONDON, ONTARIO, CANADA

Computer Science 3357a

Computer Networks I

Course Syllabus - Fall 2014

1 Course Description

This course provides an introduction to concepts and issues involved in computer networks and data communications. Topics include the Internet, protocol layers and their service models (both the OSI and TCP/IP models), network programming, principles of reliable data transfer, congestion control, routing, error detection and correction techniques, analog and digital data signaling and transmission, and a variety of other topics in network security, multimedia networking, mobile and wireless data communications, and network management, as time permits.

2 Lecture Topics

The following list of topics may be covered, depending on time and the dynamics of the semester.

- *Networking fundamentals.* A history of computer networking and the Internet; the structure of the Internet; connectionless and connection-oriented services; circuit switching and packet switching fundamentals; protocols; layered protocol architectures and service models.
- *A tour of protocol layers.* The OSI and TCP/IP layered architectures; the application layer and sample application services; transport layer services, including discussions of the principles of reliable data transfer and congestion control; network layer services, including routing and multicasting; data link layer services, including error detection and correction techniques and a variety of protocols (Ethernet, ATM, wireless 802.11b, etc.); physical layer services, including signaling, analog and digital data transmission, and channel capacity.
- *Network programming.* BSD socket programming; TCP and UDP programming interfaces; asynchronous communications; advanced socket options and programming techniques.
- *Advanced topics.* Multimedia networking; network security; wireless and mobile computing; network management.

3 Prerequisites / Antirequisites

Prerequisites

- Computer Science 2208a/b, 2210a/b and 2211a/b
- Students are assumed to be familiar with the C programming language

Antirequisites

- ECE 4436a/b

Note: Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

4 Instructor

Name	Office	Office Hours	Email
Jeff Shantz	Middlesex College 346	To be announced	x@y where x = jeff, y = csd.uwo.ca

5 Course Web Site

The course web site is available at the following address:

http://www.csd.uwo.ca/courses/CS3357a

All course materials will be posted at this site. Lecture notes may be posted after lectures on this site, and announcements will be posted on the main page. It is the student's responsibility to check the course web site on a frequent and regular basis.

6 Required Textbook

Computer Networking: A Top-Down Approach
James F. Kurose and Keith W. Ross
Pearson, Sixth Edition, 2012
ISBN: 9780132856201

There will be one copy of the text available at the Taylor Library on 1-day reserve.

It is expected that students follow along in the textbook and read the sections and chapters corresponding to the lectures given.

7 Lecture and Lab Schedule

There are 3 lecture hours per week. See the online timetable at:

https://studentservices.uwo.ca/secure/Timetables/mastertt/ttindex.cfm

8 Lectures

Copies of lecture notes will be available on the course web site after each lecture for the purpose of review. You are advised that these are copies of the instructor's notes and are not complete course notes. They are not a substitute for attending lectures.

Be advised that lecture notes are provided as a *courtesy* and are *not a right*. If class attendance becomes an issue, the instructor reserves the right to stop posting and/or remove lecture notes from the course web site at any time.

9 Student Evaluation

Students will be evaluated based on the following components:

	Weight	Out (Tentative)	Due (Tentative)
Take-Home Labs	10%	Mon Sep 15, 2014	Mon Nov 24, 2014
Assignment 1	15%	Mon Sep 15, 2014	Mon Oct 06, 2014
Assignment 2	15%	Mon Oct 06, 2014	Mon Nov 03, 2014
Assignment 3	15%	Mon Nov 03, 2014	Mon Dec 01, 2014
Midterm Exam	15%		Wed Oct 22, 2014 (in class)
Final Exam	30%		Final exam period

Notes:

- If, for any reason, the schedule given above cannot be adhered to, the marks will be prorated as follows:
  - The assignments are worth a total of 45%. If any assignments must be cancelled, the remaining individual assignment weights will be prorated to add up to 45%.
  - The labs are worth a total of 10%. If any labs must be cancelled, the remaining individual lab weights will be prorated to add up to 10%.
- There will be no makeup exams, assignments, or labs, except for students requesting a special consideration for religious reasons. These students must have notified the course instructor and filed documentation with their Dean's office at least 2 weeks prior to the date of the exam,
- If you miss an evaluation for any other reason and present valid documentation to the Dean's office, your final exam mark will be weighted to include the weight of the missed item. You must notify the course instructor within a week of the missed evaluation and documentation must be received by your Dean's office within 2 weeks of the missed evaluation.
- All assignments and labs are due by 23:59:59 on their specified due dates. Due dates are subject to change.
- To be eligible to receive a passing grade in the course, your mark on the final exam must be at least 45%, and your weighted average on the assignments must be at least 45%. Otherwise, the maximum overall mark you can receive is 45%. To be eligible to receive a grade of 60% or higher, your mark on the final exam must be at least 50%, and your weighted average on the assignments must be at least 50%. Otherwise, the maximum overall mark you can receive is 58%.

10 Take-Home Labs

There will be 10 take-home labs, with each lab taking approximately 1 - 2 hours. Therefore, doing the labs should be equivalent to completing a medium-sized, third year Computer Science assignment. Furthermore, the content of the labs is designed to assist you in completing your assignments, with the intent that the labs should reduce the amount of time you would have otherwise spent working on your assignments.

Take-home labs are intended to give you practical exposure to in-demand technologies that will be useful both for this course, and for your career. They consist mostly of following step-by-step instructions, and then usually completing and submitting a short programming exercise to demonstrate your mastery of

the lab content and practice your C programming skills.

A lab manual will be provided free-of-charge to students and may explore topics such as:

- Building C programs (e.g. with Autotools)
- Useful libraries (e.g. syslog, getopt)
- Socket programming in C
- Encryption libraries (e.g. OpenSSL)
- Packet sniffing tools (e.g. Wireshark)
- Network troubleshooting tools (e.g. traceroute, arp, ping, etc.)
- Network security (e.g. common attacks; tools such as nmap; etc.)

An initial batch of labs will be made available on Monday September 15, with subsequent labs being released at a rate of approximately 1 lab per week. All labs will be due by 23:59:59 on Monday November 24, giving you most of the semester to complete them at your leisure.

No lates will be accepted with no exceptions (except religious and medical reasons with proper documentation submitted to the Dean's office). Labs submitted after 23:59:59 on Monday November 24 will not be graded and will receive a grade of zero.

Labs will be graded automatically by an *automarking* system. When a student submits a lab, a battery of tests will be run against the student's submission and a grade will be assigned based on the result of these tests. Since the labs are automatically marked, individual tests are graded on a pass/fail basis – no part marks are given. Furthermore, you will be expected to follow submission instructions precisely since the automarker will assume certain file and directory naming conventions.

Each lab may be submitted up to five (5) times prior to the final submission deadline (i.e. the initial submission, and up to four resubmissions). The penalties applied for resubmissions are as follows:

	Penalty
Initial Submission	0%
First Resubmission	4%
Second Resubmission	8%
Third Resubmission	16%
Fourth Resubmission	32%

The grade you receive for a lab is the grade assigned to your *last* submission of that lab – *not* the highest grade of your submissions. For instance, if you submit Lab 1 and receive 80%, but you then resubmit it and receive 70% (after the 4% penalty), your grade for the lab is 70%: the last grade received for the lab.

Labs are expected to be an individual effort.

11 Assignments

11.1 General

- All assignments are to be completed individually.
- Assignment descriptions, including updates and clarifications, will be posted on the course web site.
- Instructions for the submission of assignments will also be posted on the course web site.
- Students must ensure that their submitted programs run correctly in the virtual machine provided to the class.
- It is the student's responsibility to keep up-to-date backups of assignment files in case of system crashes or other unforeseen events. Push to GitHub often.
- Assignments are marked by teaching assistants. Every effort will be made to return marked assignments within 3 weeks of the assignment due date.
- If you have any questions regarding an assignment mark, you must first contact and discuss your concerns with the TA who marked the assignment. If the matter remains unresolved, you may then take your concerns to your course instructor.
- The marks for all assignments will be posted by the end of the term. It is your responsibility to ensure that the posted marks are correct.

11.2 Submission of Assignments

- All labs and assignments require only electronic submission, due by 23:59:59 on the due date. No paper submission will be required.
- Electronic submissions will be made on GitHub – you will be assigned a private GitHub repository to which you will submit your code.
- Instructions for submitting programming assignments will be posted on the course web site.

11.3 Late Assignments

- Late assignments will receive a penalty of $(2^{n+1})\%$ of the maximum mark for the assignment, where n is the number of days late. For instance, an assignment submitted 1 day late would receive a penalty of $2^2 = 4\%$.
- *An assignment which is more than 4 days late will not be accepted*
- No extensions will be given for assignments. Workload, exams, minor illnesses, and home computer problems are not valid excuses for being unable to complete an assignment within the allotted time. However, in the event of serious medical or compassionate grounds, you should follow the procedure for Academic Accommodation for Medical Illness, as given in section 13.

11.4 Programming Assignment Marking Schemes

- A programming assignment is considered to be "working" if it is shown to satisfy all the requirements specified in the assignment description, including correct results.

- Note that a programming assignment is an exercise meant to give you practice in certain concepts. Therefore, a program that produces the correct output is not necessarily a "working" program; it must also satisfy the specifications given in the assignment description.
- Other criteria in terms of which an assignment will be evaluated include coding style, comments, and efficiency.

12 Exams

- There will be a 90-minute, in-class midterm on Wednesday October 22.
- A 3-hour, closed-book final exam will be held at the end of the course, during the final exam period.
- For both exams, each student will be permitted to bring in one 8.5" by 11" sheet containing *original, hand-written* notes on both sides. Sheets that have been photocopied, contain text that has been shrunk in some manner, or that are deemed to have been produced by anything/anyone other than the student by hand using a pen or pencil will be confiscated at exam time.
- No calculators or reference materials of any kind are allowed.
- Each student must achieve a grade of at least 45% on the final exam in order to be given a passing grade in the course.
- Students must bring their UWO identification to the exam.
- The final exam is scheduled by the Office of the Registrar during the final exam period. Details will be provided when they are available. Students are advised not to make travel plans until they have consulted the final exam schedule.
- As an important note, computer-marked multiple-choice exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

13 Academic Accommodation for Medical Illness

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

If you are a science student, the Academic Counselling Office of the Faculty of Science is located in WSC 191, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their web site is available at:

http://www.uwo.ca/sci/undergrad/academic_counselling/index.html

A student requiring academic accommodation due to illness must use the Student Medical Certificate when visiting an off-campus medical facility:

https://studentservices.uwo.ca/secure/medical_document.pdf

For further information, please consult the university's medical illness policy at:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

14 Course Communications

Students should check the course web site and their `uwo.ca` email on a regular basis. This is the primary method by which information will be disseminated to all students in the class. The missing of critical information due to your failure to check the course web site or email cannot be used as a basis for appeal.

You should note that email at ITS and other email providers may have quotas or limits on the amount of space they dedicate to each account. Unchecked email may accumulate beyond those limits and you may be unable to retrieve important messages from your instructors. The failure to receive an email due to your account being over its quota cannot be used as a basis for appeal. You are expected to keep sufficient free space in your email account to accommodate incoming email.

15 Computing Facilities

Each student will be given an account on the Computer Science Department senior undergraduate computing facility, GAUL. In accepting the GAUL account, a student agrees to abide by the department's Rules of Ethical Conduct.

After-hours access to some Computer Science lab rooms is granted electronically by student card. If a card is lost, a replacement card will no longer open these lab rooms, and the student must bring the new card to a member of the Systems Group in Middlesex College Room 345.

16 Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x82147 for any specific question regarding an accommodation.

17 Tutoring

The role of tutoring is to help students understand course material. Tutors should not write part or all of an assignment for the students who hire them. Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two students hand in assignments judged similar beyond the possibility of coincidence.

18 Ethical Conduct

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a scholastic offence, at the following address:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

All assignments must be completed individually. You may discuss approaches to problems with other students; however, the work handed in must be your individual effort.

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a serious and major

academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

Assignments that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero with an additional penalty equal to the weight of the assignment. Students are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

The University of Western Ontario uses software for plagiarism checking. Students will be required to submit their programs in electronic form for plagiarism checking.

19 Support Services

Learning-skills counsellors at the Student Development Centre are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling. The Student Development Centre is available at:

http://www.sdc.uwo.ca

Students who are in emotional/mental distress should refer to Mental Health@Western for a complete list of options about how to obtain help:

http://www.health.uwo.ca/mental_health

Additional student-run support services are offered by the USC:

http://westernusc.ca/services

Registrarial Services is available at:

http://www.registrar.uwo.ca