UNSW Course Outline

ZEIT8213 Communications and Information Systems - 2024

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General Course Information

Course Code : ZEIT8213
Year : 2024
Term : Semester 1
Teaching Period : Z1
Is a multi-term course? : No
Faculty : UNSW Canberra
Academic Unit : School of Engineering and Technology
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : UNSW Canberra at ADFA
Campus : UNSW Canberra
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Communications and Information Systems is a 6UOC course that introduces essential principles of data communication and computer networks. The data communication part focuses on the fundamentals of communication providing basic definitions. This part also introduces the

Physical and Data-link layers of the network stack, specifically addressing the representation/ encoding of transmitted information, hardware addresses, as well as media access control and reliable communication at the data-link layer.

The computer network part delves into the Network and Transport layers of the network stack, forming the foundation of modern communication networks, including the Internet. The discussion covers package routing at the Network layer, reliable communication at the Transport layers, and potential attacks. Finally, the Application layer, the top layer of the network stack, is introduced, with HTTP presented as an example of the Application layer protocol. The course is accompanied by practical exercises aimed at acquiring the basics of using computers to solve problems.

This practical component seeks to bridge the gap between the theory covered in lectures and the practical skills needed to solve real-world problems. Furthermore, the programming skills acquired during the course provide the means to expand beyond the covered material.

Course Aims

The goal of this course is to provide students with an opportunity to develop an understanding of the design and use of modern telecommunication in order to reliably and securely communicate between information systems. The course allows the students to assess any current or future communication system via understanding the underlying technologies and constituent elements of the communication protocols that forms the foundation of the Internet and other networks.

Relationship to Other Courses

No prior knowledge of telecommunication or programming is needed, however having basic knowledge of algebra would be helpful.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Understand the fundamental principles of telecommunication and the hierarchical structure of modern telecommunication.
CLO2 : Understand how the Physical and Data Link layers ensure information is transmitted over various physical media e.g. how information is converted into transmittable signals whether it is a wired or wireless media.
CLO3 : Understand how data frames are delivered and what are the functional principles of network media access, traffic flow control, and error detection/correction at the bit-stream level.
CLO4 : Understand the functional principles of the Network Layer and the responsibilities of corresponding network-level protocols. Understand how network packets are delivered over wide area networks e.g. the internet.
CLO5 : Understand the functional principles of the Transport Layer, the purpose of unreliable or reliable delivery, how network packets are delivered to a specific application out tens or hundreds of applications running on a single communication device.
CLO6 : Acquire basics of cryptography and secure communication.
CLO7 : Acquire computer-based problem solving skills and practical experience implementing algorithms forming the foundation of modern communication.

Course Learning Outcomes	Assessment Item
CLO1 : Understand the fundamental principles of telecommunication and the hierarchical structure of modern telecommunication.	
CLO2 : Understand how the Physical and Data Link layers ensure information is transmitted over various physical media e.g. how information is converted into transmittable signals whether it is a wired or wireless media.	
CLO3 : Understand how data frames are delivered and what are the functional principles of network media access, traffic flow control, and error detection/correction at the bit-stream level.	
CLO4 : Understand the functional principles of the Network Layer and the responsibilities of corresponding network-level protocols. Understand how network packets are delivered over wide area networks e.g. the internet.	
CLO5 : Understand the functional principles of the Transport Layer, the purpose of unreliable or reliable delivery, how network packets are delivered to a specific application out tens or hundreds of applications running on a single communication device.	
CLO6 : Acquire basics of cryptography and secure communication.	
CLO7 : Acquire computer-based problem solving skills and practical experience implementing algorithms forming the foundation of modern communication.	

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Learning and Teaching in this course

The Learning Management System

Moodle is the Learning Management System used at UNSW Canberra. All courses have a Moodle site which will become available to students at least one week before the start of semester. Please find all help and documentation (including Blackboard Collaborate) at the Moodle Support page.

UNSW Moodle supports the following web browsers:

» Google Chrome 50+
» Safari 10+
** Internet Explorer is not recommended

** Addons and Toolbars can affect any browser's performance.

Operating systems recommended are:

Windows 7, 10, Mac OSX Sierra, iPad IOS10

For further details about system requirements click here.

Log in to Moodle here.

If you need further assistance with Moodle:

For enrolment and login issues please contact:
IT Service Centre
Email: itservicecentre@unsw.edu.au
Phone: (02) 9385-1333
International: +61 2 9385 1333

For all other Moodle issues please contact:
External TELT Support
Email: externalteltsupport@unsw.edu.au

Phone: (02) 9385-3331
International: +61 2 938 53331

Opening hours:
Monday – Friday 7:30am – 9:30 pm
Saturday & Sunday 8:30 am – 4:30pm

Other Professional Outcomes

The course consists of two interconnected modes of delivery. The first, is a series of presentations supported by a text that explain the fundamentals of communication between information systems. The second, is a series of labs that provides practical computing exercises in order to help students acquiring practical skills and a better understanding of the topics covered in lectures. Every lecture concludes with homework assignments in order to test lecture material retention and to allow students to reflect on and consolidate the course material. Students will confirm the major learning outcomes of this course through completion of the two in-class assessments/tests and ten assignments consisting of paper and pen problems as well as computing exercises. The first test covers the Physical and Data link layers of the network stack, and the second test focuses on the Network, Transport, and Application layers.

Additional Course Information

Referencing

In this course, students are required to reference following the APA 7 / Chicago NB referencing style. Information about referencing styles is available at: https://guides.lib.unsw.adfa.edu.au/c.php?g=472948&p=3246720

Study at UNSW Canberra

https://www.unsw.adfa.edu.au/study

Study at UNSW Canberra has lots of useful information regarding:

- Where to get help
- Administrative matters
- Getting your passwords set up
- How to log on to Moodle
- Accessing the Library and other areas.

Additional Information as required

CRICOS Provider no. 00098G

The University of New South Wales Canberra.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Homework Assignments Assessment Format: Individual	30%	Start Date: Not Applicable Due Date: The assignments are distributed on the weekly basis, at the end of each lecture and due to next lecture
Computing Assignments Assessment Format: Group	15%	Start Date: Not Applicable Due Date: students are expected to submit all solutions before next lab
Class Test 1 Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: Week 7: 22 April - 26 April
Class Test 2 Assessment Format: Individual	35%	Start Date: Not Applicable Due Date: Week 12: 27 May - 31 May

Assessment Details

Homework Assignments

Assessment Overview

Every lecture concludes with an assignment to consolidate the covered topics and test understanding of the covered topics.

Detailed Assessment Description

Title: Overall, 10 lecture-based homework assignments.

Assessment overview: Assignments are based on textbook exercises and lecture materials. Each problem in the assignment is weight according to its difficulty.

Weighting: Overall, all 10 lecture-based assignments weight 25% towards the final course mark.

Assessment group or individual: Individual assignment.

Mapping to the course learning outcomes: The assignments accompany each lecture to consolidate the lecture materials and test the knowledge retention. The learning outcomes 1 to 6, except the LO7, depend on completing the assignments.

Detailed assessment description: The topics for assignment are based on the topic covered in

each lecture. The topics for assignment are based on the covered material in a corresponding lecture.

Start date and due date: The assignments are distributed on the weekly basis, at the end of each lecture and due to next lecture. Late submissions will be considered on case-by-case basis depending on the students' circumstances.

Special consideration outcome: Case-by-case.

Submission notes

The assignments are submitted via Moodle

Computing Assignments

Assessment Overview

Group Computing assignments

Detailed Assessment Description

Title: Overall, 10 lab-based assignments.

Assessment overview: Assignments constitute the problems discussed and solved during the labs. The problems that are not solved during the lab time are left as homework assignments. Each problem in an assignment is weight according to its difficulty.

Weighting: Overall, all 10 lab-based assignments weight 15% towards the final course mark.

Assessment group or individual: Group assignment.

Mapping to the course learning outcomes: The assignments accompany each lecture to consolidate the lecture materials and test the knowledge retention. All learning outcomes depend on completing the assignments.

Detailed assessment description: The topics for assignment are based on the covered material in a corresponding lecture and lab. The topics are listed in the labs' weekly plan.

Start date and due date: The lab assignments that are being solved during the lab time are also considered as homework assignments and students are expected to submit all solutions before next lab. Late submissions will be considered on case-by-case basis depending on the students' circumstances.

Special consideration outcome: Case-by-case.

Class Test 1

Assessment Overview

Understanding of Physical and Data link layers of the network stack is assessed in this test.

Detailed Assessment Description

Title: Final exam

Assessment overview: This is an open book test. The test covers first half of the semester.

Weighting: The test weight 35% towards the final course mark.

Assessment group or individual: Individual

Mapping to the course learning outcomes: The test covers LO1, LO2, LO3.

Detailed assessment description: The problems are based on homework assignments and the topics covered in lectures.

Start date and due date: The test takes place during the 7th week.

Submission notes: In class.

Special consideration outcome: Case-by-case.

Submission notes

in class

Class Test 2

Assessment Overview

Understanding of Network, Transport and Applications layers of the network stack is assessed in this test.

Detailed Assessment Description

Title: Final exam

Assessment overview: This is an open book test. The test covers first half of the semester.

Weighting: The test weight 35% towards the final course mark.

Assessment group or individual: Individual

Mapping to the course learning outcomes: The test covers LO1, LO2, LO3, LO4, LO5, LO6.

Detailed assessment description: The problems are based on homework assignments and the topics covered in lectures.

Start date and due date: The test takes place during the 12th week.

Submission notes: In class.

Special consideration outcome: Case-by-case.

Submission notes

in class

Assignment submission Turnitin type

Not Applicable

General Assessment Information

The final grade is based on the total sum of midterm (20%), final example (35%) and homework assignemnts (30%) and computing exercises (15%). The feedback is provided based on the results of homework lecture-based and lab-based assignments by means of grades and worked solutions by the census date.

Late Submission of Assessment

Unless prior arrangement is made with the lecturer or a formal application for special consideration is submitted, a penalty of 5% of the total available mark for the assessment will apply for each day that an assessment item is late up to a maximum of 14 days after which an assessment can no longer be submitted and a grade of 0 will be applied.

Use of Generative AI in Assessments

In Lecture-based and Lab-based assignments Generative AI is permitted to be used to the extent of review topics covered in class and self-learning. Especially when assignments involve some planning or creative processes, you are permitted to use software to generate initial ideas.

However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work. It is a good idea to keep copies of the initial prompts, if there is any uncertainty about the originality of your work.

* Please note that the outputs from these tools are not always accurate, appropriate, nor properly referenced. You should ensure that you have moderated and critically evaluated the outputs from generative AI tools such as ChatGPT before submission.

Grading Basis

Standard

Requirements to pass course

To pass this course a minimum of 50% of the maximum score should be attained.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 26 February - 1 March	Lecture	• Lecturer self-introduction • Course introduction • Telecommunication and network stack • Communication channels • Binary digit and the smallest unit of information
	Laboratory	MATLAB GUI, variables, vectors (arrays), plotting
Week 2 : 4 March - 8 March	Lecture	• Type of networks • Analog and digital signals • Temporal and spectral signal representation
	Laboratory	Inline functions, random numbers and noise generation, time/frequency representation of periodic functions
Week 3 : 11 March - 15 March	Lecture	• Digital and analog communication • Analog to digital conversion • Digital to analog conversion
	Laboratory	Function, line encoding and pulse-code modulation, binary amplitude shift keying and binary frequency shift keying
Week 4 : 18 March - 22 March	Lecture	• Multiplexing • Shifting
	Laboratory	Branching (if, switch) and maps (dictionaries)
Week 5 : 25 March - 29 March	Lecture	• Errors, error detection and correction • Multiple access
	Laboratory	Parity bit error detection, Hamming codes for error correction*
Week 6 : 1 April - 5 April	Lecture	• Wired LANs: Ethernet • Wireless LANs • Wireless WANs
	Laboratory	Recursive functions, Dijkstra Shortest Path Routing, Throughput analysis*
Week 7 : 22 April - 26 April	Lecture	• Network layer: Internet Protocol • ARP, DHCP, NAT, ICMP • Routing
	Laboratory	Network tools: ping, arp, tcpdump, nat*
	Assessment	Class Test 1
Week 8 : 29 April - 3 May	Lecture	• Transport layer • Ports, Sockets • User Datagram Protocol (UDP) and unreliable communication
	Laboratory	tcpdump, chat implementation
Week 9 : 6 May - 10 May	Lecture	• The Transmission Control Protocol (TCP) • Reliable data transfer • TCP Attacks
	Laboratory	Implementation of RSA cryptosystem
Week 10 : 13 May - 17 May	Lecture	• Application layer • Basics of cryptography • Secure Socket Layer
	Laboratory	Web services
Week 12 : 27 May - 31 May	Assessment	Class Test 2

Attendance Requirements

Please note that lecture recordings are not available for this course. Students are strongly encouraged to attend all classes and contact the Course Authority to make alternative arrangements for classes missed.

Course Resources

Prescribed Resources

- Textbook: Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition
- Stormy Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving
- James Kurose, Keith Ross, Computer Networking: A Top-Down Approach, 2021

Course Evaluation and Development

One of the key priorities in the 2025 Strategy for UNSW is a drive for academic excellence in education. One of the ways of determining how well UNSW is progressing towards this goal is by listening to our own students. Students will be asked to complete the myExperience survey towards the end of this course.

Students can also provide feedback during the semester via: direct contact with the lecturer, the "On-going Student Feedback" link in Moodle, Student-Staff Liaison Committee meetings in schools, informal feedback conducted by staff, and focus groups. Student opinions really do make a difference. Refer to the Moodle site for this course to see how the feedback from previous students has contributed to the course development.

Important note: Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct Policy

https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Artem Lenskiy		302, Bld 16	+61405555553	TBA	No	Yes

Other Useful Information

Academic Information

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Important note: Students are reminded that any feedback provided should be constructive and professional and that they are bound by the Student Code of Conduct.

https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf

Equitable Learning Services (ELS)

Students living with neurodivergent, physical and/or mental health conditions or caring for someone with these conditions may be eligible for support through the Equitible Learning Services team. Equitable Learning Services is a free and confidential service that provides practical support to ensure your mental or physical health conditions do not adversely affect your studies.

Our team of dedicated **Equitable Learning Facilitators** (ELFs) are here to assist you through this process. We offer a number of services to make your education at UNSW easier and more equitable.

Further information about ELS for currently enrolled students can be found at: https://www.student.unsw.edu.au/equitable-learning

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. All students are expected to adhere to UNSW's Student Code of Conduct. Find relevant information at: Student Code of Conduct (unsw.edu.au)

Plagiarism undermines academic integrity and is not tolerated at UNSW. It is defined as using

the words or ideas of others and passing them off as your own, and can take many forms, from deliberate cheating to accidental copying from a source without acknowledgement.

For more information, please refer to the following:

https://student.unsw.edu.au/plagiarism

Submission of Assessment Tasks

Special Consideration

Special Consideration is the process for assessing and addressing the impact on students of short-term events, that are beyond the control of the student, and that affect performance in a specific assessment task or tasks.

Applications for Special Consideration will be accepted in the following circumstances only:

- Where academic work has been hampered to a substantial degree by illness or other cause;
- The circumstances are unexpected and beyond the student's control;
- The circumstances could not have reasonably been anticipated, avoided or guarded against by the student; and either:

(i) they occurred during a critical study period and was 3 consecutive days or more duration, or a total of 5 days within the critical study period; or

(ii) they prevented the ability to complete, attend or submit an assessment task for a specific date (e.g. final exam, in class test/quiz, in class presentation)

Applications for Special Consideration must be made as soon as practicable after the problem occurs and at the latest within three working days of the assessment or the period covered by the supporting documentation.

By sitting or submitting the assessment task the student is declaring that they are fit to do so and cannot later apply for Special Consideration (UNSW 'fit to sit or submit' requirement).

Sitting, accessing or submitting an assessment task on the scheduled assessment date, after applying for special consideration, renders the special consideration application void.

Find more information about special consideration at: https://www.student.unsw.edu.au/special/consideration/guide

Or apply for special consideration through your MyUNSW portal.

Late Submission of assessment tasks (other than examinations)

UNSW has a standard late submission penalty of:

- 5% per day,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Electronic submission of assessment

Except where the nature of an assessment task precludes its electronic submission, all assessments must be submitted to an electronic repository, approved by UNSW or the Faculty, for archiving and subsequent marking and analysis.

Release of final mark

All marks obtained for assessment items during the session are provisional. The final mark as published by the university following the assessment review group meeting is the only official mark.