COURSE OUTLINE

ELC502 Advanced Digital Communications

School: School of Science, Technology and Engineering

2026 | Trimester 1

UniSC Moreton Bay	BLENDED LEARNING	Most of your course is on campus but you may be able to do some components of this course online.
Online	ONLINE	You can do this course without coming onto campus, unless your program has specified a mandatory onsite requirement.

Please go to unisc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

Digital communications are essential to the functioning of modern society. Examples include cellphones, broadcasting, and satellite communications. In this course you will expand on your knowledge and understanding of Communication Engineering, by developing specialised techniques and the design of components in communication systems. You will explore the standards governing communication protocol and hardware, analyse performance of communication systems, and specify general telecommunication systems.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous learning materials	1hr	Week 1	12 times
Seminar – On campus	1hr	Week 1	Once Only
Tutorial/Workshop 1 – On campus	2hrs	Week 2	10 times
ONLINE			
Learning materials – Asynchronous learning materials	1hr	Week 1	12 times
Seminar – Online seminar	1hr	Week 1	Once Only
Tutorial/Workshop 1 – Online tutorial workshop	2hrs	Week 2	10 times

1.3. Course Topics

Topics may include:

- Source Coding for Digital Communications
- Timing and Carrier Synchronization
- Digital Modulation Techniques
- BPSK, QPSK, QAM
- Maximum Likelihood Detector
- Bit Error Rate (BER) Performance
- Error Control Coding Techniques
- Broadband Communications
- Orthogonal Frequency Modulation
- Wireless Communications
- Introduction to Optical Communications

2. What level is this course?

500 Level (Advanced)

Engaging with new discipline knowledge and skills at an advanced level or deepening existing knowledge and skills within a discipline. Independent application of knowledge and skills in unfamiliar contexts.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...	GRADUATE QUALITIES MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Analyse and evaluate various digital modulation techniques for efficient data transmission.	Creative and critical thinker	2, 2.1.a, 2.1
2 Assess alternative multiple access techniques and select appropriate schemes for different communication scenarios.	Creative and critical thinker	1, 1.1.a, 1.1, 2, 2.1.f, 2.1
3 Analyse spread spectrum communications to achieve secure and robust wireless communication and model wireless channels and analyse their impact on system performance.	Creative and critical thinker	2, 2.1.a, 2.1.b, 2.1
4 Apply technical knowledge and utilise telecommunications modeling platforms for prototyping and implementing digital communication systems to meet specific requirements.	Empowered	1, 1.4.a, 1.4, 2, 2.3.a, 2.3
5 Design and implement error control coding schemes to ensure reliable communication in noisy channels.	Empowered	1, 1.5.a, 1.5.c, 1.5, 2, 2.2.d, 2.2
6 Synthesise and critically evaluate core course concepts and their interrelationships and effectively communicate a comprehensive understanding of the course's main ideas and their broader implications for communication systems.	Knowledgeable Creative and critical thinker Empowered Communication Problem solving Applying technologies	1, 1.2.a, 2, 2.1, 3.2.b, 3.2

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1	Elements of competency: Knowledge and Skill Base
1.1.a	Knowledge and Skill Base - Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline: Engages with the engineering discipline at a phenomenological level, applying sciences and engineering fundamentals to systematic investigation, interpretation, analysis and innovative solution of complex problems and broader aspects of engineering practice.
1.4.a	Knowledge and Skill Base - Discernment of knowledge development and research directions within the engineering discipline: Identifies and critically appraises current developments, advanced technologies, emerging issues and interdisciplinary linkages in at least one specialist practice domain of the engineering discipline.
1.5.a	Knowledge and Skill Base - Knowledge of engineering design practice and contextual factors impacting the engineering discipline: Identifies and applies systematic principles of engineering design relevant to the engineering discipline.
1.5.c	Knowledge and Skill Base - Knowledge of engineering design practice and contextual factors impacting the engineering discipline: Appreciates the issues associated with international engineering practice and global operating contexts.
1.2.a	Knowledge and Skill Base - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline: Develops and fluently applies relevant investigation analysis, interpretation, assessment, characterisation, prediction, evaluation, modelling, decision making, measurement, evaluation, knowledge management and communication tools and techniques pertinent to the engineering discipline.
1.1	Knowledge and Skill Base: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
1.4	Knowledge and Skill Base: Discernment of knowledge development and research directions within the engineering discipline.
1.5	Knowledge and Skill Base: Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
2	Elements of competency: Engineering Application Ability
2.1.a	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Identifies, discerns and characterises salient issues, determines and analyses causes and effects, justifies and applies appropriate simplifying assumptions, predicts performance and behaviour, synthesises solution strategies and develops substantiated conclusions.
2.1.f	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Conceptualises alternative engineering approaches and evaluates potential outcomes against appropriate criteria to justify an optimal solution choice.
2.1.b	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Ensures that all aspects of an engineering activity are soundly based on fundamental principles - by diagnosing, and taking appropriate action with data, calculations, results, proposals, processes, practices, and documented information that may be ill-founded, illogical, erroneous, unreliable or unrealistic.
2.3.a	Engineering Application Ability - Application of systematic engineering synthesis and design processes: Proficiently applies technical knowledge and open ended problem solving skills as well as appropriate tools and resources to design components, elements, systems, plant, facilities and/or processes to satisfy user requirements.
2.2.d	Engineering Application Ability - Fluent application of engineering techniques, tools and resources: Applies a wide range of engineering tools for analysis, simulation, visualisation, synthesis and design, including assessing the accuracy and limitations of such tools, and validation of their results.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.
2.2	Engineering Application Ability: Fluent application of engineering techniques, tools and resources.
2.3	Engineering Application Ability: Application of systematic engineering synthesis and design processes.
3.2.b	Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Prepares high quality engineering documents such as progress and project reports, reports of investigations and feasibility studies, proposals, specifications, design records, drawings, technical descriptions and presentations pertinent to the engineering discipline.
3.2	Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1. Pre-requisites

Enrolled in MC005 or MC006 or GC005 or GC006 or GD005 or GD006

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

5.5. Microcredential Information

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

Early feedback will be provided through completion of weekly activities in workshops. Furthermore, feedback on each assessment will be provided which will be used to help with the following assessment.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Practical / Laboratory Skills, and Written Piece	Individual	25%	1500 words	Week 5	Online Assignment Submission with plagiarism check
All	2	Practical / Laboratory Skills	Individual	25%	1500 words	Week 9	Online Assignment Submission with plagiarism check
All	3	Examination - Centrally Scheduled	Individual	40%	2 hours	Exam Period	Online Assignment Submission with plagiarism check
All	4	Oral	Individual	10%	A 10-12 minute presentation which may be followed by approximately 5-10 minutes of questions.	Week 12	Online Submission

All - Assessment Task 1: Simulation

GOAL:	Experimental/simulation work to verify students' ability to apply knowledge and skills acquired in the course.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Experimental/simulation work to verify students' ability to apply knowledge and skills acquired in the course.
CRITERIA:	

No.		Learning Outcome assessed
1	Analysis and evaluation of various digital modulation techniques for efficient data transmission.	1
2	Assessment of alternative multiple access techniques and selection of appropriate schemes for different communication scenarios.	2
3	Application of technical knowledge and utilise software-defined radio platforms for prototyping and implementing digital communication systems to meet specific requirements.	4

GENERIC SKILLS:	Communication, Problem solving, Organisation, Applying technologies, Information literacy

All - Assessment Task 2: Experimental/simulation work

GOAL:	To apply knowledge and skills acquired in the course.
PRODUCT:	Practical / Laboratory Skills
AUTHORSHIP STATEMENT:	
FORMAT:	Laboratory
CRITERIA:	

No.		Learning Outcome assessed
1	Analysis and evaluation of various digital modulation techniques for efficient data transmission.	1
2	Assessment of alternative multiple access techniques and selection of appropriate schemes for different communication scenarios.	2
3	Analysis of spread spectrum communications to achieve secure and robust wireless communication and modelling wireless channels and analyse their impact on system performance.	3
4	Design and implementation of error control coding schemes to ensure reliable communication in noisy channels.	5

GENERIC SKILLS:	Communication, Problem solving, Organisation, Applying technologies, Information literacy

All - Assessment Task 3: Final exam

GOAL:	Questions and problems related to the materials covered in the course.
PRODUCT:	Examination - Centrally Scheduled
AUTHORSHIP STATEMENT:	
FORMAT:	Questions and problems related to the materials covered in the course.
CRITERIA:	

No.		Learning Outcome assessed
1	Analysis and evaluation of various digital modulation techniques for efficient data transmission.	1
2	Assessment of alternative multiple access techniques and selection of appropriate schemes for different communication scenarios.	2
3	Analysis of spread spectrum communications to achieve secure and robust wireless communication and modelling wireless channels and analyse their impact on system performance.	3
4	Application of technical knowledge and utilise software-defined radio platforms for prototyping and implementing digital communication systems to meet specific requirements.	4
5	Design and implementation of error control coding schemes to ensure reliable communication in noisy channels.	5

GENERIC SKILLS:	Communication, Problem solving, Applying technologies, Information literacy

All - Assessment Task 4: Course summary and critical evaluation

GOAL:	To assess your ability to synthesise and critically evaluate the course's core concepts, demonstrating a sophisticated and integrated understanding of its main ideas, their interrelationships, and broader implications.
PRODUCT:	Oral
AUTHORSHIP STATEMENT:	
FORMAT:	Presentation
CRITERIA:	

No.		Learning Outcome assessed
1	Synthesis & Critical Evaluation: Integrated and insightful critiques of core course concepts and their interrelationships.	6
2	Clarity & Communication: Well-organised, engaging, and clear presentation, effectively using visuals to enhance understanding.	6
3	Engagement & Understanding: Accurate and thoughtful responses to questions, demonstrating deep understanding and critical thinking.	6

GENERIC SKILLS:	Communication, Problem solving

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

> There are no required/recommended resources for this course.

8.2. Specific requirements

Not applicable

9. How are risks managed in this course?

Risk assessments have been conducted for the field activities being undertaken and a high level of risk has been identified. High level risk may include, boating, diving, and hot works such as welding, cutting and grinding. Where high risks exist you will be given training and advice about how to control the high level risk, however it is also your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:
(a) The final mark is in the percentage range 47% to 49.4%; and
(b) The course is graded using the Standard Grading scale

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:
(a) One day: deduct 5%;
(b) Two days: deduct 10%;
(c) Three days: deduct 20%;
(d) Four days: deduct 40%;
(e) Five days: deduct 60%;
(f) Six days: deduct 80%;
(g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:
Less than 15 minutes: No penalty
From 15 minutes to 30 minutes: 20% penalty
More than 30 minutes: 100% penalty

10.4. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.5. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.6. General Enquiries

For course-specific questions, contact your teaching staff or Course Coordinator.

For other enquiries or to access support, please contact Student Central:

- UniSC Student Central
- UniSC Adelaide Student Central