

# UoS Outline

## ELEC3506/9506 Communication Networks (2025)

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

# Lecturer

Dr. Wibowo Hardjawana

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School of Electrical and Information Engineering

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Consultation hours: by appointment

# Tutors and Lab Demonstrators

## ***Tutorials:***

- Mr. Hao Chang [hao.chang@sydney.edu.au](mailto:hao.chang@sydney.edu.au)

## ***Labs:***

- Dr. Thomas Huang [thomas.huang@sydney.edu.au](mailto:thomas.huang@sydney.edu.au) (Lab Co-ordinator)
- Mr. Dawei Tan [dawei.tan@sydney.edu.au](mailto:dawei.tan@sydney.edu.au) (Lab Co-ordinator)
- Dr. Bellal Hossain [md.bellal.hossain@sydney.edu.au](mailto:md.bellal.hossain@sydney.edu.au)
- Mr. Mingcheng Nie [mingcheng.nie@sydney.edu.au](mailto:mingcheng.nie@sydney.edu.au)
- Mr. Ishara Kosgolle Gedara [ikos0266@sydney.edu.au](mailto:ikos0266@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 at H70.01.1130*

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

*Labs: Mon 09:00-11:00 [weeks: 5 to 13] in J15.02.210*

*Mon 11:00-13:00 [weeks: 5 to 13] in J15.02.210*

*Tue 12:00-14:00 [weeks: 5 to 13] in J15.02.210*

*Tue 14:00-16:00 [weeks: 5 to 13] in J15.02.210*

*Thu 09:00-11:00 [weeks: 5 to 13] in J15.02.210*

*Tutorials: Fri 09:00-11:00 [weeks: 2 to 13] in J05.02.203*

*Fri 11:00-13:00 [weeks: 2 to 13] in J05.02.203*

*Fri 13:00-15:00 [weeks: 2 to 13] in J05.02.203*

**Note 1:** Tutorials start in week 2. There are 4 Labs in this unit. Labs start from Week 5

**Note 2:** Weeks 2–4, everybody attends the tutorial.

**Note 3:** Each student attends a lab or a tutorial each week, BUT NOT BOTH from Week 5 onwards (alternate).

**Note 4:** If you are allocated a lab session for the week in your personal timetable, do NOT attend the tutorial for that week.

# 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 12-14 September 25
  - Quiz 2 is on Week 10, available from 17-19 October 25
  - Canvas: MCQs requiring calculation and concept understanding
  - Only allow 1 attempt to complete these quizzes
- Final Exam (48%)
  - 2 hour Essay-type Exam
  - Essay-type: Analytical questions on topics with answers requiring calculation and/or short explanations
  - 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.
- You have a choice to either work on the lab individually or work in a group (group members MUST belong to the same lab sessions)
- 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, 6<sup>th</sup> ed., 2022
- J. F. Kurose and K. W. Ross, Computer Networking: A Top-Down Approach, 8<sup>th</sup> ed., 2022 (and also 6<sup>th</sup> edition, 2013)

# 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 and Network Security(Week 12)
- Guest Lectures from Telstra (Week 13)

# Quizzes 1 and 2 Canvas Details

- 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 and Network Security (Week 12)
- Guest Lecture from Telstra (in-person and not recorded) (Week 13)

# 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.).

# 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 (including but not limited to live class exercise discussion and answers) than what 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**. **Expectations are for the group to work together during their respective session.**
- 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 **and the course enrolled (e.g. Mr. XXXXX, 30%, ELEC3506 and Mr. YYYYY, 70%, ELEC3506)**
- **Four** lab reports must be submitted
- **Max 7 pages report + cover are imposed to ensure report quality**

# Tutorials

- Materials in tutorials **are assessable**. Lectures and tutorials complement 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 in-person**.
- 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



# How to be successful in this course?

- Regularly attend the lectures, labs, and tutorials
- Lectures give you fundamental theories; to pass this unit, you need to improve your problem-solving skills by
  - Participate in the knowledge test during lectures
  - Own reading or review time
  - Try to answer tutorial questions and lecture examples by yourself
  - Try to explain the concepts discussed in the lectures yourself
  - Trying to connect the theory and the mathematics required to solve problems
- Data networking may look like an easy course because of the common usage of the Internet in everyday life. Don't underestimate its complexity!

# 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	T3 - All	
5	Network Layer – Data Transfer	T4 – Timetable if no Lab	L1 –Timetable
6	Network Layer – Routing Protocols	T4 – As above	L1- As above
7	Network Layer - Continues	T5 - As above	L2 – As above
8	Transport Layer	T5 – As above	L2- As above
9	Application Layer		
10	WAN Technologies	T6 – As above	L3 – As above
11	QoS in IP Networks	T6 – As above	L3- As above
12	Wireless Networks and Network Security	T7 - As above	L4 – As above
13	Guest Lectures from Telstra	T7 – As above	L4- As above