Computer Networks and Applications

COMP 3331/COMP 9331
2022 T1

LIC: Salil Kanhere

Course Outline & Logistics

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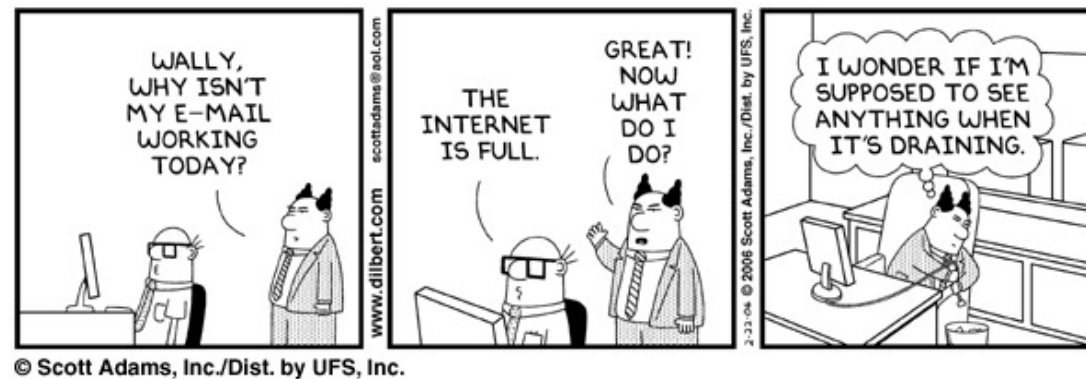
Today's Agenda

- 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: Salil Kanhere
- Course Admin: Ayda Valinezhad Orang
- Tutors:
  - Ali Dorri
  - Ayda Valinezhad Orang
  - Farhan Zain
  - Gary (Jiawei) Hu
  - Pooja Gupta
  - Ravin Gunawardena
  - Rui Li
  - Tim Arney
  - Wei Song

Resources

- https://webcms3.cse.unsw.edu.au/COMP3331/22T1/

- 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**

Very important

Me

- Research
  - Internet of Things, Cyber Physical Systems, Pervasive Computing, Cybersecurity, Blockchain, Machine Learning
- Teaching
  - UG: COMP{1911, 1917, 1921, 1521, 3331, 6733}
  - PG: COMP{9331, 9332, 9333, 9337}
- Admin
  - Postgraduate Research Coordinator
- Life:
  - Science/Technology, Metal/Rock, Travel, Movies, Lifting heavy things, …

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 and algorithms and 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

- *Computer Networking: A Top Down Approach*, Jim Kurose, Keith Ross, Addison-Wesley (Pearson), 7th Edition, 2016
  - 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
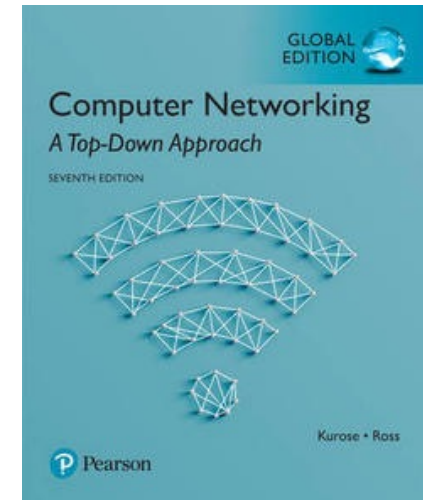
Course Aims

- To gain in-depth introduction to a wide range of 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

- Online via Zoom Meetings

  - **Links to the two weekly meetings on the Lectures Page**

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

- Recordings

  - Youtube and Echo 360 Playlists (linked to the Lectures Page)

- We will focus on most important concepts and supplement with

  - Problem solving exercises

  - Discussions

  - News

- Certain material will be left for self study

  - These will be indicated on the lecture notes

- We will use Poll Everywhere quizzes a few times every lecture

  - For you to reinforce concepts

  - For me to get an indication of your understanding
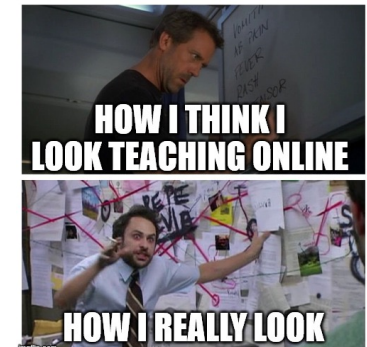
Quiz: The most useful superpower for a UNSW student would be:

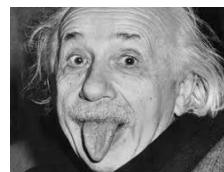| A	B	C	D
Invisibility	Flight	Telepathy	Time Travel

E: Some other power??

Type in your browser: **pollev.com/salil**

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
    - Serves as preparation for exams

Online Labs: VLAB
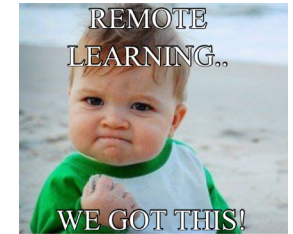
- Access CSE lab environment on your own machine remotely

- Uses VNC

- Recommended client: TigerVNC (https://tigervnc.org)

- Details: https://taggi.cse.unsw.edu.au/FAQ/VLAB_-_The_technical_details/

- UNSW VPN: https://www.myit.unsw.edu.au/services/students/remote-access-vpn

- China Students Access Network: https://www.myit.unsw.edu.au/services/students/china-students-access-network

- You will need to know basic command line Linux commands: http://www.unixguide.net/linux/linuxshortcuts.shtml

Getting help

- Use online discussion forums (Ed Discussions)
  - Join via - https://edstem.org/au/join/kABavC
  - Fellow students benefit from your questions
  - Fellow students can answer your questions
  - Develop a community
  - WebCMS forum is disabled

- 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
  - Distinct consultations for assignment help - C/Python/Java

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

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Revisions based on myExperience Feedback

- ## More support for programming
  - ### Planning on some videos/support sessions

- ## Forum Responses too short
  - ### Will try to be a little more elaborate but do appreciate that we are dealing with a LOT of questions in peak times

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
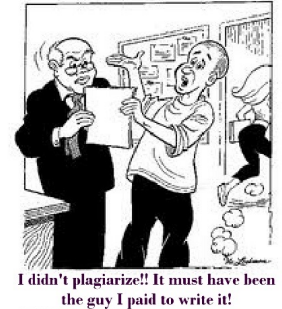
Plagiarism

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 4, due in Week 10
    - Implement a networked application or protocol
    - We assume you are proficient in one of C/Java/Python
- Concepts and theory – 60%
  - Mid-term test (20%):
    - **Monday, 28th March 2022, 11:00 – 13:00 (Week 7)**
    - Open-book online exam
  - Final Exam (40%)
    - End of term
    - Open-book online exam
    - Hurdle – **must score at least 40% to pass the course**
  - Inspera platform, accessible through Moodle -
    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

- 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, 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 do I go from here?

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