UNSW Course Outline

TELE4651 Wireless Communication Technologies - 2024

Published on the 28 Aug 2024

General Course Information

Course Code : TELE4651
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Electrical Engineering & Telecommunications
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate, Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Wireless communication technologies define how to efficiently, reliably, and securely transmit and receive information via electromagnetic waves over the air without wires, cables, or any other electrical conductors. In this modern and digital era, wireless communications have

become an integral part of daily life for everyone, including GPS, Wi-Fi, digital TV, wireless payment, cellular mobile phones (4G and 5G), Internet of Things (IoT), and Bluetooth. It is growing to be more important in the digital society as it facilitates easy information sharing and allows freedom to roam around the globe.

TELE4651 is a 4th-year course in Telecommunication Engineering. It provides detailed knowledge of the fundamental concepts in wireless communications and in-depth discussions on several selected areas, namely, digital transmission and receiving techniques, antenna diversity techniques, wideband transmissions and receiving with software-defined radio (SDR) designs. It includes signal processing for wireless communications, modulation, demodulation, Nyquist pulse shapes, maximum likelihood detection, error performance, symbol synchronization and time recovery, frame synchronization, channel estimation, and equalization. Then it expands to time-variant multipath fading, Doppler shift, shadowing effect, time selective channel, frequency selective channel, and the effects of fading on wireless transmission. It also introduces narrowband and wideband transmissions technologies including space diversity, time diversity and frequency diversity techniques, direct spread-spectrum communications, DS-CDMA, frequency hopping, OFDM techniques, single-carrier-FDE, linear least squares estimation, frequency offset, SDR designs, and their applications.

Course Aims

This is a fourth-year elective course for students following a BE (Electrical) or (Telecommunications) program. It provides advanced knowledge of wideband wireless communication techniques to enable students to design advanced wireless communication systems. At the end of the course, you should be able to:

- be familiar with wireless channel models and the effects of fading on the transmitted signals.
- have developed an understanding of various diversity techniques.
- have developed an understanding of wideband transmission technologies.
- have developed an understanding of SDR technologies for wireless communications.

Relationship to Other Courses

This is a fourth-year course offered by the School of Electrical Engineering and Telecommunications. It is an elective for students pursuing a BE in Electrical or Telecommunications Engineering, as well as for those in related combined degree programs and Computer Engineering students.

The course provides advanced knowledge in wideband wireless communication techniques, equipping students with the skills needed to design sophisticated wireless communication

systems. Topics covered include digital transmission and reception technologies, channel impairments and mitigation techniques, and wideband OFDM transmission. The course also serves as an excellent foundation for research in this area. Throughout the course, students are exposed to the latest advancements in the field, as presented in recent international conferences and journals, and some of the lab work is structured as empirical research investigations.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels
CLO2 : Apply software-defined radio technologies for implementing various transmission and receiving schemes
CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms
CLO4 : Analyse the performance of wireless communication systems
CLO5 : Apply principles and techniques to communications systems design or undertake further research

Course Learning Outcomes	Assessment Item
CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels	• LabVIEW Test and Pre-Labs • Laboratory Practical Experiments and Lab Reports • Mid-Term Examination • Final Examination
CLO2 : Apply software-defined radio technologies for implementing various transmission and receiving schemes	• Mid-Term Examination • Final Examination
CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms	• LabVIEW Test and Pre-Labs • Laboratory Practical Experiments and Lab Reports • Mid-Term Examination • Final Examination
CLO4 : Analyse the performance of wireless communication systems	• LabVIEW Test and Pre-Labs • Laboratory Practical Experiments and Lab Reports • Mid-Term Examination • Final Examination
CLO5 : Apply principles and techniques to communications systems design or undertake further research	• LabVIEW Test and Pre-Labs • Laboratory Practical Experiments and Lab Reports • Mid-Term Examination • Final Examination

Learning and Teaching Technologies

Moodle - Learning Management System

Learning and Teaching in this course

Delivery Mode

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:
• Formal lectures, which provide you with a focus on the core analytical material in the course, together with qualitative, alternative explanations to aid your understanding;
• Tutorials, which allow for exercises in problem solving and allow time for you to resolve problems in understanding of lecture material;
• Laboratory sessions, which support the formal lecture material and also provide you with practical construction, measurement and debugging skills;
• Video lectures, small periodic quizzes (non-assessed), etc.

Learning in this course

You are expected to attend all lectures, tutorials, labs, and mid-term exams in order to maximize learning. You must prepare well for your laboratory classes and your lab work will be assessed. In addition to the lecture notes/video, you should read relevant sections of the recommended text. Reading additional texts will further enhance your learning experience. Group learning is also encouraged. UNSW assumes that self-directed study of this kind is undertaken in addition to attending face-to-face classes throughout the course.

Tutorial classes

You should attempt all of your problem sheet questions in advance of attending the tutorial classes. The importance of adequate preparation prior to each tutorial cannot be overemphasized, as the effectiveness and usefulness of the tutorial depends to a large extent on this preparation. Group learning is encouraged. Answers for these questions will be discussed during the tutorial class and the tutor will cover the more complex questions in the tutorial class. In addition, during the tutorial class, 1-2 new questions that are not in your notes may be provided by the tutor, for you to try in class. These questions and solutions may not be made available on the web, so it is worthwhile for you to attend your tutorial classes to gain maximum

benefit from this course.

Laboratory program

The laboratory schedule is deliberately designed to provide practical, hands-on exposure to the concepts conveyed in lectures soon after they are covered in class. You are required to attend laboratory from Week 1 to Week 10. Laboratory attendance WILL be kept, and you are encoraged to attend at least labs 0-4.

Laboratory Exemption

There is no laboratory exemption for this course. Regardless of whether equivalent labs have been completed in previous courses, all students enrolled in this course must take the labs. If, for medical reasons, (note that a valid medical certificate must be provided) you are unable to attend a lab, you will need to apply for a catch-up lab during another lab time, as agreed by the laboratory coordinator.

Other Professional Outcomes

Relationship to Engineers Australia Stage 1 competencies:

The Course Learning Outcomes (CLOs) contribute to the Engineers Australia (National Accreditation Body) Stage I competencies as outlined below

Engineers Australia (EA), Professional Engineer Stage 1 Competencies

PE1: Knowledge and Skill Base:
PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals: CLO 1, 3, 4
PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing: CLO 1, 3, 4
PE1.3 In-depth understanding of specialist bodies of knowledge: CLO 1, 3, 4
PE1.4 Discernment of knowledge development and research directions: CLO 1, 3, 4
PE1.5 Knowledge of engineering design practice: CLO 1, 3, 4
PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice: CLO 5

PE2: Engineering Application Ability:
PE2.1 Application of established engineering methods to complex problem solving: CLO 2, 4, 5
PE2.2 Fluent application of engineering techniques, tools and resources: CLO 2, 4, 5
PE2.3 Application of systematic engineering synthesis and design processes: CLO 2, 4, 5

PE2.4 Application of systematic approaches to the conduct and management of engineering projects: CLO 2, 4, 5

PE3: Professional and Personal Attributes:
PE3.1 Ethical conduct and professional accountability: n/a
PE3.2 Effective oral and written communication (professional and lay domains): CLO 4
PE3.3 Creative, innovative and pro-active demeanour: CLO 5
PE3.4 Professional use and management of information: CLO 4, 5
PE3.5 Orderly management of self, and professional conduct: n/a
PE3.6 Effective team membership and team leadership: n/a

This course is also designed to provide the course learning outcomes that arise from targeted graduate capabilities. The targeted graduate capabilities broadly support the UNSW and Faculty of Engineering graduate capabilities (also listed below).

Targeted Graduate Capabilities

Electrical Engineering and Telecommunications programs are designed to address the following targeted capabilities which were developed by the school in conjunction with the requirements of professional and industry bodies:

- The ability to apply knowledge of basic science and fundamental technologies;
- The skills to communicate effectively, not only with engineers but also with the wider community;
- The capability to undertake challenging analysis and design problems and find optimal solutions;
- Expertise in decomposing a problem into its constituent parts, and in defining the scope of each part;
- A working knowledge of how to locate required information and use information resources to their maximum advantage;
- Proficiency in developing and implementing project plans, investigating alternative solutions, and critically evaluating differing strategies;
- An understanding of the social, cultural and global responsibilities of the professional engineer;
- The ability to work effectively as an individual or in a team;
- An understanding of professional and ethical responsibilities;
- The ability to engage in lifelong independent and reflective learning

UNSW Graduate Capabilities

The course delivery methods and course content directly or indirectly address a number of core

UNSW graduate capabilities, as follows:

- Developing scholars who have a deep understanding of their discipline, through lectures and solution of analytical problems in tutorials and assessed by assignments and written examinations.
- Developing rigorous analysis, critique, and reflection, and ability to apply knowledge and skills to solving problems. These will be achieved by laboratory experiments, interactive checkpoint assessments and lab exams during the labs.
- Developing capable independent and collaborative enquiry, through a series of tutorials spanning the duration of the course.
- Developing independent, self-directed professionals who are enterprising, innovative, creative and responsive to change, through challenging design and project tasks.
- Developing citizens who can apply their discipline in other contexts, are culturally aware and environmentally responsible, through interdisciplinary tasks, seminars and group activities

Additional Course Information

Credits:

This is a 6 UoC course and the expected workload is 15 hours per week throughout the 10-week term.

Pre-requisites and Assumed Knowledge:

The pre-requisite for this course is TELE3113 Introduction of Analogue and Digital Communications (or equivalent). Knowledge from TELE4653 is highly desirable. It is essential that you are familiar with digital signal, modulation, and detection before this course is attempted. It is further assumed that students are familiar with LabView and Matlab, and have good computer literacy. Students who are not confident in their knowledge from previous digital communications courses (especially the topics mentioned) are strongly advised to revise their previous course materials as quickly as possible to avoid difficulties in this course.

COURSE STAFF:

Primary Staff Contact, Course Co-convener, and Lecturer: Prof. Jinhong Yuan, j.yuan@unsw.edu.au

Course Co-convener, Lecturer, and Tutor: Dr. Akram Shafie, akram.shafie@unsw.edu.au

Laboratory Contact: Dr. Shane Xie, yixuan.xie@unsw.edu.au

Consultations: You are encouraged to ask questions on the course material, after the lecture class times in the first instance, rather than via email. Lecturer consultation times will be advised

during lectures. You are welcome to email the tutor or laboratory demonstrator, who can answer your questions about this course and provide you with consultation times. ALL email inquiries should be made from your student email address with TELE4651 in the subject line; otherwise, they will not be answered.

Keeping Informed: Announcements may be made during classes, via email (to your student email address), and/or via online learning and teaching platforms. In this course, we will use Moodle https://moodle.telt.unsw.edu.au/login/index.php. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Contact Hours: The course consists of 2-3-hour lectures per week, 1-hour tutorial per week, and a 3-hour laboratory session per week (except the first two weeks when you have one lab session per week). Students can contact the staff during this time.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
LabVIEW Test and Pre-Labs Assessment Format: Individual Short Extension: Yes (3 days)	10%	Start Date: 16/09/2024 12:00 AM Due Date: 28/09/2024 12:00 AM Post Date: 16/09/2024 12:00 AM
Laboratory Practical Experiments and Lab Reports Assessment Format: Individual Short Extension: Yes (7 days)	40%	Start Date: 09/09/2024 12:00 AM Due Date: 15/11/2024 12:00 AM Post Date: 09/09/2024 12:00 AM
Mid-Term Examination Assessment Format: Individual	20%	Start Date: 07/10/2024 12:00 AM Due Date: 26/10/2024 12:00 AM Post Date: 07/10/2024 12:00 AM
Final Examination Assessment Format: Individual	30%	Start Date: 18/11/2024 12:00 AM Due Date: 29/11/2024 12:00 AM Post Date: 30/11/2024 12:00 AM

Assessment Details

LabVIEW Test and Pre-Labs

Assessment Overview

Every lab session will have prelab which includes a mixture of problems and programming to prepare you for that week's experiment. You may work on the prelab with your lab partner but not with other students and all work must be your own. You may not participate in the lab without a prelab. Copying another student's prelab is considered cheating and the appropriate action will

be taken. All prelab assignments will be due at the beginning of each lab. No late prelabs will be accepted as you need to be prepared for the lab.

After completing each experiment, your work will be assessed by the laboratory demonstrator, and feedback given verbally. Both the results sheet and your lab book will be assessed by the laboratory demonstrator. Assessment marks will be awarded according to your preparation (completing set preparation exercises and correctness of these or readiness for the lab in terms of pre-reading), how much of the lab you were able to complete, your understanding of the experiments conducted during the lab, the quality of the code you write during your lab work (according to the guidelines given in lectures), and your understanding of the topic covered by the lab.

The LabVIEW test is conducted in week 2 during lecture time. It is used to test students' understanding of LabVIEW, as the software is essential for all lab experiments. Students must pass the LabVIEW test in order to do the laboratory experiments.

Course Learning Outcomes

- CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels
- CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms
- CLO4 : Analyse the performance of wireless communication systems
- CLO5 : Apply principles and techniques to communications systems design or undertake further research

Detailed Assessment Description

As above

Assessment Length

1 hour

Submission notes

Via Moodle

Assessment information

Study LabView selftraining package

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

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Laboratory Practical Experiments and Lab Reports

Assessment Overview

Laboratories are primarily about learning, and the laboratory assessment is designed mainly to check your knowledge as you progress through each stage of the laboratory tasks. It is essential that you complete the laboratory preparation before coming to the lab. You are required to write the aim of the experiment and draw the program/block diagram if any in your lab book. This will be verified and signed by your demonstrators in the lab. You will be recording your observations/ readings in your lab book first and then completing and submitting the results sheet before leaving the lab.

The purpose of the lab report is to discuss what was observed in the lab and to answer several questions related to wireless communication engineering. The lab report is an opportunity to synthesize what was learned. The questions will be based on what you have learned/observed in your laboratory classes and lectures, and marks will be awarded for the correct understanding of practical and relevant theoretical concepts, correct operation of laboratory equipment, and correct interpretation of measured results. The report for each lab is due at the beginning of the next lab. Your work will be assessed by the laboratory demonstrator and feedback given verbally.

Course Learning Outcomes

- CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels
- CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms
- CLO4 : Analyse the performance of wireless communication systems
- CLO5 : Apply principles and techniques to communications systems design or undertake further research

Detailed Assessment Description

As above

Assessment Length

3 hours for each week

Submission notes

Written and submission during the lab session

Assessment information

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Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

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Mid-Term Examination

Assessment Overview

The mid-term examination tests your general understanding of the course material, and it is designed to give you feedback on your progress through the analytical components of the course. Questions may be drawn from any course material up to the end of week 5 (TBC). It may contain questions requiring some (not extensive) knowledge of laboratory material, and will definitely contain numerical and analytical questions. Marks will be assigned according to the correctness of the responses and verbal class-wide feedback will be given during lectures.

Course Learning Outcomes

- CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels
- CLO2 : Apply software-defined radio technologies for implementing various transmission and receiving schemes
- CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms
- CLO4 : Analyse the performance of wireless communication systems
- CLO5 : Apply principles and techniques to communications systems design or undertake

further research

Detailed Assessment Description

As above

Assessment Length

1 Hour

Submission notes

Hand written

Assessment information

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Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

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Final Examination

Assessment Overview

This is a standard closed-book 2-hour written examination, comprising up to five compulsory questions. University-approved calculators are allowed. The examination tests analytical and critical thinking and general understanding of the course material and lab material in a controlled fashion. Questions may be drawn from any aspect of the course (including laboratory) unless specifically indicated otherwise by the lecturer. Marks will be assigned according to the correctness of the responses.

Course Learning Outcomes

- CLO1 : Apply the principles, algorithms, and technologies used in the transmission of information in wireless mobile channels
- CLO2 : Apply software-defined radio technologies for implementing various transmission and

receiving schemes
- CLO3 : Explain the operation of example transmission and receiving algorithms, and discuss the effects of varying the parameter values within these algorithms
- CLO4 : Analyse the performance of wireless communication systems
- CLO5 : Apply principles and techniques to communications systems design or undertake further research

Detailed Assessment Description

As above

Assessment Length

2 hours

Submission notes

Hand written

Assessment information

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Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

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General Assessment Information

Major changes from previous years:

In this course, we are going to introduce the Tiered Learning Taxonomy (TLT) Framework to evaluate students' lab work. This framework was borrowed from Professor Eliathamby Ambikairajah, who proposed and successfully implemented this framework in ELEC3104. Some details of TLT are as follows.

Tiered Learning Taxonomy (TLT) Framework

- Tiered Learning Taxonomy (TLT) is a self-driven learning framework for analysing students' depth of knowledge or for measuring how well a student understands a topic.

- TLT divides the learning curve within the course into 5 Hierarchical levels of increasing complexity in student's understanding of topics studied.

Why does this matter to you?

- The taxonomy encourages students to think about which level they are currently at with their learning, and what they need to do in order to progress to the next level.
- Within this TLT framework, students have more control and choice over how much they want to learn and deepen their knowledge.
- The TLT framework has been designed to include Pass, Credit, Distinction and High Distinction levels to help students understand the different levels (Levels 0 to 5) on the learning curve, and what they need to do to progress.
- If you are happy with your current level of learning and don't want to deepen your knowledge to progress to the next level, that is entirely your choice. At an absolute baseline, all students must achieve a Pass level (i.e. be at Level 2) as a total final mark (≥50%) at completion of the course, if you want to pass the course.
- The Course is designed to provide an increasing complexity from Pass (Level 2) to High Distinction (Level 5) levels as shown on the Taxonomy Framework diagram below.

Different Stages of the TLT Framework

- Level 0: The students don't have any understanding about the topic, but have the pre-requisite knowledge to commence this course.
- Level 1: Very basic understanding, where their knowledge accrues in greater quantity. They understand all of the concepts.
- Level 2: Students know all the concepts and are able to link many of the concepts to each other.
- All concepts are known, and additionally there is a deep understanding that comes with a qualitative change in how the concepts are understood. They are able to connect the concepts in multiple ways. Surface knowledge (Levels 1 & 2) is required as a baseline, in order to develop deep knowledge

Relationship between Levels and required lab works:

All Lab Works in TELE4651 will be levelled as per the TLT for this course. You must do Level 2 (Pass) lab works as a baseline, which includes Lab 0- Lab 4. If you choose to attempt any other lab works beyond Level 2, please complete other labs in sequential order (i.e. attempt Level 3 (Credit, Lab 5) first, before doing Level 4 (Distinction, Lab 6) and then Level 5 (High Distinction, Lab 7).)

Please note that TLT framework only applies to the Lab works in TELE4651.

Grading Basis

Standard

Requirements to pass course

Achieve a total mark of 50 out of 100.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 2 September - 8 September	Reading	Reading Course Outlines and General Information for TELE4651
Week 1 : 9 September - 15 September	Reading	Additional Lecture Notes, Page 1-5 LabVIEW: Online Self-paced training from NI
	Lecture	Introduction to wireless communications and digital communications overview
	Tutorial	Tute 1
	Laboratory	Self-paced training of LabView on your own PC/Laptop in the lab.
Week 2 : 16 September - 22 September	Reading	Additional Lecture Notes, Page 5-18 Lab Note: Conduct Lab 0 and prepare for Lab 1
	Lecture	Review of signal processing fundamentals: Stochastic processes, Fourier transforms, sampling theorem, discrete-time processing of continuous-time signals
	Assessment	LabVIEW Test
	Tutorial	Tute 2
	Laboratory	Lab0: LabVIEW Additional Tasks
Week 3 : 23 September - 29 September	Tutorial	Tute 3
	Reading	Additional Lecture Notes, Page 18-32 Lab Note: Conduct Lab 1 and prepare for Lab 2
	Lecture	An Overview of Digital Modulation and Demodulation
	Laboratory	Lab1: Part 1 Introduction to NI LabVIEW Lab1: Part 2 Introduction to NI RF Hardware
Week 4 : 30 September - 6 October	Reading	Additional Lecture Notes, Page 32-41 Lab Note: Conduct Lab 2, Prepare for Lab 3
	Lecture	Digital Implementation of pulse-shaping and Synchronization
	Tutorial	Tute 4
	Laboratory	Lab 2: Part 1 Modulation and Detection Lab 2: Part 2 Pulse Shaping and Matched Filtering
Week 5 : 7 October - 13 October	Reading	Additional Lecture Notes, Page 41-47 Lab Note: Conduct Lab 3, Prepare for Lab 4
	Lecture	Channel Estimation and Equalization
	Tutorial	Tute 5
	Laboratory	Lab 3: Synchronization
Week 6 : 14 October - 20 October	Lecture	Revision
	Tutorial	Revision
	Laboratory	Catch-up Lab
	Other	Industry Guest Lecture on Mobile Networks
Week 7 : 21 October - 27 October	Reading	Additional Lecture Notes, Page 47-53 Lab Note: Conduct Lab 4, Prepare for Lab 5
	Lecture	Frequency Domain Equalization and OFDM
	Tutorial	Tute 6
	Laboratory	Lab 4: Channel Estimation & Equalization
	Assessment	Mid-Term Test (tentative)
Week 8 : 28 October - 3 November	Reading	Additional Lecture Notes, Page 54-57 Lab Note: Conduct Lab 5, Prepare for Lab 6
	Lecture	OFDM Channel Estimation and Freq. Offset Estimation Demystifying the IEEE 802.11a WiFi Standard and GSM Standard
	Tutorial	Tute 7
	Laboratory	Lab 5: Frame Detection & Frequency Offset Correction
Week 9 : 4 November - 10 November	Reading	Additional Lecture Notes, Page 66-75 Lab Note: Conduct Lab 6, Prepare for Lab 7
	Lecture	Wireless Channels: Large Scale Fading
	Tutorial	Tute 8

	Laboratory	Lab 6: OFDM Modulation & Frequency Domain Equalization
Week 10 : 11 November - 17 November	Reading	Additional Lecture Notes, Page 75-84 Lab Note: Lab 7
	Lecture	Wireless Channels: Small Scale Fading
	Tutorial	Tute 9
	Laboratory	Lab 7: Synchronization in OFDM Systems

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Prescribed Resources

Textbook

- Andrew Goldsmith, Wireless communications, Cambridge University Press, 2005.

You may want to check the coverage of this text before purchasing, as some topics in the syllabus are not featured. Unfortunately there is no single text that covers all topics in a satisfactory depth. Additional references, listed below and at the end of some lecture note sets, will in combination provide complete coverage of the course. Lecture notes will be provided, however note that these do not treat each topic exhaustively and additional reading is required.

Other reference books

- B. Vucetic and J. Yuan: Space-time coding: John Wiley and Sons, 2003.
- Simon Heykin and Michael Moher, “Modern Wireless Communications”, Pearson Prentice Hall, 2005.
- Gordon L. Stuber, Principles of Mobile Communication, Boston, MA: Kluwer Academic Publishers, 1996.
- Theodore S. Rappaport, Wireless Communications: Principles and Practice. Upper Saddle River, NJ: Prentice-Hall, 1996.

Online resources

Moodle

As a part of the teaching component, Moodle will be used to disseminate teaching materials, host forums and occasionally quizzes. Assessment marks will also be made available via Moodle: https://moodle.telt.unsw.edu.au/login/index.php.

Mailing list

Announcements concerning course information will be given in the lectures and/or on Moodle and/or via email (which will be sent to your student email address).

Recommended Resources

Lecture Notes and Lab Notes will be provided to students on Moodle.

Students need to download the materials from Moodle.

Additional Costs

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Course Evaluation and Development

Students feedback from previous years include 1) Labs are difficult and even they implemented the SDR they had difficulties to understand the meaning of the implementation; 2) more support for tutorials.

In this year, 1) We have rescheduled the lab sessions and particularly slowed the lab sessions in the first four weeks, so the lab demonstartors can provide more help to students and explain the meaning of implementations. 2) We will provide two tutorials revision session to help students.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Jinhong Yuan				Tuesday afternoon	No	Yes
	Akram Mohamed Shafie		320		Tuesday afternoon	No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or

within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the

University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way

through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

General Conduct and Behaviour

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

Use of AI for assessments

Your work must be your own. If you use AI in the writing of your assessment, you must acknowledge this and your submission must be substantially your own work. More information can be found on this website.

Workplace Health & Safety (WHS)

WHS for students and staff is of utmost priority. Most courses involve laboratory work. You must follow the rules about conduct in the laboratory. About COVID-19, advice can be found on this website.

School Contact Information

Consultations: Lecturer consultation times will be advised during the first lecture. You are welcome to email the tutor or laboratory demonstrator, who can answer your questions on this course and can also provide you with consultation times. ALL email enquiries should be made from your student email address with ELEC/TELExxxx in the subject line; otherwise they will not be answered.

Keeping Informed: Announcements may be made during classes, via email (to your student email address) and/or via online learning and teaching platforms – in this course, we will use Moodle https://moodle.telt.unsw.edu.au/login/index.php. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

Student Support Enquiries

For enrolment and progression enquiries please contact Student Services

Web

Electrical Engineering Homepage