



TELE3118

Network Technologies

Session 1, 2009

SCHOOL OF ELECTRICAL ENGINEERING
AND TELECOMMUNICATIONS

Course staff

- Course convener and lecturer: Dr. Vijay Sivaraman
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- Tutor: Dr. Tim Moors
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Judy (Li) Chu (Email: judy.chu@gmail.com)

Consultations

- Thursdays 11am—12pm
- Students are strongly encouraged to use the open consultation hour rather than contact by email.

Course details

- This course is 6 units of credit.
- This course involves lectures, tutorials, and laboratories.
- Lecture times: Wed 9-11am (OMB145) and Thu 10-11am (OMB145).
- Tutorials: Wed 12-1pm (MorvB G5) and Wed 1-2pm (Law 275).
- Labs: Thu 12-3pm and Fri 12-3pm in EE343A. Note that you will be expected to work on your programming assignment outside of designated lab hours using the undergraduate computer labs in the EE building.

Course aims

This course aims to develop a fundamental understanding of the architecture of data communication networks such as the Internet. It will introduce students to the layered communication protocol stack (referred to as the TCP/IP stack in the Internet context), and progressively work through the functions and technologies at the various layers. Topics covered will include the physical medium, medium access mechanisms, IP addressing and routing, TCP congestion control, and applications such as email, web, and DNS. Particular emphasis will be given to the engineering design choices that have helped shape today's Internet.

Relation to other courses

This course provides an introduction to data networking, and establishes the foundation for subsequent courses such as TELE3119 "Trusted Networks" which covers the security aspects of data networks, and TELE4642 "Network Performance" which studies tools and techniques for analysing the performance of data networks.

Student learning outcomes

Upon successful completion of this course, you will be able to:

- Describe the role of layers in the architecture of a communication system
- Distinguish the architectural differences between telephone and data networks
- Evaluate medium access mechanisms suitable to different physical media
- Design simple data networks by constructing appropriate IP addresses and routes
- Analyse mechanisms for reliability and congestion-control in the Internet
- Recognise the steps by which applications such as email and web operate
- Construct client-server applications that operate over the Internet

The course delivery methods and course content address a number of core UNSW graduate attributes; these include:

- The skills involved in scholarly enquiry: This course develops an attitude towards keeping up to date with the latest methods and technology.
- An in-depth engagement with the disciplinary knowledge in its inter-disciplinary context: This course will help appreciate the societal context and technological and market advances in other disciplines that have helped shape the Internet.
- The capacity for analytical and critical thinking and for creative problem solving: This course develops the ability to analyse and criticise the design decisions that have shaped the Internet, and to indulge in design problems outside the limits of principles and examples used in teaching.
- The ability to indulge in independent and reflective learning.
- The skills to appropriately locate, evaluate, and use relevant information.
- The capacity to contribute to and work within the international community.
- The skills required for collaborative and multi-disciplinary work.

The rationale behind the approach to learning and teaching

- This course covers a significant breadth of content, and in the lectures I hope to lay out the material in a structured logical way and present the rationale behind every step of the engineering design process of a data communications system. I believe this critical thought process through the design stages will help students in retaining the material much better. I therefore strongly urge students to not miss classes, and to participate actively in class discussion.
- The tutorials will focus on problem solving, which will not only consolidate and apply the theory learnt in the lectures, but also provide an opportunity for reflection, critical thinking, and discussion.
- The laboratory assignments will stress the applicability of the course material to the real-world. In-lab experiments will provide first-hand observation of and experimentation with the technologies used in the Internet. The mini-project will provide an opportunity to design and implement a real-world application that works over the Internet.

Teaching strategies

- Lectures – to convey the basic architecture and technologies, and discuss the rationale behind the design choices.
- Tutorials – to learn problem-solving techniques, employ critical thinking, and reflect and discuss alternative methods.
- Labs – in-lab experiments will provide hands-on experience with networking technologies. The mini-project will provide you with the opportunity to design and demonstrate a real Internet-application.
- Mid-session test – will provide feedback on your understanding of the material.
- Final examination – final test of competency.

Assessment

- Labs/Assignments [30%]:
 - [20%] Experiments will be undertaken in each lab session. You are required to prepare beforehand by reading the handouts posted on the course web-page.
 - [10%] A mini-project will require you to design and develop a real-world application that requires communication over the Internet. The final demonstration of the working code will be in week 12.
- Late submissions will generally attract a penalty for each late day.
- Mid-session test [30%]: This course will have an in-class written test of two hours that will evaluate and provide feedback on your understanding of the material in this course. The test will be held in week 6 (Wed 22 Apr). Re-tests will not be granted in the event that a student misses the test, unless satisfactory written evidence is presented of adverse conditions that prevented the student from taking the test. In such a case, the course coordinator may, at his discretion, conduct the re-test orally with the individual student, typically within two weeks of the original test date.
- Final exam [40%]: This three-hour final exam scheduled by the University will test your overall competency in the course.

Course schedule

Week	Topic
1	Introduction, Network Protocol Stack, Physical Layer
2-3	Data Link Layer: Errors, MAC, Wireless, Ethernet
4-8	Network Layer: IP addressing, forwarding, routing, features
9-10	Transport Layer: UDP, TCP, socket programming
11-12	Application Layer: web, email, FTP, DNS

Textbooks and Resources for students

- The prescribed textbook for this course is: James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", 4th Edition, Addison-Wesley, 2007. Information on this book is available at <http://www.aw-bc.com/kurose-ross/>
- A useful reference book we will use is: Andrew S. Tanenbaum, "Computer Networks", 4th Edition, Prentice Hall, 2002. Information on this book is available at <http://authors.phptr.com/tanenbaumcn4/>
- Papers and other reading material will be posted on the course web-page <https://subjects.ee.unsw.edu.au/tele3118/>

- Students seeking resources can also obtain assistance from the UNSW Library; please see info.library.unsw.edu.au/web/services/services.html

Academic honesty and plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.*

Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management.

Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle

† Adapted with kind permission from the University of Melbourne.

Course evaluation and development

- Students are strongly encouraged to provide feedback on the course during lectures, tutorials, and labs, including suggestions for improving the course content, organisation, delivery, and assessment. Such feedback will be considered carefully with a view to acting on it constructively wherever possible.
- Towards the end of the course formal feedback will be gathered using the Course and Teaching Evaluation and Improvement (CATEI) Process.

Other matters

- Expectations and responsibilities of students: Students are expected to attend lectures and tutorials since the material in this course is fairly large and class discussions will show the thought process behind the design, which will help in retention. Group study and problem-discussion is also highly encouraged.
- Special consideration for missed in-class tests requires provision of satisfactory written evidence within a week of the illness or misadventure; the re-test may be conducted orally by the course convenor within two weeks of the date of the missed test. Special consideration for final examination will have to go through the normal University procedures.
- Information on Occupational Health and Safety policies and expectations are available at: www.riskman.unsw.edu.au/ohs/ohs.shtml
- Equity and diversity: Students who have a disability that requires some adjustment in their learning and teaching environment are encouraged to discuss their study needs with the course convenor prior to, or at the commencement of the course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734). Information for students with disabilities is available at: www.equity.unsw.edu.au/disabil.html. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional examination and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.