Computer Networks and Applications

COMP 3331/COMP 9331

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Course Outline & Logistics

Today's Agenda

- Course (non-technical) details

- Logistics: How we will roll

- What is this course about?

- Introduction to Computer Networks (Chapter 1)

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WebCMS Portal

- https://webcms3.cse.unsw.edu.au/COMP3331/18s2/
- Everything is posted on the course website
  - **Course Outline (PLEASE READ THIS THOROUGHLY)**
  - Lecture Notes
  - Video Recordings
  - Lab Schedules, Allocations and Lecture
  - Assignment and Lab Exercises
  - Homework Problems
  - Consultation hours
  - Announcement: Your responsibility to check the announcement forum on regular basis for important updates/changes to schedule, etc.
  - Nothing will be handed out in the class
  - **Your active participation and interaction is crucial to ensure that all of us get the most out of this course**

Very important

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Course Material

- *Computer Networking: A Top Down Approach*, Jim Kurose, Keith Ross, Addison-Wesley(Pearson), 7th Edition, 2016 (6th Edition will suffice for most of the part).

- 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
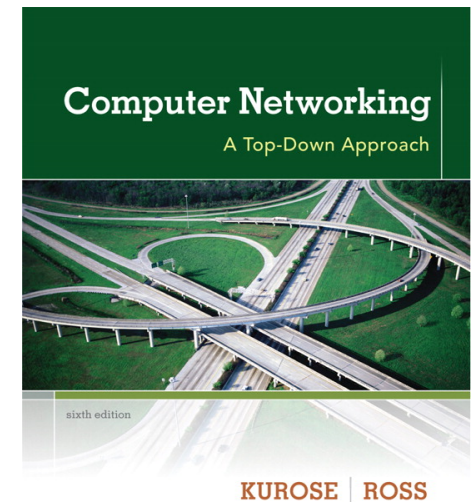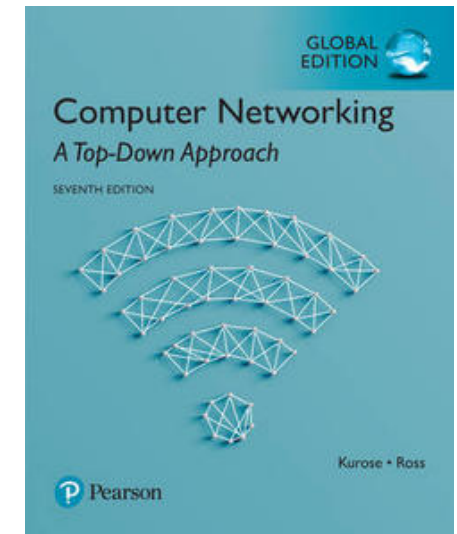
Course Aims

- 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
  - You will gain problem solving skills

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Teaching/Learning Strategies

- Lectures (12 weeks, 3-hr per week)

- Labs (7 of them)
  - Hands-on learning

- Assignments (both individual, due Week 12)
  - Basic network programming and protocol design
  - C or Java or Python

- Weekly Homework (Self-assessed)
  - Problem solving skills

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Lectures

- Lectures (12 weeks, 3-hr per week)

- We will focus on most important concepts and supplement with

  - Problem solving exercises

  - Discussions

  - Additional material

- Certain material will be left for self study

  - These will be indicated on the lecture notes

Labs

- 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
- 9 lab sessions:
  - 7 Lab Exercises:
    - Some are *submission* only, other requires *demonstration*
    - 5 best performing labs out of 7 will be used for assessment
    - Lab Report to be submitted at midnight on the day of your lab
    - Highly encouraged to attempt lab tasks before attending labs
    - Demonstrate select labs to the tutors
  - 2 Tutorials (Week 5 & 12)
    - Help with problem solving
    - Prep for exams
- Strongly encouraged to work in pairs (but individual submissions only)

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Assessment

- Hands-on – 40%
  - Labs 20%
  - Assignment 20%
    - Single assignment due in 12th Week
    - Implement a networking software (C/Java/Python)
- Concepts and theory – 60%
  - Mid-session test (20%)
    - In Week 6 (includes material from Week 1 to Week 5)
    - Closed-book MCQ
    - Negative marking enforced to deter random attempts
  - Final Exam (40%)
    - Closed-book written exam, End of semester
    - Critical thinking and problem solving questions
    - Hurdle component – must obtain at least 40% to clear

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Assessment

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

lab = marks for lab exercises (scaled to 20)

assign = mark for the programming assignment (scaled to 20)

midExam = mark for the mid-semester exam (scaled to 20 marks)

finalExam = mark for the final exam (out of 40 marks)

mark = lab + assign + midExam + finalExam

grade = HD|DN|CR|PS if mark >= 50 && finalExam >= 16

= FL   if mark < 50 || finalExam < 16

NOTE: If you cannot clear the final exam hurdle, the maximum marks
reported will be 40/100

Getting help

- Use discussion forum for labs, assignment, and other matters at WebCMS
  - Fellow students benefit from your questions
  - Fellow students can answer your questions

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  - Develop a community

- Please avoid emailing as much as possible; you
  https://powcoder.com
  may be directed to use forum if you email

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- 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

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- You will be automatically added as a student to the course website. Log on using zid/zpass

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Be original !!

- ## Collaboration

  - You may discuss approaches, not solutions

  - You must submit your own work

  - We strongly support discussions

- ## Plagiarism

  - Zero tolerance, don't do it

https://my.unsw.edu.au/student/academiclife/Plagiarism.pdf
https://student.unsw.edu.au/plagiarism

What is this course about ?

- Introductory (first course) 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

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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?

Why learn the fundamentals?

- Applicable to all computer networks

- Help you design new types of networks

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- Change/reinvention

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  - Today's Internet is different from yesterday's

  - And tomorrow's will be different again

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  - But the fundamentals remain the same

Pictures: http://medicineworld.org/, Wikipedia

Nano-scale computer networks?

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

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Pre-requisites

- Good understanding of algorithms, data structures and basic probability

- Proficient in programming: C, Java or Python

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Where do I go from here?

- COMP 9332: Network Routing and Switching

- COMP 9333: Advanced Computer Networks

- COMP 9334: System Capacity and Planning

- COMP 3441/9441: Security Engineering

- COMP 4335/9335: Wireless Mesh and Sensor Networks

- COMP 4336/9336: Mobile Data Networking

- COMP 4337/9337: Securing Wireless Networks

- COMP6733: Internet of Things

- Thesis Projects

- Research (Master's, PhD)