



## UNSW Course Outline

# ZEIT8219 Satellite Communications - 2024

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## General Course Information

Course Code : ZEIT8219

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 : Online

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

Satellite communication are now a major part of most telecommunications networks as well as every-day lives through mobile communication systems and broadcast television. A fundamental understanding of such systems is therefore important to a wide range of system designers,

engineers, and communications system users.

This course covers the fundamentals of satellites, including: the basic building blocks of a satellite; orbits; radio wave propagation and link calculations; signal and noise power; system hardware for space and ground segments; multiplexing and multiple access techniques; coding schemes; error rates, detection and correction; data rates. The course also considers incoming technologies and future trends

This is a 6 UoC course

## **Course Aims**

The course is focused on the fundamental principles underlying satellite communication systems, treating each with sufficient depth to provide a balanced overview of the constituent system elements.

## **Relationship to Other Courses**

Overlap with content from ZEIT4225.

# Course Learning Outcomes

Course Learning Outcomes
CL01 : Describe the following aspects of a satellite communications system: satellite subsystems, satellite orbits, frequency bands, antennas and electromagnetic wave propagation for communications between earth stations and satellites.
CL02 : Explain the following analogue and digital communications techniques: modulation, multiplexing, channel coding and multiple access techniques as they relate to satellite communications.
CL03 : Evaluate the advantages and disadvantages of the different types of satellite orbits.
CL04 : Perform calculations to determine properties of earth station antennas and satellite footprints.
CL05 : Perform calculations required to conduct a link budget analysis of a satellite system.

Course Learning Outcomes	Assessment Item
CL01 : Describe the following aspects of a satellite communications system: satellite subsystems, satellite orbits, frequency bands, antennas and electromagnetic wave propagation for communications between earth stations and satellites.	
CL02 : Explain the following analogue and digital communications techniques: modulation, multiplexing, channel coding and multiple access techniques as they relate to satellite communications.	
CL03 : Evaluate the advantages and disadvantages of the different types of satellite orbits.	
CL04 : Perform calculations to determine properties of earth station antennas and satellite footprints.	
CL05 : Perform calculations required to conduct a link budget analysis of a satellite system.	

## Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Blackboard Collaborate

## Learning and Teaching in this course

### Teaching Strategies

You will achieve the major learning outcomes of this course through completion of the online quizzes and assessment. The assignments and tests evaluate your level of understanding of the key concepts that make up modern satellite communication systems.

The course Moodle site will include a course Q&A forum. Students are encouraged to interact through the forum, and the lecturer will use the forum to answer questions throughout the course.

Tutorial sessions will be held online (through Moodle) at dates and times to be agreed.

## **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](mailto: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](mailto: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

## 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
Test 1 (Topics 1-3) Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: 17/03/2024 11:59 PM
Assignment 1 Assessment Format: Individual	20%	Due Date: 21/04/2024 11:59 PM
Test 2 (Topics 4-9) Assessment Format: Individual	30%	Due Date: 12/05/2024 11:59 PM
Assignment 2 Assessment Format: Individual	40%	Due Date: 09/06/2024 11:59 PM

## Assessment Details

### Test 1 (Topics 1-3)

#### Assessment Overview

n/a

#### Detailed Assessment Description

Assessment 1 is conducted through a Moodle test. The test can be performed at any time between the start date and the due date. The questions will be presented in a similar manner to the quiz questions.

Assignment 1 covers CLO1, CLO2 and CLO3

#### Assessment Length

1 hour

#### Assignment submission Turnitin type

This is not a Turnitin assignment

### Assignment 1

#### Assessment Overview

n/a

#### Detailed Assessment Description

The assignment will be posted on Moodle. The assignments require higher-order independent thinking beyond the ability to read, comprehend, and remember the information provided in the

textbooks and notes. They will help you draw together all the discrete areas studied in each topic. Marks for the assignments will be allocated based on the depth of understanding demonstrated.

Assignment 2 covers CLO2 and CLO3

## **Test 2 (Topics 4-9)**

### **Assessment Overview**

n/a

### **Detailed Assessment Description**

Assessment 3 is conducted through a Moodle test. The test can be performed at any time between the start date and the due date. The questions will be presented in a similar manner to the quiz questions.

Assignment 3 covers CLO2, CLO3, CLO4 and CLO5

## **Assignment 2**

### **Assessment Overview**

n/a

### **Detailed Assessment Description**

The assignment will be posted on Moodle. The assignments require higher-order independent thinking beyond the ability to read, comprehend, and remember the information provided in the textbooks and notes. They will help you draw together all the discrete areas studied in each topic. Marks for the assignments will be allocated based on the depth of understanding demonstrated.

Assignment 4 covers CLO1, CLO2, CLO3, CLO4 and CLO5

### **Assignment submission Turnitin type**

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

## **General Assessment Information**

*Online Revision Quizzes*

Online quizzes are provided to assist you in confirming your understanding of the body of knowledge covered by the course.

There are nine online quizzes: one for each of the first nine topics. You may attempt the quizzes as many times as you wish to assist you in your study. No marks are awarded for completion of the quizzes, but you should be aware that the online tests contain similar questions in a similar format, so practice with the quizzes will be useful to you.

To provide an indication of the course difficulty, students are required to attempt quizzes 1-3 by the end of week 3 (17 Mar). Feedback and grades will be given to students by the census date (24th of March).

### *Online Tests*

The online tests are to be completed before the due dates specified in the table above. Test questions are similar to the revision quizzes for the relevant chapters, plus longer extension questions with detailed calculations. The test questions will be presented in a similar manner to the quiz questions. Test 1 will cover material from Topics 1–3; Test 2 will cover material from Topics 4–9.

You may start the tests at any time before the final due date (although it is recommended that you complete the appropriate quizzes first). You may attempt each test only once—your mark will be based on that attempt. Please note that, unlike the quizzes, the tests are timed, and you must complete as many questions as you can within the set time.

### *Assignments*

The assignments (posted on Moodle) provide you with an opportunity to demonstrate your ability to apply the knowledge and understanding you have gained throughout the course. The assignments require higher-order independent thinking beyond the ability to read, comprehend, and remember the information provided in the textbooks and notes. They will help you draw together all the discrete areas studied in each topic.

### **Grading Basis**

Standard

### **Requirements to pass course**

You must achieve at least 50 marks out of a total 100 marks to pass this course. You are not required to pass any one particular piece of assessment; you simply need to pass the course

overall.

## 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 5 days (120 hours) after which an assessment can no longer be submitted and a grade of zero will be applied.

## Use of Generative AI in Assessments

Use of Generative Artificial Intelligence (AI) – such as ChatGPT – in UNSW Assessments: PLANNING ASSISTANCE allowed. As this assessment task involves 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, i.e., only occasional AI generated words or phrases may form part of your final submission. It is a good idea to keep copies of the initial prompts to show your lecturer if there is any uncertainty about the originality of your work. If the outputs of generative AI such as ChatGPT form a part of your submission, it will be regarded as serious academic misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

*\* To cite: OpenAI (Year Accessed). ChatGPT.*

*OpenAI. <https://openai.com/models/chatgpt/>*

*\* 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.*

# Course Schedule

## Attendance Requirements

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

# General Schedule Information

Week	Date	Topic
1	26 Feb - 3 Mar	1. Introduction (Edwin)
2	4-10 Mar	2. Satellite Orbits (Edwin)
3	11-17 Mar	3. Frequency Bands (Test 1 due 17 <sup>th</sup> Mar) (Rabbia)
4	18-24 Mar	4. Propagation (Rabbia, Edwin)
5	25-31 Mar	5. Antennas (Rabbia, Edwin)
6	1-7 Apr	6. Digital Signals & Modulation (Rabbia)
7	8-14 Apr	7. Errors & Channel Coding (Rabbia)
8	15-21 Apr	Assignment 1 due 21 <sup>st</sup> Apr
9	22-28 Apr	8. Multiple Access Techniques (Rabbia)
10	29 Apr-5 May	9. Link Budget Analysis (Rabbia)
11	6-12 May	10. Networking for Satcom (Rabbia)
12	13-19 May	Test 2 due 12th May
13	20-26 May	11. Optical Links (Rabbia)
14	27May-2 Jun	Dedicated to Assignment 2
15	3 Jun-9 Jun	Assignment 2 due 9 <sup>th</sup> June
	10 <sup>th</sup> July	Result Release

## Course Resources

### Prescribed Resources

Compulsory Text

G. Maral, M. Bousquet, Z. Sun, *Satellite Communications Systems: Systems, Techniques and*

*Technology*, 6th ed, Wiley, West Sussex, 2020, ISBN: 978-1-119-38208-9.

#### Recommended Readings:

D. Roddy, *Satellite Communications*, 4<sup>th</sup> ed, McGraw Hill, New York, 2006, ISBN: 0071462988.

T. Pratt & J. Allnutt, *Satellite Communications*, 3<sup>rd</sup> ed, Wiley, 2019, ISBN: 978-1-119-48217-8

All texts cover similar material but give a different perspective. Other materials will be made available via the course Moodle page. Students are also encouraged to post questions and answers in the Q&A forum.

## 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, and 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	Edwin Peters		B16R220		Weekdays. We aim to respond to emails by COB the next business day. For zoom/teams consultations, please contact me to arrange a time.	No	Yes
Lecturer	Rabbia Saleem		B16R220		Weekdays from week 3. We aim to respond to emails by COB the next business day. For zoom/teams consultations, please contact me to arrange a time.	No	No

# Other Useful Information

## Academic Information

### 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 each 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 (where applicable). Student opinions really do make a difference. Refer to the Moodle site for your 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.

<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 Equitable 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 Plagiarism

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 \(unsw.edu.au\)](https://student.unsw.edu.au/conduct)

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.