Computer Network Design - Course Outline
NWEN 302: 2014 Trimester 2

This document sets out the workload and assessment requirements for NWEN 302. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

This course addresses the principles, architectures and protocols that have shaped the development of the Internet and modern networked applications. It examines network design principles, underlying protocols, technologies and architectures of the TCP/IP protocol stack. The design of various protocols in the stack, such as, protocols like ARP, ICMP, IP, DHCP, TCP, UDP, routing protocols like OSPF, and IPv6 will be covered in detail, together with logical link control, medium access control and physical media communications issues.

Objectives

By the end of the course, students should be able to:
1. Explain the process in which packets are delivered from source to destination in the Internet (GA 3(b))
2. Explain key routing algorithms, the process of how routing protocols communicate/exchange topology information and set up routing tables (GA 3(a), 3(b), 3(d), 3(e))
3. Explain the operation of the TCP flow and congestion control algorithms (GA 3(a), 3(b), 3(c), 3(d), 3(e))
4. Explain the role of medium access control and implications of different types of physical layers (GA 3(a), 3(b), 3(c), 3(d), 3(e))
5. Setup and interconnect networks with an emulation tool (GA 3(b), 3(d), 3(f))
6. Implement a simple packet sniffer to analyze data packets on the network (GA 3(b), 3(d), 3(f))
7. Implement simple networking algorithms and protocols using TCP/IP primitives (GA 3(b), 3(d), 3(f))
8. Setup and configure a simple network of SDN-enabled devices and demonstrate the usage, comparing it with the traditional Internet model (GA 3(b), 3(d), 3(f)).

Textbook and recommended reference

The textbook for NWEN 302 is:
- James F. Kurose and Keith W. Ross, *Computer Networking: A Top-Down Approach*, Sixth Edition, Pearson, available from VicBooks.

Good reference books are:
- Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, *Computer Networks: An open source approach*, McGraw-Hill, 2011, available in the VUW library.
- Computer Networking : Principles, Protocols and Practice, Olivier Bonaventure, Universite catholique de Louvain, available online.

Supplementary reference texts for network performance modelling are:
- Alberto Leon-Garcia, *Probability and Random Processes for Electrical Engineering* (2nd ed), Prentice-Hall, 1994.
- S.K. Bose, *An Introduction to Queueing Systems*, Kluwer, 2002.
- L. Kleinrock, *Queueing Systems Volume 1:Theory*, Wiley, 1975.
- D. Bertsekas and R. Gallager, *Data Networks*, Prentice-Hall, 1992. (available free online from author's homepage)

Supplementary references for Software Defined Networking are:
- F. Hu, *Network Innovation through OpenFlow and SDN : Principles and Design*, Taylor and Francis, 2014. (e-book available from http://VUW.eblib.com/patron/FullRecord.aspx?p=1408015.)
- T.D. Nadeau and K. Gray, *SDN: software defined networks*, O'Reilly Media, Inc., 2013, available in the VUW library.

Lectures, Tutorials, Laboratories, and Practical work

A schedule of lecture topics, readings, and assignment due dates is available online

- Lectures for NWEN 302 are: Tue/Wed/Thu 14:10-15:00 in Laby LBLT118.
- There are no tutorials for this course, but students are encouraged to approach the lecturers if they have questions; students can also discuss with tutors if they have questions on the assignments/labs.

- There will be weekly 2hr labs in CO246: Mon 10:00-12:00 and Wed 10:00-12:00

Assignments and Labs

There will be 4 lab projects, 2 for weeks 1-6 and 2 for weeks 7-12.

There will also be 4 homework assignments, 2 for weeks 1-6 and 2 for weeks 7-12.

All assignments/labs are due 3 weeks from the date they are handed out, unless otherwise stated.

Workload

In order to maintain satisfactory progress in NWEN 302, you should plan to spend at least 10 hours per week on this paper. A plausible and approximate breakdown for these hours would be:
- Lectures: 3 hours
- Readings: 2 hours
- Assignments: 2 hours
- Labs: 3-4 hours

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building (Cotton 358).

Staff

The course organiser for NWEN 302 is Prof Winston Seah. The lecturers for the course are Prof Winston Seah and Dr Bryan Ng. Their office hours are **09:00hrs - 17:00hrs** and contact details as follows:

- Prof Winston Seah
- Alan MacDarmid 403
- +64 4 463 5233 x 8493
- winston.seah@ecs.vuw.ac.nz

- Dr Bryan Ng
- Alan MacDarmid 404
- +64 4 463 5233 x 9998
- Andy.Linton@ecs.vuw.ac.nz

Tutors:
- *Labs*
- David Harrison
- David.Harrison@ecs.vuw.ac.nz

- *Assignments*
- Abigail Koay
- Abigail.Koay@ecs.vuw.ac.nz

Lab technical support:
- Radek Hes
- Cotton 360
- +64 4 463 6496
- radek.hes@ecs.vuw.ac.nz

Announcements and Communication

The main means of communication outside of lectures will be the NWEN 302 web area at http://ecs.victoria.ac.nz/Courses/NWEN302_2014T2/. There you will find, among other things, this document, the lecture schedule and assignment handouts, and the NWEN 302 Forum. The forum is a web-based bulletin board system. Questions and comments can be posted to the forum, and staff will read these posts and frequently respond to them.

Assessment

Your grade for NWEN 302 will be determined based on the following assessment weightings:

Item	Weight	Due
Assignment 1	2.5%	8 August 2014 (Friday)
Assignment 2	2.5%	29 August 2014 (Friday)
Assignment 3	2.5%	3 October 2014 (Friday)
Assignment 4	2.5%	17 October 2014 (Friday)
Lab 1	10%	10 August 2014 (Sunday)
Lab 2	10%	7 September 2014 (Sunday)
Lab 3	10%	21 September 2014 (Sunday)
Lab 4	10%	12 October 2014 (Sunday)
Final Examination	50%	24 October - 15 November

Exam

The timetable for final examinations will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 2 is 24 October - 15 November.

Policies and Penalties for late Submission

All assignments are to be submitted electronically (in PDF format) via the ECS submission system and are due at 23:59 on the date specified. The penalty for late submissions will be a deduction of 20% of the marks per day late (00:00 the following day is counted as one day late).

All projects are to be submitted electronically via the ECS submission system and are due at 23:59 on the date specified. A project is penalised at 10% per day late (00:00 the following day is counted as one day late).

Any request for extension must be supported by a medical certificate or other acceptable documentation for non medical reasons. Medical certificates must be provided by a registered medical practitioner. **Approval for extensions can only be granted by the course lecturers.**

Last day for submission of all assignments and lab reports is 19 Oct 2014.

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Mandatory Requirements

1. Attempt all labs and obtain at least 40% of the total available marks across all the labs;
2. Attempt and submit all assignments;
3. Obtain a D grade or better in the final exam.

Passing NWEN 302

To pass NWEN 302, a student must satisfy mandatory requirements and gain at least a **C-** grade overall.

Withdrawal

The last date for withdrawal from NWEN 302 with entitlement to a refund of tuition fees is Friday 25 July 2014. The last date for withdrawal without being regarded as having failed the course is Friday 26 September 2014 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at http://www.victoria.ac.nz/home/study.

Find out about academic progress and restricted enrolment at http://www.victoria.ac.nz/home/study/academic-progress.

The University's statutes and policies are available at http://www.victoria.ac.nz/home/about/policy, except qualification statutes, which are available via the Calendar webpage at http://www.victoria.ac.nz/home/study/calendar (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at http://www.victoria.ac.nz/home/about/avcacademic

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

Grievances
Student and Staff Conduct
Meeting the Needs of Students with Disabilities
Student Support
Academic Integrity and Plagiarism
Dates and Deadlines including Withdrawal dates
School Laboratory Hours and Rules
Printing Allocations
Expectations of Students in ECS courses

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

Course Outline as PDF