COMP3331/9331
Computer Networks and Applications
2023 Term 2

1st Course on Computer Networks

Lecturer in Charge: **Mahbub Hassan**

Course Outline & Logistics

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Who cares about computer networking?

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

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: Mahbub Hassan
- Course Admin: Wei Song
- Tutors (tentative):
  - Wei Song
  - Ayda Valinezhad Orang
  - Gary (Jiawei) Hu
  - Isura Nirmal
  - Ravin Gunawardena
  - Jueming Jamin Chen
  - Wenyao Chen
  - Richard Li
  - Tim Arney (ED Questions)

Resources

Very important

- **https://webcms3.cse.unsw.edu.au/COMP3331/23T2/**

- Everything is posted on the course website
  - **Course Outline (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**

Me

- Professor of Computer Networking at UNSW

- PhD in Computer Networking (Monash Uni)

- 29 yrs teaching and research experience in Computer Networking

- Computer Networking books authored/co-authored:
  - Wireless and Mobile Networking, CRC Press, 2022
  - High Performance TCP/IP Networking, Prentice Hall, 2004
  - Engineering Internet Quality of Service, Artech House, 2002
  - Performance of TCP/IP over ATM Networks, Artech House, 2000

- Winner of Teaching Excellence Awards (Monash Uni and UNSW)

- More details available from personal website:
  - https://www.cse.unsw.edu.au/~mahbub/

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You

- Mix of UG (mostly 2nd/3rd year) and PG (mostly 1st year)
- 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

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
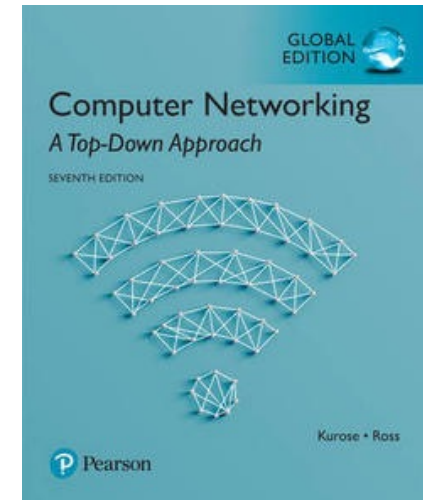
Course Aims

- 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 (9 weeks, 4-hr per week)

- 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 10:00 - 12:00 & Thursday 09:00 - 11:00

- Weeks 1-5 and 7-10 (2 x 2-hour lectures x 9 weeks)

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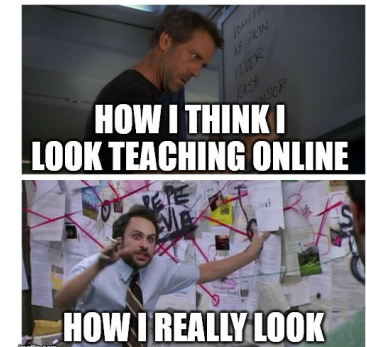
Quiz: The most useful superpower for a UNSW student would be:
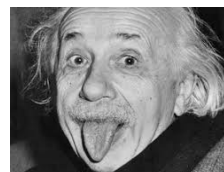

A

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)
- **Mix of in-person and online labs (as per your enrolment)**
    - **In-person labs: CSE labs, online: Teams/Zoom – meeting links will be posted on course webpage**
- 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:
    - 6 Lab Exercises (guided by tutors)
        - 5 best performing labs out of 6 will be used for assessment
        - Lab report to be submitted (no demos)
        - Highly encouraged to attempt lab tasks before attending labs
    - 2 Problem-based learning sessions (Tutorials in Week 5 & 10)
        - No marks

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
  - 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 onsultations for assignment help - C/Python/Java

- Tutors
  - Establish an agreeable mode of communicating with your tutor

Revisions based on myExperience Feedback

- Student feedback from Term 1 was generally positive

  - Rating was above both school and faculty averages

- No major changes

- Assignment

  - Clearer specs

  - More help 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)
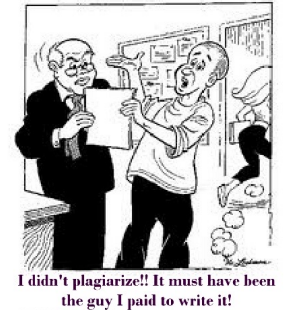
Assessment

- Hands-on – 40%
  - Labs 20%
  - Assignment 20%
    - Assignment released in 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**)
  - Final Exam (40%)
    - End of term
    - Open-book online exam (**Inspera**)
    - 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)

When Life Gives You Lemons, Make Lemonade

Unfortunately, life would also have to give you sugar for that. Enjoy your lemon juice.

PATIENCE YOU MUST HAVE

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, NAT, VPNs, 802.11,…. anyway?

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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)