COMP3331/9331 Computer Networks and Applications
SUBJECT OUTLINE

Session 1, 2013

Course Staff

	Name	E-mail id	Phone	Office	Consultation Hours
Lecturer-in-charge	Salil Kanhere	salilk	9385 66995	K17-612	Wed 10:00 - 11:00 Thu 10:00 - 11:00
Lab demonstrators and tutors	Haleh Amintoosi	haleha	9385 4354	K17-615-06	
	Lukas Li	kail	9385 7225	K17-501-17	
	Ghulam Murtaza	gmurtaza	9385 4358	K17-615-07	

Course Information

Units of Credit: 6

Parallel Teaching: This is a combined undergraduate and postgraudate course. The written exams for the postgraduate students will contain some questions, which are different from the undergraduate exam, and will more challenging.

Pre-requisites:
For COMP3331: COMP1921 or COMP1927 or MTRN3530
For COMP9331: Co-requisite: COMP9024 or enrolment in MIT program 8684 or GradCert program 7344.
The course also involves two programming assignments. Students can choose to either use Java or C for these. It is assumed that students have necessary knowledge of at least one of these programming languages.

Aims: To provide an in-depth introduction to a wide range of topics in the field of computer networks including the Internet. To get a hands-on understanding of the working on network protocols. To gain expertise in preliminary network programming and problem solving skills. To build the necessary foundational knowledge required in subsequent networking courses (COMP4335-4336, COMP9332-9336).

Learning Outcomes: The following are the student learning outcomes:

- Students successfully completing this course will have a working knowledge of computer networks, and will be able to demonstrate their knowledge both by describing aspects of the topics, and by solving problems related to the topics.
- Students will also be equipped with the necessary skills to develop simple networked applications.
- A wide range of assessment components ranging from programming assignments, lab exams and written exams will be used to measure these outcomes. This is explained in greater details in the description of the individual assessment tasks.
- By completing the two programming assignments, the students will develop the following UNSW graduate attributes:(i) the ability to engage in independent and reflective learning because they will need to use the concepts learned in the lectures to design their program specifications individually and (ii) information literacy skills to appropriately locate, evaluate and use relevant information because they will need to use the programming skills previously acquired in earlier subjects and textbooks to design the software programs.
- By solving the sample problem sets released every week and answering the questions presented in lectures, the students will develop the following UNSW graduate attributes: (i) the capacity for analytical and critical thinking for creative problem-solving because these problems have been specifically designed so that students can gain the required analytical skills for solving similar

problems in the exams.

Teaching Rationale: This course takes a top-down approach to teaching computer networks. The rationale behind this is that most students have first hand experience using applications running over the Internet. This allows them to relate to each layer of protocol stack as we travel down the layers. Once they are committed, they participate in appropriate cognitive aspects such as learning the details with a focus to understand them. Students get mentally prepared to answer questions where very often there is no single answer or the answers can be unexpected. This results in deep learning and gives students a sense of accomplishment and confidence.

Teaching Strategy: Learning will be largely facilitated through the delivery of lectures. The hands-on laboratories will provide an opportunity to gain deeper understanding of the concepts discussed in the lectures. The sample problems, homework problem set and tutorials will help in the development of problem solving skills and in preparing for the exams. The programming assignments are mainly geared to allow students to gain familiarity with basic network programming and designing network protocols.

Course Schedule

Lectures: 3-hours per week for 12 weeks (Thursday 12:00 - 15:00), CLB (Central Lecture Block) 6

Laboratory sessions: 2-hour per week (practical hands-on experiments based on lectures) starting from Week 3. Out of a total of 7 lab classess, 5 sessions will be used for experiments, 1 session for programming practice and 1 session will be used for the lab exam. Refer to Labs section of the webpage for details and schedule. A laboratory handout will be provided for the experiments. These handouts are self-contained and most students should not have problem in following them on their own. For this reason, only the first session (Lab 1) of the five lab classes (Lab 1 to Lab 5) devoted to experiments is staffed with a lab demonstrator. The programming practice session is also self-guided and is not staffed.
(Note that the marking of Assignment 1 will be conducted during the lab hours of Week 9)

Tutorials: There will be 2 tutorial sessions: one in Week 5 (before the midsession exam) and one in Week 13 (before the final). They will be conducted during the lecture hours for the above weeks. These sessions will be used to demonstrate the solutions to certain representative problems. Students are strongly encouraged to attend since this serves as a very good preparation for the exams.

Consultations: In addition to lectures and labs, there will be an optional consultation slot each week. Check the web page for timings. Students having difficulty may seek further help on a strictly first come first serve basis.

Lecture Schedule and Topics: The following table lists the tentative schedule. Students will be informed of any changes during the lecture and by announcements on the notices page.

Week	Date	Topics	Assessment Task	Labs
1	7 March	Course Overview,Introduction to Computer Networks: Internet Architecture, Circuit and Packet Switching, Access Systems		NO
2	14 March	Introduction (contd.): Delay Calculation, Protocol Layers + Application Layer: Principles of Application Layers, HTTP,		NO
3	21 March	Application Layer (contd.): DNS, P2P Networks, Socket Programming	**Programming Assignment 1 available**	Lab 1
4	28 March	Transport Layer: Introduction to services, Multiplexing, UDP, Reliable data delivery		Programming Practice
		Mid-session Break		
5	11 April	Transport Layer (contd.): TCP, Congestion Control, Tutorial 1		Lab 2 (Self-guided)

6	18 April	**Mid-session Exam**		NO
7	25 April	Anzac Day Holiday		Lab 3 (Self-guided)
8	2 May	Network Layer: Virtual Circuits, IP, Addressing, Router Internals	P**rogramming Assignment1 due early in the week/ Assignment 2 available**	NO
9	9 May	Network Layer (contd.): Routing Algorithms + Data Link Layer: Services, Error detection		Demonstration of Assignment 1 to markers during lab hours
10	16 May	Data Link Layer (contd.): Multiple Access Protocols, Link layer addressing, Ethernet, Switches		Lab 4 (Self-guided)
11	23 May	Wireless and Mobile Networks: Wireless characteristics, CDMA, Cellular Networks, Mobility + Network Security: Symmetric and Public Key Cryptography		Lab 5 (Self-guided)
12	30 May	Network Security (contd.): Authentication, Digital Signatures, Key Distribution and certification, Firewalls		**Lab Exam**
13	6 June	Revision, Tutorial 2	**Programming Assignment 2 due**	
	14 June -1 July	Exam Period	**Final Exam**	

Student Resources

Textbook: Computer Networking - A Top-Down Approach Featuring the Internet, J. Kurose and K. Ross, Addition Wesley , Sixth Edition, 2012.

Reference Texts:

- Unix Network Programming Volume 1 - Networking APIs: Sockets and XTI, W. Richard Stevens, Prentice Hall, Second Edition, 1998.
- Java Network Programming, E. R. Harold, O'Reilly, Third Edition, 2004.
- Computer Networks: A Systems Approach, Larry Peterson and Bruce Davie, Morgan Kaufmann, Fourth Edition, 2007.

Sample Problem Sets:
Sample problem sets will be released every other week on the course webpage. They will be useful in preparing for the exams. Questions from previous exams will also be discussed during the lectures to familiarise students with the exams.

Other Resources:
Links to various other resources such as important RFCs, etc can be found on the Resources link on the course webpage. Links to additional reading material will be provided on the lecture notes page.

Software Availability:
For the labs, we will be using several Unix based network utility programs. The purpose of these programs and information on how to use them will be provided in the lab handouts. We will also extensively used a packet sniffing tool called Wireshark, which has been widely deployed on CSE machines. A detailed manual for Wireshark is available under the Lab exercises link on the course webpage. Further, a part of the second lab is devoted to enable students to gain familiarity with this tool.

Programming assignments are expected to be developed in C or Java. We will discuss only certain new networking programming aspects in these languages. Students are assumed to have sufficient expertise in either of these two programming languages. Links to network programming in C and

Java will be available under the assignments link of the course webpage. Sample code demonstrating a simple client/server application will also be supplied as a starting point for students.

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Assessment

There will be 4 assessment components as listed below:

Component	Weight
Lab Exam	10%
Programming Assignments	25%
Mid-Semester Exam	20%
Final Exam	45%

To pass this course a student MUST receive at least 40% marks in the final exam. The following formula outlines exactly how the final mark will be computed:

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labExam   = mark for lab exam (out of 10)
ass1      = mark for assignment 1 (out of 13)
ass2      = mark for assignment 2 (out of 12)
midExam   = mark for mid-session exam (out of 20)
finalExam = mark for final exam (out of 45)

mark      = labExam + ass1 + ass2 + midExam + finalExam
grade     = HD|DN|CR|PS if mark >= 50 &&  finalExam >= 18
          = FL          if mark < 50 || finalExam < 18
```

1 - **Lab Exam**. The lab exam will be conducted in one of the lab sessions towards the end of the session. Each student will be required to submit his/her answers at the end of session to the lab supervisor. Check the Labs link on the course webpage for the exam schedule. The lab exam will make up 10% of your final mark.

Subject policy on Lab exams: lab exams are conducted during normal lab sessions. There is no supplementary of replacement test for Labs. Make sure you do not miss any of lab exams. Each student must attend the lab exam **ONLY** in his/her allocated lab session.

2 - **Programming Assignments**. There will be two programming assignment, which will together contribute to 25% of your final mark. Both assignments MUST be individual submissions. The details and specification for the first assignment will be announced in Week 3. You will have 4-5 weeks to finish this assignment. The second assignment will be released in Week 7-8. You will have 4-5 weeks to finish this assignment. You can either use C or JAVA as the programming language for the assignments. Please note that this course does NOT involve teaching any programming language.

Note: Exceptions will be made for students who lack programming background and are not enrolled in a CSE/EE/IT degree program (e.g: Mechatronics and other branches of engineering). Upon seeking approval from the LIC, such students can work on an alternate programming assignment to replace the regular first assignment. These students will also have an option of choosing a non-programming assignment in place of the second programming assignment.

Subject policy on assignment: The assignments are an integral part of the assessment. Make sure that you submit your assignments on time. Follow the submission directions in the assignment carefully. Late submissions will be penalised according to the rules specified in the assignment specifications.

3 - **Mid-Semester Examination**. The examination will be held on 18 April 2013 (Week 6) during normal lecture hours (12:00 - 15:00). The format and details (location, duration, etc) will be announced. The exam will make up 20% of your final mark.

4 - **Final Examination**. The format and details will be announced. The exam will take place during the university exam period. The final exam is worth 45% of your final mark.

Note: The postgraduate students will have a few slightly challenging questions as compared to the undergraduates, in both the examinations. Approximately 15-20% of the total questions will be different.

Academic Honesty and Plagiarism

All submissions are routinely subject to scrutiny for similarities with other students' assignments. If you copy from another person, or get an unreasonable amount of help from a friend (so your assignment begins to look like theirs), or if you work very closely with someone, there is a good chance we will detect it. When we do, you will be penalised. At the very least, you will lose some or all marks for that assignment. In the past, students have been automatically failed for submitting stolen assignments. Further details of the School plagiarism policy can be found here. (You acknowledged receipt of these rules when you obtained your CSE computer account, and the link above is for your convenience so that you can review the rules now.)

We are aware that a lot of learning takes place in student conversations, and don't wish to discourage those. However, it is important, for both those helping others and those being helped, not to provide/accept any programming language code in writing, as this is apt to be used exactly as is, and lead to plagiarism penalties for both the supplier and the copier of the codes. Write something on a piece of paper, by all means, but tear it up/take it away when the discussion is over.

If you are new to studying in Australia, be aware that attitudes to plagiarism at UNSW may be different from those in your home country. Make sure you are clear about the rules here at UNSW. In brief, and for the purposes of COMP3331/9331, plagiarism includes copying or obtaining all, or a substantial part, of the material for your assignment, whether programming language code, or written or graphical report material, without written acknowledgement in your assignment from:

1. a location on the internet;
2. a book, article or other written document (whether published or unpublished) whether electronic or on paper or other medium;
3. another student, whether in your class or another class;
4. a non-student (e.g. from someone who writes assignments for money)

Note also that there is a big difference between being able to understand someone else's code, and writing that code yourself from scratch. A computer programmer has to be able to write code from scratch. The assignments provide opportunities for you to develop the skills necessary to write your own networking code. Use these opportunities!
Further details on the CSE student plagiarism policy can be found here.
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Special Considerations / Supplementary Examination

The following cases may be considered:
(1)A student has submitted a fully documented request for Special Consideration within 7 days of the assignments or examination. The medical or other evidence is clearly of a nature to affect the student's performance seriously (minor ailments such as cold, headache - unless chronic, or severe enough to require prescribed medication, will not be considered). Feeling 'unwell', for instance does not excuse a poor result. In simple terms, not all applications are automatically accepted.
(2)A student's performance during the semester, particularly in mid-session exam, lab test and programming assignments have been of satisfactory standard. Students who perform poorly in such assessment components will not be granted a supplementary exam.
(3)A student who is unfit to attend the final exam or attended the exam but was forced to leave through illness.
(4) Supplementary examination is usually conducted immediately (e.g 1 or 2 days) after notification of final exam results. Students who are offered the supplementary exam will be informed via email about the exam date, time and location. No further considerations will be offered.

Re-Assessment Policy: Due care is taken to mark all assessment components fairly and appropriately. Therefore, it is unlikely that marks will be changed after a re-assessment. However, students who still feel that the mark they received does not reflect their performance have the right

to apply for re-assessment. The re-assessment procedure may be in one of the following form and MUST be applied via NewSouth Q in the Chancellary within 14 days after notification of results of assessment. Please note that re-assessment or re-marking of a piece of work may result in marks to go up or down. Further details can be found from UNSW student guide at following site: http://studentlifelearning.unsw.edu.au/needhelp/study.html

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Course Evaluation and Development

Student feedback on this course, and on the lecturing in this course, will be gathered via an online questionnaire, which will be e-mailed to all students towards the end of the session. Student feedback is taken seriously, and continual improvements are made to the course based in part on this feedback. The course questionnaire results go to the Head of the School of Computer Science and Engineering, who reads the results and follows up in cases where action is clearly needed.

In addition feedback will also be gathered mid-way through the session to gauge the student experience and make any quick changes if required to improve student learning.

Specifically, feedback received in previous sessions has lead to several changes over the years including:

- Weekly sample questions for practice.
- 2 Tutorial sessions; one before each exam.
- Frequent updating of the subject content to reflect latest developments in the Internet.
- Homework problem set.
- Mid-session feedback from students.
- Non-programming option with the second assignment for students with minimal exposure to programming (i.e. non-CSE students).

Communications via E-Mail

(1)All students MUST read 'Notices' from the course web-site for any updates or notices regularly. Students must also check their school e-mail reguarly for announcements regarding this course.
(2) Students must follow the proper communication channels:-
(a)The official course mailing address (cs3331@cse.unsw.edu.au) should only be used for students who have personal problems and wish to seek help from LIC or Adminstrator on confidential basis. Please allow up to a few days to receive a reply. If it's urgent, use the consultation hours.
(b) If you are e-mailing us from a non-cse e-mail account (such as hotmail, yahoo, etc), please **include your full name and student number** in the e-mail to enable us to identify the sender.
(c) Do not send direct emails to LIC, Administrator, etc. via their personal email addresses. Emails received at private accounts **will not be read** and **automatically deleted without reply**

Further Information

- Students enrolled in COMP3331/9331 are expected to attend all classes
- The use of School of Computer Science and Engineering computing laboratories is subject to rules described in the Yellow Form, which you acknowledge (electronic) receipt of when you receive your computing account. The Yellow Form also outlines what to do in case illness or misadventure that affects your assessment, and supplementary examinations procedures within the School of Computer Science and Engineering.
- Information on UNSW Occupational Health and Safety policies and expectations
- Equity and Diversity issues

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