UoS Outline

ELEC3506/9506 Communication Networks (2024)

Dr. Wibowo Hardjawana

School of Electrical and Information Engineering

The University of Sydney

Acknowledgement of Country

- I would like to acknowledge and pay respect to the traditional owners of the land on which we meet; the Gadigal people of the Eora Nation. It is upon their ancestral lands that the University of Sydney is built.
- As we share our own knowledge, teaching, learning and research practices within this university may we also pay respect to the knowledge embedded forever within the Aboriginal Custodianship of Country.

UoS Outline

- Course materials (Lecture Notes, Tutorial/Lab Notes) for ELEC3506 available via Canvas

  https://canvas.sydney.edu.au/

  look for ELEC3506/9506
- Please check this website regularly!

- Core unit of study for Computer, Software, and Telecommunications Engineering
- Recommended elective unit of study for Electrical Engineering

Assumed Knowledge

- Assumed Knowledge (Not Compulsory):
- **SOFT2004** Software Development Methods 1
- **COMP2004** Programming Practice
- **SOFT2130** Software Construction
- Prohibition

–Previous instances of this course: **ELEC4501** Data Communication Networks, **ELEC3504** Data Communications and the Internet, **ELEC4501** Data Communication Networks

- **NETS2150** Fundamentals of Networking or equivalents: **NETS2009** Network Organisation, **NETS2909** Network Organisation (Adv), **NETS3007** Network Protocols, **NETS3907** Network Protocols (Advanced)

Lecturer

Dr. Wibowo Hardjawana

Room 219, Bldg. J13

School of Electrical and Information Engineering

Email: wibowo.hardjawana@sydney.edu.au

Consultation hours: by appointment

Tutors and Lab Demonstrators

Tutorials:

- Dr. Shuvashi Saha shuvashis.saha@sydney.edu.au

Labs:

- Dr. Thomas Huang thomas.huang@sydney.edu.au (Lab Co-ordinator)
- Mr. Dawei Tan dawei.tan@sydney.edu.au (Lab Co-ordinator)
- Mr. Milad Elisha milad.elisha@sydney.edu.au

Responsibilities

- Helping students understand concepts
- Answering specific questions about lectures and tutorials
- Helping students in performing lab experiments
- Tutorial/lab instructing

Timetable

- **2-hour Lecture per week (in-person)**

  Wed 14:00-16:00 [weeks: 1 to 13] in-person

- **2-hour Lab or Tutorial per week (in-person)**

Labs:

Mon 09:00-11:00 [weeks: 1 to 13] in Electrical Engineering Room 430

Tue 12:00-14:00 [weeks: 1 to 13] in Electrical Engineering Room 430

Thu 09:00-11:00 [weeks: 1 to 13] in Electrical Engineering Room 430

Tutorials:

Fri 09:00-11:00 [weeks: 1 to 13] in ABS Lecture Theatre 1040

- **About 5-hour independent study**

- Note 1: Each student attends a lab or a tutorial on each week not both; refer to the Lab/Tutorial schedule
- Note 2: Tutorials start on week 2. There are 4 Labs in this unit. Labs starts from Week 5.
- Note 3: **No labs and tutorials on Weeks 10**
- Note 4: Weeks 2–4, everybody attends tutorial (no alternation). **Please come to your allocated session.**
- Note 5:Your lab/tutorial day is allocated by the student center and is shown on your personal timetable. **Please do not ask for change of day.**

Assessment

- Lab Reports (32%) – maximum 7 pages report

  (4 labs * 8 marks each = 32 Marks)

- Quizzes (20%)
  - 30 minutes and worth 10% each
  - Quiz 1 is on Week 6, available from 4-6 September 24
  - Quiz 2 is on Week 10, available from ~~9-11~~11-13 Oct 24
  - Will be in Canvas and online
  - Only allow 1 attempt to complete these quizzes
- Final Exam (48%)
  - 2 hour Essay-type Exam
  - In-person

Assessment Condition (Important!!!)

- **No late submissions are allowed for Quizzes.**
- **Any Lab Reports submitted after 11:59pm on the due date set in Canvas will be penalised by 5% of the maximum awardable mark for each calendar day after the due date.**
- **If the Lab Reports are submitted more than ten calendar days late, a zero mark will be awarded.**
- **Compliance with Academic Integrity https://www.sydney.edu.au/students/academic-integrity.html**

Textbooks

- Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, 6th ed., 2022

- J. F. Kurose and K. W. Ross, Computer Networking: A Top-Down Approach, 8th ed., 2022 (and also 6th edition, 2013)

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Outline

- Background and Preview: An Introduction to Internet (Week 1)
- Physical layer (Week 2)
- Data link layer (Week 3)
- Local area networks (LAN) (Week 4)
- Network layer, Data Transfer [IPv4 Networks] (Week 5,6)
- Network layer, Routing Protocols [routing and IPv6] (Week 6,7)
- Transport layer [TCP and UDP] (Week 8)
- Application layer (Week 9)
- Wide Area Networks (WAN) (Week 10)
- QoS (Week 11)
- Wireless Networks (Week 12)
- Mobile IP and Network Security (Week 13)

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Syllabus

- Communication reference models (TCP/IP, and OSI). Circuit-switched and packet-switched networks.
- Network node functions and building blocks. LAN, WLAN, WAN, ad hoc networks, and heterogeneous interworking technologies.
- Fundamental IEEE and IETF network standards, routing, protocols, and underlying mechanisms.
- Wireless networks
- TCP/IP protocol stack (IP, ICMP, DHCP, ARP, TCP, UDP etc.).
- Applications and protocols (FTP, Telnet, SMTP, HTTP etc.).

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Outcomes

- Understand the legal and social framework of communication networks
- Understand and appreciate key aspects of network design, protocols and hardware technologies,
- Understand and apply techniques to solve real problems in network and protocol design and implementation
- Familiar with major technical organizations, standardization bodies and standards in the area

Lecture Notes

- Materials for this unit of study are taken from several textbooks and are organized so that they provide a complete introductory course on data communications and networking.
- A set of slides used by the lecturer will be provided to you. My talk during lectures may have more information than those you find on the slides.
- It is always a good idea to add your personal comments to the lecture notes during lecture sessions.
- You may read other references provided in this note if you feel that you understand their method better. Students should find their most appropriate way and text in learning the topics discussed in this unit.

Labs

- Exact title and description of lab experiments will be on Canvas.
- Lab attendance is compulsory and will be marked
- If labs are done in a group, one group Lab report must be submitted by students for each lab.
- Students can do the lab individually if they wish to
- Lab reports will be marked and need to be concise
- Lab reports must be submitted with a cover page indicating the percentage contribution for each group member.
- Four lab reports must be submitted
- **Max 7 pages report + cover are imposed to ensure report quality**
- **Project cover states each student's contribution in percentage**
- More info will be released later

Tutorials

- Materials in tutorials **are assessable**. Lectures and tutorials are complementing one another. Don't miss either of them.
- You will have a set of questions for each tutorial session. It is recommended that you try to solve those questions before going to the tutorial session. Tutorial sessions **are not assessable**.
- The tutor will go through all questions and give you the answers. If you just come to the session without any preparation, it won't be useful at all.
- Tutorial solutions will be provided to you after the tutorial

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How to be successful in this course?

- Regularly attend the lectures, labs, and tutorials
- Try to answer tutorial questions by yourself
- Lectures give you fundamental theories; to pass this unit you need to improve your problem-solving skill by
  - Attempting as many problems and questions as you can (from your text and other resources including informative and practice quizzes)
  - Trying to connect the theory and the mathematics required to solve problems
- Data networking may look an easy course because of the common usage of the Internet in everyday life. Don’t underestimate its complexity!

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Weekly Schedule

Week	Lectures	Tutorials	Labs
1	Background and Preview		
2	Physical Layer	T1 - All	
3	Data Link Layer	T2 - All	
4	MAC Protocols and Wired LAN Standards	T3 - All	
5	Network Layer – Data Transfer	T4 - Odd SIDs	L1 – Even SIDs
6	Network Layer – Routing Protocols	T4 – Even SIDs	L1- Odd SIDs
7	Network Layer - Continues	T5 - Odd SIDs	L2 – Even SIDs
8	Transport Layer	T5 – Even SIDs	L2- Odd SIDs
9	Application Layer	T6 - Odd SIDs	L3 – Even SIDs
10	WAN Technologies		
11	QoS in IP Networks	T6 – Even SIDs	L3- Odd SIDs
12	Wireless Networks	T7 - Odd SIDs	L4 – Even SIDs
13	Mobile IP and Network Security	T7 – Even SIDs	L4- Odd SIDs

Lab/Tutorial Groups

No Labs and Tutorials on Week 10

Will be announced by your Tutor.