

COMP3331/9331

Computer Networks and Applications

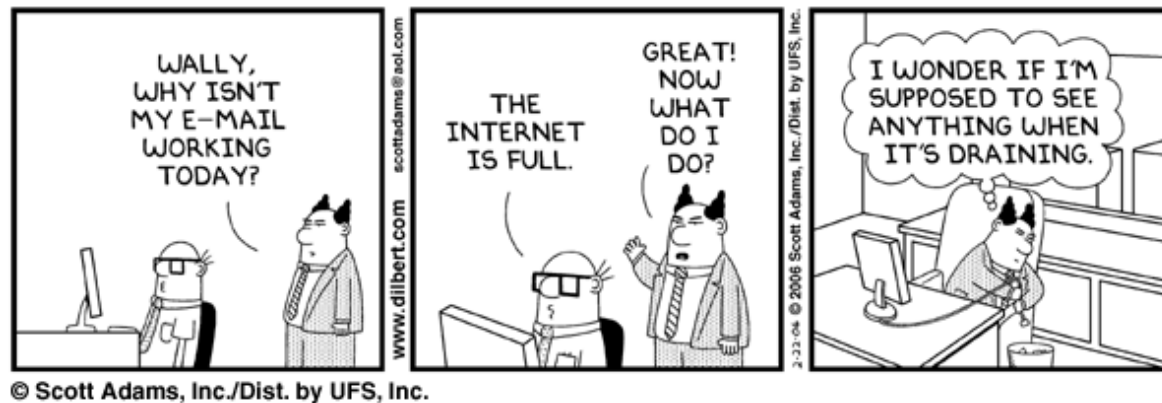
2024 Term 3

Lecturer in Charge: **Wen Hu**

Lecturer and Course Admin: **Isura Nirmal**

Course Outline & Logistics

*1st Course on
Computer Networks*



Who cares about **computer networking**?

	2022 Revenue (US\$)
Google	279 Billion
Facebook (Meta)	117 Billion
Cisco	51 Billion

2023 Optus outage

Article [Talk](#)

From Wikipedia, the free encyclopedia

The **2023 Optus outage** was an unplanned [outage](#) of all [Optus](#) internet, [cellular](#) and [fixed-line](#) services in Australia first detected on 8 November 2023 at 04:05 [AEDT](#).^[2] The outage caused disruption across government and corporate sectors including hospitals, banks, train services, [EFTPOS](#) payment systems, and calls to [emergency services](#).^{[2][3]} Restoration was gradual with some services being restored around 13:00 [AEDT](#).^[4] The outage directly affected more than 10 million people and 400,000 businesses across [Australia](#).^{[5][6]}

The cause was likely due to several routers disconnecting as an automated protective measure against routing update overload.^[1] Optus stated that the outage was not due to a [cyberattack](#).^{[2][7]}

Today's Agenda

- Course (non-technical) details
- Logistics: How we will roll
- What is this course about?
- Introduction to Computer Networks (course content begins)

Course Staff

- Lecturer-in-Charge: Wen Hu
- Course Admin: Isura Nirmal
- Tutors

Yihe	Yan	Thirasara	Beruwawela
Julian	Zincone	Varun	Agarwal
Jibitesh	Saha	Jueming	Jamin
Navodika	Karunasingha	Mitchell	Gayfer
Yifan	Wang	Wei	Song
Cheng	Jiang	Manmeet	Dhaliwal
Yibing	Xu	Wenyao	Chen
Yanxiang	Wang	Ishan	Karunanayake
Nimish	Ukey	Ayda	Valinezhad
Mahshid	Gohari	Ravin	Gunawardena
Jiawei (Gary)	Hu	Chen	Yang
Mark	Cardamis	Vinayak	Kuanr
Mohammad	Majid		



You

- Mix of UG (mostly 2nd/3rd year) and PG (mostly 1st year)
 - ~1,000
- Mostly CSE students but a few from other Engineering schools (Mech, EET) and Faculties (Business, Science, Law)
- Assumed Knowledge:
 - COMP1927/COMP2521/MTRN3500
 - Good understanding of data structures, algorithms, basic probability theory
 - Proficient in one of the following programming languages: C, Java or Python
 - We DO NOT assume that you know anything about computer networks

Resources

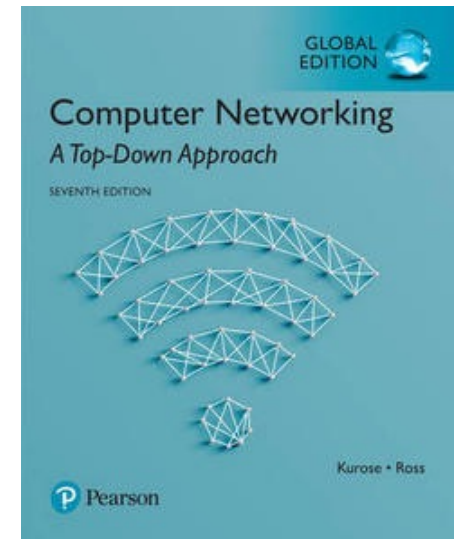
Very important



- <https://webcms3.cse.unsw.edu.au/COMP3331/24T3/>
- Everything is posted on the course website
 - **ECOS (PLEASE READ THIS THOROUGHLY)**
 - Lecture Notes
 - Video Recordings
 - Lab Schedules, Allocations and Locations
 - Assignment and Lab Exercises
 - Homework Problems
 - Exam Information
 - Consultation hours
 - **Announcement:** Your responsibility to check the announcement forum on regular basis for important updates/changes to schedule, etc.
 - **Your active participation and interaction is crucial to ensure that all of us get the most out of this course**
 - Note: You will need to login using your **zID/zPass**

Course Material

- **Textbook:** *Computer Networking: A Top Down Approach*, Jim Kurose, Keith Ross, Addison-Wesley (Pearson), 8th Edition, 2020
 - UNSW Book Shop Links: [Physical](#) [E-book](#)
- Lecture Notes (on WebCMS)
- Links/articles on additional material
- Reference Books:
 - *Computer Networks: A Systems Approach*, Larry Peterson and Bruce Davie, Morgan Kaufmann, Fourth Edition, 2007.
 - *Unix Network Programming Volume 1 - Networking APIs: Sockets and XTI*, W. Richard Stevens, Prentice Hall, Second Edition, 1998 (Third edition also available)
 - *Java Network Programming*, E. R. Harold, O'Reilly, Third Edition, 2004.
- Links to programming help



Course Aims

- To gain in-depth introduction to the key topics in the field of computer networks, including the Internet
- To obtain hands-on understanding of networking protocols
- To gain skills in network programming, designing and implementing network protocols, evaluating network performance and problem solving
- To build necessary foundational knowledge required in more advanced networking courses

Teaching/Learning Strategies

- Lectures (8 x 4 hours and 1 x 2 hours)
- Labs
 - Hands-on learning
- Programming Assignment
 - Network programming and protocol design
- Weekly Homework (Self-assessed)
 - Problem solving skills

Lectures

- In-person face-to-face: Monday and Thursday 14:00 - 16:00
- Weeks 1-5 and 7-10
 - (2 x 2-hour lectures x 8 weeks + 1 x 2-hour lecture x 1 week)
- Lecture Recordings
 - Linked to the Lectures Page
- We will focus on most important concepts and supplement with
 - Problem solving exercises
 - Discussions
- Certain material will be left for self study
 - These will be indicated on the lecture notes
- In-lecture polls and quizzes
 - For you to reinforce concepts
 - For me to get an indication of your understanding

Quiz: The most useful superpower for a UNSW student would be:



A

Invisibility



B

Flight



C

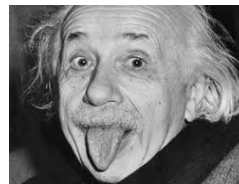
Telepathy



D

Time Travel

E: Some other power??



Labs

- 2-hour lab sessions starting **Week 2** (Weeks 2-5, 7-10)
- **In-person labs: CSE labs**
- Hands-on experiments related to concepts covered in lectures
 - Wireshark packet sniffer, ns-2 network simulator, other network measurement tools, socket programming practice
- 8 lab sessions:
 - 5 Lab Exercises (guided by tutors)
 - Lab report to be submitted (no demos)
 - Highly encouraged to attempt lab tasks before attending labs
 - 2 Problem-based learning sessions (Tutorials in Weeks 5& 10)
 - No marks
 - 1 Programming tutorial session (Week 7).

Online Labs: VLAB



- Access CSE lab environment on your own machine remotely
- Uses VNC
- Recommended client: TigerVNC (<https://tigervnc.org>)
- https://taggi.cse.unsw.edu.au/FAQ/Really_quick_guide_to_VLAB/
- UNSW VPN: <https://www.myit.unsw.edu.au/services/students/remote-access-vpn>
- You will need to know basic command line Linux commands:
<http://www.unixguide.net/linux/linuxshortcuts.shtml>



Getting help

- Use online discussion forums on Ed (Join here <https://edstem.org/au/join/qqtmd>)
 - Fellow students benefit from your questions
 - Fellow students can answer your questions
 - Develop a community
- Use cs3331@cse.unsw.edu.au for communication with us.
 - DO NOT email LiC/admin on personal email address
- Consultation hours
 - LiC for lecture-related help – 1 hour each week
 - Tutor Consultations for assignment help - C/Python/Java
- Tutors
 - Establish an agreeable mode of communicating with your tutor

Join here <https://edstem.org/au/join/qqtmnd>



Revisions based on myExperience Feedback

- Student feedback from Terms 1, 2 was generally positive
- No major changes to the structure
- Programming specific lab during Week 7 focusing on socket programming and how to work with multi-threading
- Assignment
 - Specs will be more concise and released before Week 3
 - More consultations sessions through Weeks 4-9

Code of Conduct

- CSE offers an inclusive learning environment for all students. In anything connected to UNSW, including social media, these things are student misconduct and will not be tolerated:
 - racist/sexist/offensive language or images
 - sexually inappropriate behaviour
 - bullying, harassing or aggressive behaviour
 - invasion of privacy
- Show respect to your fellow students and course staff
- Staff are also reminded to show respect to students

Plagiarism



What is plagiarism?

Presenting the (thoughts or) work of another as your own. Cheating of any kind constitutes academic misconduct and carries a range of penalties. Please read course intro for details.

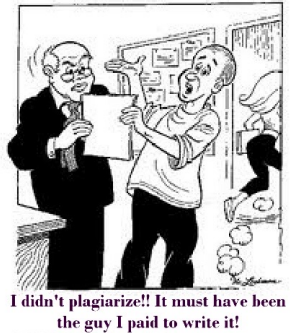
Examples of inappropriate conduct:

- groupwork on assignments/labs (discussion OK)
- allowing another student to copy your work
- getting your hacker cousin to code for you
- purchasing a solution to the assignment

Remember: You are only cheating yourself and chances are you will get caught!

Plagiarism

- Labs, assignments, exams must be entirely your own work
- You **can not** work on assignment as a pair (or group)
- Plagiarism will be checked for and penalized
- Plagiarism may result in suspension from UNSW
- Scholarship students may lose scholarship
- International students may lose visa
- Supplying your work to any another person may result in loss of all your marks for the lab/assignment
- If you store your code in online repositories DO NOT MAKE IT PUBLICLY ACCESSIBLE (THIS IS ASSUMED TO BE PLAGIARISM)



Assessment

- **Hands-on – 40%**
 - Labs 20%
 - Assignment 20%
 - Assignment released before Week 3, due in Week 9
 - Implement a networked application or protocol
 - We assume you are proficient in one of C/Java/Python (coding skills are must in most practical networking jobs!)
- **Concepts and theory – 60%**
 - Mid-term test (20%):
 - **Week 7**
 - Open-book online exam (**Inspera --- Take home and Non-invigilated**)
 - Final Exam (40%)
 - End of term
 - close-book online exam (**Inspera --- On campus and Invigilated**)
 - Hurdle – **must score at least 40% to pass the course**
 - **Inspera platform** <https://unsw.sharepoint.com/sites/Assessment-Platform-Pilot>

Assessment

NOTE: To pass the course, a student **MUST** receive at least **40% marks on the final exam**

```
lab = marks for lab exercises (20 marks)
assign = mark for the programming assignment (20 marks)
midTerm = mark for the mid-semester exam (20 marks)
scaledfinalExam = scaled mark for the final exam (out of
40 marks)
mark = lab + assign + midTerm + scaledfinalExam
Grade:
= HD|DN|CR|PS if mark >= 50 && scaledfinalExam >= 16
= FL          if mark < 50 || scaledfinalExam < 16
```

NOTE: If you cannot clear the final exam hurdle (after scaling), reported grade would be 'UF' with maximum marks reported as 40

How to do well in this course

- Keep up with and absorb all the content
 - Clear weekly tasks; do not accumulate
 - **This is an intense course requiring full attention**
- A critical/analytical viewpoint will help
- Solve all homework/practice problems
- Do the lab exercises *yourself*
- Do the assignment *yourself*
- Practice, practice, practice



Online/Hybrid Delivery

- We all need to work together
- Course Staff
 - Regular communication about upcoming deadlines (weekly notices)
 - Timely response to questions
 - Timely feedback on assessments
- Students
 - Take responsibility
 - Be aware of deadlines/deliverables and how to access resources
 - Links for lectures/labs/consults/exams
 - VLAB for labs and assignments
 - Check course notices regularly
 - Ask questions through the appropriate channels (online forum is preferred)
 - Participate in lectures and forum (community building)



What is this course about ?

- Introductory course in computer network
- Learn *principles* and *practice* of computer networking
- We use the **Internet** as a vehicle to understand the core concepts of networking

What is this course about ?

1. To learn how the Internet works
 - Internet is a complex global infrastructure
 - What are the organising principles behind the Internet?
 - What really happens when you “browse the Web”?
 - What are TCP/IP, DNS, HTTP, BGP, NAT, VPNs, 802.11,..... anyway?



What is this course about ?

1. To learn how the Internet works
 - Internet is a complex global infrastructure
 - What are the organising principles behind the Internet?
 - What really happens when you “browse the Web”?
 - What are TCP/IP, DNS, HTTP, BGP NAT, VPNs, 802.11,.... anyway?
2. To learn the fundamentals of computer networks
 - What issue you need to take into consideration to make a computer network work well?
 - What design strategies have proven valuable?
 - How do we evaluate network performance?

Where could I go from here?

- COMP 4336/9336: Mobile Data Networking
 - COMP6733: Internet of Things Design Studio
 - COMP 9334: System Capacity and Planning
 - COMP 3441/9441: Security Engineering
 - COMP 4337/9337: Securing Wireless Networks
 - COMP 9333: Advanced Computer Networks (Refreshed)
-
- Thesis/Coursework Projects
 - Research Degree (MPhil, PhD)

