UNSW Course Outline

COMP9331 Computer Networks and Applications - 2024

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General Course Information

Course Code : COMP9331
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Computer Science and Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course is an introductory course on computer networks aimed at students with a computer science / electrical engineering background. You will focus on common paradigms and protocols used in present data communication. Through lectures, in-class activities, labs and assignments,

you will learn the theory and application of:

(1) Medium access control, congestion control, flow control, and reliable transmission,

(2) Addressing and naming,

(3) Routing and switching,

(4) Widely used protocols such as Ethernet, IP, TCP, UDP, HTTP, etc.

(5) Special-purpose networks including content delivery, peer-to-peer, and wireless networks, and

(6) Security threats and standard defensive techniques (if time permits)

This is a combined undergraduate and postgraduate course. The corresponding undergraduate course code is COMP3331.

Course Aims

The course aims to provide students with an overview of the core topics in computer networks and the Internet's architecture and protocols. Students will be introduced to network programming and will learn to design and implement network protocols and applications and evaluate network performance. As an introductory course, one of the aims is to prepare students for more advanced study in follow-on courses.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the current architecture of the Internet and the entities involved in its operations
CLO2 : Identify soundness and/or potential flaws in proposed protocols
CLO3 : Design networked applications and protocols, and implement them in C, Java or Python
CLO4 : Analyse and evaluate the performance of computer networks
CLO5 : Capture and analyse network traffic
CLO6 : Explain security and ethical issues in computer networking

Course Learning Outcomes	Assessment Item
CLO1 : Describe the current architecture of the Internet and the entities involved in its operations	• Mid-term Exam • Final Exam
CLO2 : Identify soundness and/or potential flaws in proposed protocols	• Programming Assignmnent • Mid-term Exam • Final Exam
CLO3 : Design networked applications and protocols, and implement them in C, Java or Python	• Lab • Programming Assignmnent
CLO4 : Analyse and evaluate the performance of computer networks	• Lab • Programming Assignmnent • Final Exam
CLO5 : Capture and analyse network traffic	• Lab
CLO6 : Explain security and ethical issues in computer networking	• Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | WebCMS3

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Programming Assignmnent Assessment Format: Individual	20%	Due Date: Week 9: 04 November - 10 November
Lab Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: Week 2: 16 September - 22 September, Week 3: 23 September - 29 September, Week 4: 30 September - 06 October, Week 8: 28 October - 03 November, Week 9: 04 November - 10 November
Mid-term Exam Assessment Format: Individual	20%	Due Date: Week 7: 21 October - 27 October
Final Exam Assessment Format: Individual	40%	Start Date: Not Applicable Due Date: 22 Nov − 5 Dec 2024

Assessment Details

Programming Assignmnent

Assessment Overview

Students will be asked to implement a moderately complex component of a network architecture, in C, Java or Python.

The assignment will be partly auto-marked. The submissions will be reviewed by tutors, who will provide feedback.

Course Learning Outcomes

- CLO2 : Identify soundness and/or potential flaws in proposed protocols
- CLO3 : Design networked applications and protocols, and implement them in C, Java or Python
- CLO4 : Analyse and evaluate the performance of computer networks

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or

media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see here.

Lab

<u>Assessment Overview</u>

Students will work on a set of small exercises to explore tools and techniques for analysing and building networking applications.

Marks are awarded by the lab demonstrators using criteria given in each lab exercise.

<u>Course Learning Outcomes</u>

- CLO3 : Design networked applications and protocols, and implement them in C, Java or Python
- CLO4 : Analyse and evaluate the performance of computer networks
- CLO5 : Capture and analyse network traffic

<u>Generative AI Permission Level</u>

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

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Mid-term Exam

<u>Assessment Overview</u>

The mid-term exam will be 75 minutes long and will be held approximately in the middle of the term. It will examine students on topics covered from the first half of the term.

<u>Course Learning Outcomes</u>

- CLO1 : Describe the current architecture of the Internet and the entities involved in its

operations
- CLO2 : Identify soundness and/or potential flaws in proposed protocols

<u>Generative AI Permission Level</u>

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

Final Exam

<u>Assessment Overview</u>

The final exam will be 2 hours long and will be held in the UNSW exam period. It will examine students on all topics covered in the term.

<u>Course Learning Outcomes</u>

- CLO1 : Describe the current architecture of the Internet and the entities involved in its operations
- CLO2 : Identify soundness and/or potential flaws in proposed protocols
- CLO4 : Analyse and evaluate the performance of computer networks
- CLO6 : Explain security and ethical issues in computer networking

<u>Generative AI Permission Level</u>

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

General Assessment Information

<u>Grading Basis</u>

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Course Logistics Introduction: • What is the Internet? • Network edge and core • Performance of networks Introduction: • Layering and Encapsulation
Week 2 : 16 September - 22 September	Lecture	Application Layer: • Principles of networked applications • The Web & HTTP • Email • Domain Name Service (DNS) • Peer-to-Peer Networks and DHT
Week 3 : 23 September - 29 September	Lecture	Application Layer: • Content Distribution Networks • Socket Programming Transport Layer: • Transport services
Week 4 : 30 September - 6 October	Lecture	Transport Layer: • Multiplexing & Demultiplexing • UDP • Principles of reliable data delivery • Pipelined Protocols
Week 5 : 7 October - 13 October	Lecture	Transport Layer: • TCP • Connection management & flow control • Congestion contro
Week 7 : 21 October - 27 October	Lecture	Network Layer, Data Plane: • Overview • IP
Week 8 : 28 October - 3 November	Lecture	Network Layer, Data Plane: • IP Addressing • NAT • IPv6 Network Layer, Control Plane: • Routing algorithms • Link State
Week 9 : 4 November - 10 November	Lecture	Network Layer, Control Plane: • Distance Vector • ICMP Link Layer: • Error detection • Multiple Access Protocols
Week 10 : 11 November - 17 November	Lecture	Link Layer: • Link-Layer Addressing and ARP • Ethernet • Switches Wireless Networks • Wireless Characteristics • 802.11 • CSMA/CA A Day in the Life of a Web request

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Course Textbook:

- Computer Networking - A Top-Down Approach Featuring the Internet, J. Kurose and K. Ross, Pearson, 8th Edition, 2020 (Seventh edition will suffice for most parts). UNSW Bookshop Link - [Print Version](#) , Pearson Link - [E-book Version](#)

Reference Texts:

- Unix Network 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.
- Learning Python, Mark Lutz, O'Reilly, Fifth Edition, 2013.
- Computer Networks: A Systems Approach, Larry Peterson and Bruce Davie, Morgan Kaufmann, Fifth Edition, 2011.
- Introduction to Computer Networks and Cybersecurity, John Wu and J. David Irwin, CRC Press, 2013.
- Computer Networks, Andrew Tanenbaum and David Wetherall, Fifth Edition, Pearson, 2010.
- Wireless and Mobile Networking, Mahbub Hassan, CRC Press, 2022

Links to additional reading material will be available on the lecture notes page.

Course Evaluation and Development

Student feedback on this course is obtained through the myExperience survey at the end of each term. We value student feedback and take it seriously, using it as a basis for continuous improvements to the course. We strongly encourage students to promptly inform the course lecturer of any issues that may arise. We are open to suggestions and criticisms and committed to taking appropriate actions to rectify any problems and enhance the student's learning experience.

Based on the feedback received for previous terms, we note that it was generally positive. Consequently, we do not anticipate making any significant changes to the course. However, it was brought to our attention that some students found the programming assignment quite challenging and would perhaps benefit from additional help with coding. In response to this concern, we will be offering additional help sessions and tutorials on network programming. We hope that this extra support will assist students in completing the assignment on time ensuring a better learning experience for everyone.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Wen Hu					No	Yes
	Isural Bamunusinghe					Yes	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at

the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You 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 tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also

be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - https://nucleus.unsw.edu.au/en/contact-us

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the courses convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)

You should **never** contact any of the following people directly:

- Vice Chancellor

- Pro-vice Chancellor Education (PVCE)

- Head of School

- CSE administrative staff

- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.