

Computer Networks and Applications

COMP 3331/COMP 9331

<https://moodle.telt.unsw.edu.au/course/view.php?id=31236>

Lecturer in Charge: Prof. Mahbub Hassan

<http://www.cse.unsw.edu.au/~mahbub>

Course Outline

How is **computer networking** impacting our economy?

| | 2017 Revenue |
|----------|---------------------|
| Google | 109 Billion Dollars |
| Cisco | 48 Billion Dollars |
| Facebook | 40 Billion Dollars |

Today's Agenda

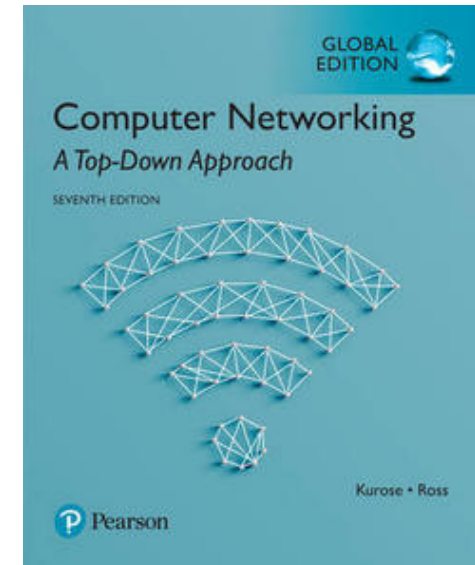
- Course management
- What is this course about?
- Introduction to Computer Networks and the Internet (Chapter 1)

Moodle Portal

- <https://moodle.telt.unsw.edu.au/course/view.php?id=31236>
- Everything is posted on Moodle
 - **Course Outline (PLEASE READ THIS THOROUGHLY)** **Very important**
 - Lecture Notes
 - Lab Schedules, Allocations and Locations
 - Assignments and Lab Exercises
 - Homework Problems
 - Consultation Hours
 - **Announcements**: Your responsibility to check the ‘Announcement Forum’ on regular basis for important updates/changes to schedule, etc.
 - Nothing will be handed out in class

Course Material

- *Computer Networking: A Top Down Approach*
7th Edition, Jim Kurose, Keith Ross, 6th Edition, Pearson, 2012.
- Lecture Notes (on website)
- 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
 - *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 network protocols.
- To gain skills in network programming (client server, socket 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 (12 weeks, 3-hr per week)
 - Fundamental concepts and theories of computer networking
 - No lecture in Week 4, but will use Week 13 instead
- Labs (7 of them)
 - Hands-on learning (network performance analysis, protocol analysis, network programming)
- Assignment (only one, but individual, due Week 12)
 - Network programming and protocol design (C/Java/Python)
- Weekly Homework (Self-assessed)
 - Problem solving skills
- Weekly Moodle Quiz (may not be all weeks)

Lectures

- Go beyond the text book
 - Latest in R&D
 - Advanced concepts -links will be provided
- Down side (is it ??)
 - Certain material will be left for self-study
 - These will be indicated on the lecture notes, related text sections will be pointed to you

Note: Self-study and additional material (as indicated by LIC) is all examinable

- Please **ask questions** if needed

Labs

Tell me and I forget

Show me and I remember

Involve me and I understand

- Chinese Proverb



- 2 hour lab sessions **starting Week 2**
- Hands-on experiments related to concepts that you learn in lectures
- Wireshark packet sniffer, ns-2 network simulator, other network measurement tools
- Lab sessions:
 - Total of 7 labs, each 2-hour
 - Highly encouraged to attempt them before attending labs
 - Demonstrate select tasks to lab instructors: 4 marks
 - 5 best performing labs out of 7 will be used for assessment (5x4 = 20 marks for labs)
- 2 Problem-based learning sessions

Assessment

- **Hands-on – 40%**
 - Labs (20%)
 - 5 best performing labs out of 7 (each lab has 4 marks)
 - Assignment (20%)
 - A single individual, due Week 12
 - Implement a networking software (C/Java/Python)
- **Concepts and theory - 60%**
 - Mid-session Test (20%)
 - Closed-book MCQ (negative marking enforced to deter random attempts), Week 7
 - Final Exam (40%)
 - Closed-book written exam, End of semester
 - *Hurdle component – must obtain at least 40% to clear hurdle*

Overall and Final Grade

- If you cannot clear the final exam hurdle, the maximum mark reported will be 40/100
- To pass the course, must obtain
 - At least 40% in the final exam, and
 - At least 50% overall (labs+mid-session test+assignment+final exam)

Supplementary Exams

- **No supplementary for labs and mid-session test**
 - You can miss up to 2 labs without major problem (best 5 out of 7 are used for assessment)
 - If you miss mid-session, you may be able to use final exam at a higher percentage to make up for this, but is subject to special consideration application with evidence and LIC's assessment and decision
- Supplementary for final exam only accepted is students could not attend the final exam due to misfortune (must submit evidence and subject to LIC's assessment and decision); it's not a second chance!!

Getting help



- Use **Moodle forums** for labs, assignment, and other matters (please avoid emailing LiC/admin as much as possible; you may be redirected to use Moodle Forum if you email)
- **Consultation** hours
 - LiC for lecture-related help – 2 hours each week
 - Lab consultation hours for lab and programming related help

Accounts for accessing lab machines

- Use your zid/zpass to log into CSE computers
- New to UNSW - <https://it.unsw.edu.au/students/zpass/index.html>
- You will be automatically added as a student to the course website. Log on using zid/zpass

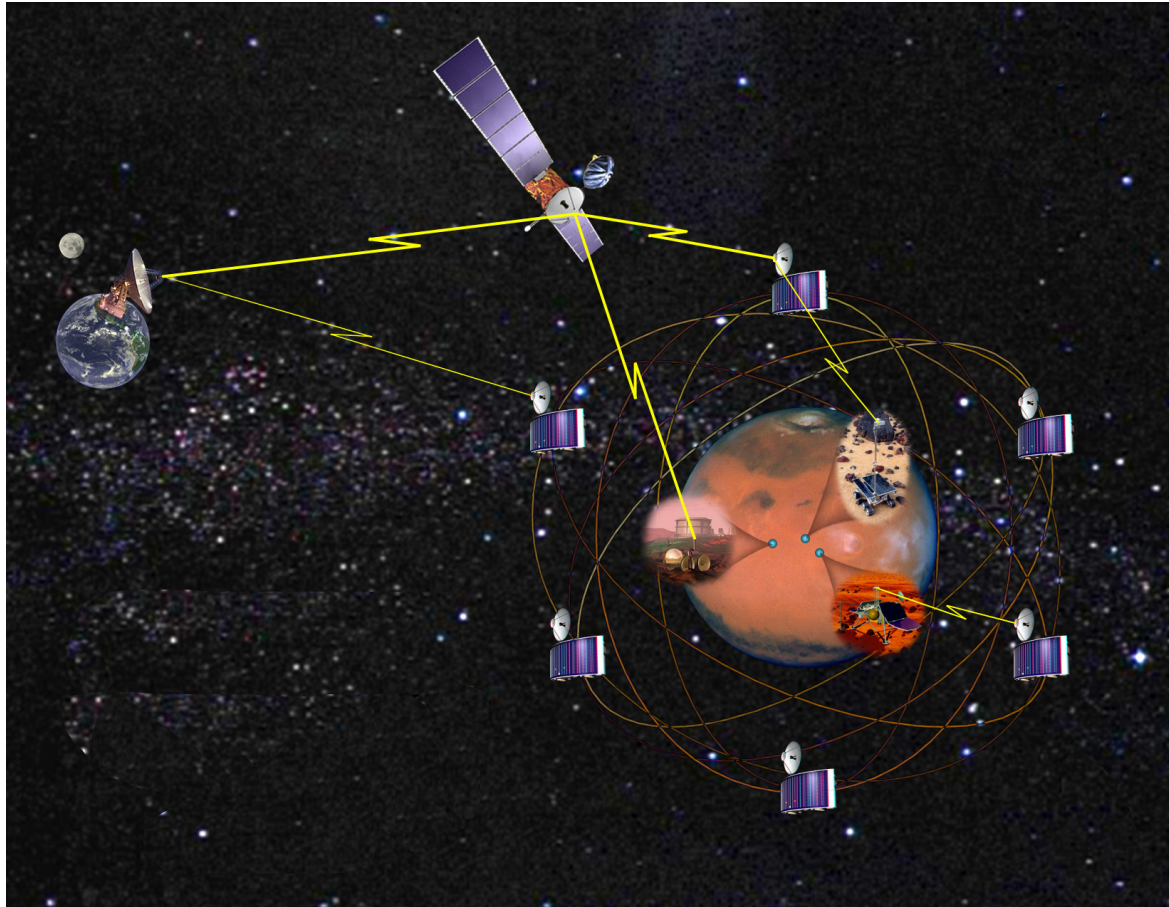
What is this course about ?

- **Introductory** (first) course in computer networks
 - learn **principles** of computer networking
 - learn **practice** of computer networking
 - Internet architecture/protocols as case-study

Principles of computer networking

- Internet is a complex global infrastructure
 - What are the organising principles behind the Internet?
 - Layering
 - Hierarchy
 - ...
- What issues you need to take into consideration to make a computer network works well?
- Why principles are important?
 - Help you to design new types of networks

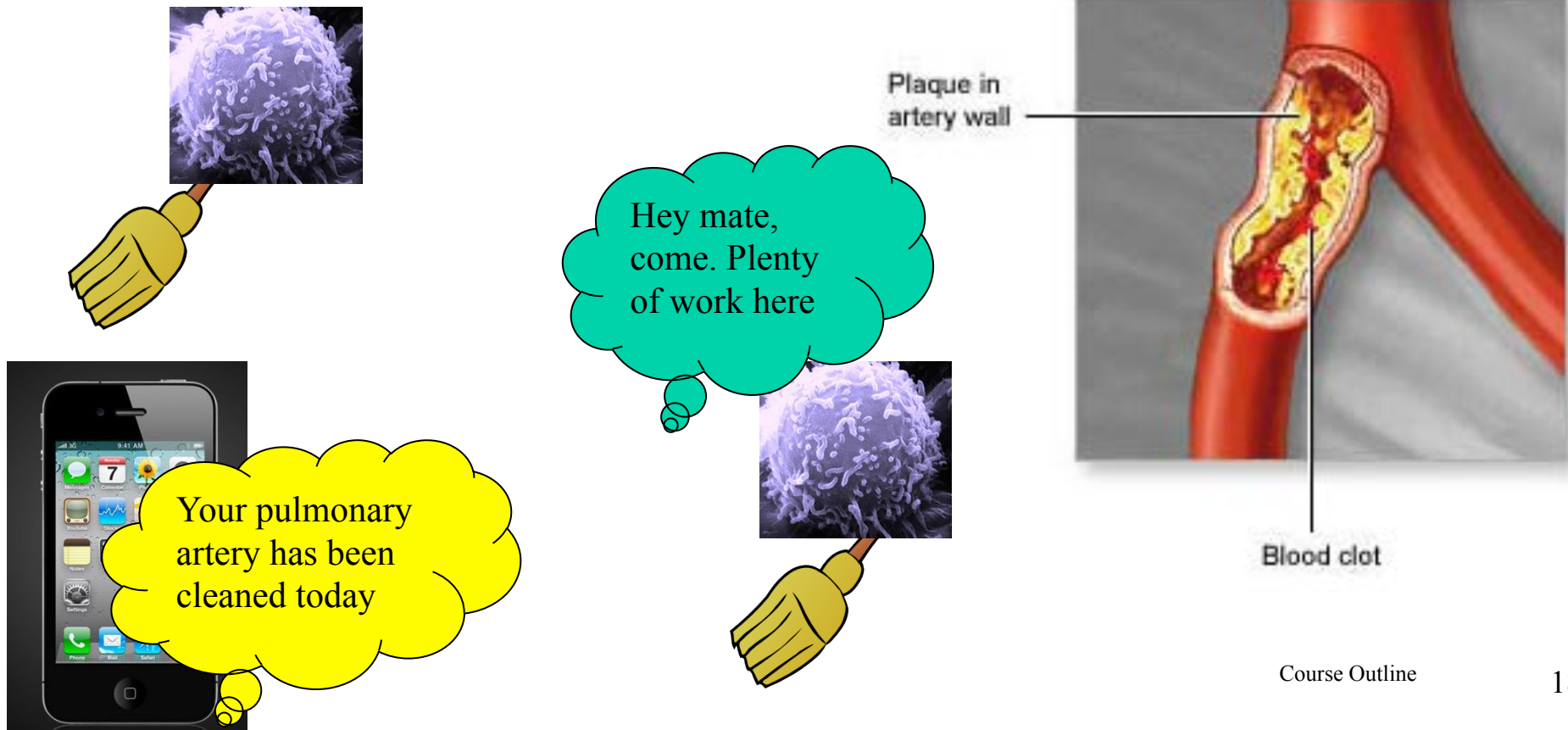
Interplanetary internet



<http://images.spaceref.com/news/02.28.00.marsnetwork.jpg>

Nano-scale computer networks

- 1 nm = 10^{-9} m = 1/25000 diameter of a human hair
- Network of nanorobots to sweep coronary plaque



Practice of computer networking

- How do you enable two pieces of software to communicate with each other?
- New apps!

Pre-requisite Knowledge



- Good understanding of algorithms, data structures and basic probability
- Proficient in programming: C/Java/Python

Where do I go from here?

- COMP 9332: Network Routing and Switching
- COMP 9333: Advanced Computer Networks
- COMP 9334: System Capacity and Planning
- COMP 4335/9335: Wireless Mesh and Sensor Networks
- COMP 4336/9336: Mobile Data Networking
- COMP 9337: Network Security
- COMP6733: Internet of Things
- Thesis projects
- Masters/PhD