COURSE OUTLINE

ELC700 Micro-grid and Energy Storage Systems

School: School of Science, Technology and Engineering

2026 | Trimester 2

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

In this course you will develop an in-depth knowledge and understanding of micro- and smart-grid technologies along with their design and implementation strategies. Further you will be introduced to energy storage systems and develop a broad understanding and appreciation of the scientific principles that underpin the operation of such systems.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous weekly learning material	1hr	Week 1	12 times
Seminar – On campus	1hr	Week 1	3 times
Tutorial/Workshop 1 – On campus	2hrs	Week 1	10 times
Laboratory 1 – Mandatory on campus intensive	10hrs	Break week	Once Only
ONLINE			
Learning materials – Asynchronous weekly learning material	1hr	Week 1	12 times
Seminar – Online	1hr	Week 1	3 times
Tutorial/Workshop 1 – Online	2hrs	Week 1	10 times
Laboratory 1 – Mandatory on campus intensive	10hrs	Break week	Once Only

1.3. Course Topics

Topics may include:

- Introduction to micro-grid
- Micro-grid - components, standards, applications, operations
- Use of micro-grid as smart-grid
- Smart-grid - standards, control, communication, cyber security and energy management
- Smart metering
- Energy storage systems - background, application and objectives
- Overview and study of different energy storage systems

2. What level is this course?

700 Level (Specialised)

Demonstrating a specialised body of knowledge and set of skills for professional practice or further learning. Advanced 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 Develop and analyse the key objectives and applications of energy storage in electical networks.	Creative and critical thinker Sustainability-focussed	2, 2.1.a, 2.1, 3, 3.1.c, 3.1
2 Evaluate and assess solutions to problems associated with a variety of energy storage systems in micro-grids.	Creative and critical thinker	2, 2.1.a, 2.1, 3, 3.1.c, 3.1
3 Apply industry standard software analysis tools to simulate and study characteristics and behaviour of micro-grids and smart-grids	Empowered	2, 2.2.d, 2.2, 3, 3.1.c, 3.1
4 Design micro-grids and smart-grids to meet specified criteria and performance standards and conduct fault analysis specific to micro-grids and smart-grids.	Engaged	1.6.a, 1.5, 1.6, 2, 2.3.a, 2.3
5 Demonstrate advanced technical knowledge to identify the main components of a micro-grid and discern the differences between micro-grid and smart-grid systems and their applications.	Knowledgeable	1, 1.3.a, 1.3, 3, 3.1.c, 3.2.b, 3.3.c, 3.1, 3.2, 3.3
6 Demonstrate advanced specialist knowledge to explain the scientific and conceptual principles underpinning the operation of energy storage systems and key characteristics which inform their selection for use.	Knowledgeable Sustainability-focussed	1, 1.3.a, 1.3, 3, 3.1.c, 3.3.b, 3.5.b, 3.1, 3.3, 3.5

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	

CODE	COMPETENCY
1.6.a	Knowledge and Skill Base - Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline: Appreciates the basis and relevance of standards and codes of practice, as well as legislative and statutory requirements applicable to the engineering discipline.
1	Elements of competency: Knowledge and Skill Base
1.3.a	Knowledge and Skill Base - In-depth understanding of specialist bodies of knowledge within the engineering discipline: Proficiently applies advanced technical knowledge and skills in at least one specialist practice domain of the engineering discipline.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within the engineering discipline.
1.5	Knowledge and Skill Base: Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific 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.
2.2.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.
2.3.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.
2.1	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	Elements of competency: Professional and Personal Attributes
3.1.c	Professional and Personal Attributes - Ethical conduct and professional accountability: Understands the accountabilities of the professional engineer and the broader engineering team for the safety of other people and for protection of the environment.
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.
3.3.c	Professional and Personal Attributes - Creative, innovative and pro-active demeanour: Is aware of broader fields of science, engineering, technology and commerce from which new ideas and interfaces may be drawn and readily engages with professionals from these fields to exchange ideas.
3.3.b	Professional and Personal Attributes - Creative, innovative and pro-active demeanour: Seeks out new developments in the engineering discipline and specialisations and applies fundamental knowledge and systematic processes to evaluate and report potential.
3.5.b	Professional and Personal Attributes - Orderly management of self, and professional conduct: Understands the importance of being a member of a professional and intellectual community, learning from its knowledge and standards, and contributing to their maintenance and advancement.
3.1	Professional and Personal Attributes: Ethical conduct and professional accountability.
3.2	Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.
3.3	Professional and Personal Attributes: Creative, innovative and pro-active demeanour.
3.5	Professional and Personal Attributes: Orderly management of self, and professional conduct.

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 GC005, GD005 or MC005

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	1a	Practical / Laboratory Skills, and Written Piece	Individual	10%	600 words (+/- 10%)	Week 3	Online Assignment Submission with plagiarism check
All	1b	Practical / Laboratory Skills, and Written Piece	Individual	40%	2000 words	Week 11	Online Assignment Submission with plagiarism check
All	2a	Oral and Written Piece	Individual and Group	20%	600 words (+/- 10%)	Week 6	Online Assignment Submission with plagiarism check
All	2b	Oral and Written Piece	Group	30%	2000 word report and 10 mins oral presentation.	Week 12	Online Assignment Submission with plagiarism check

All - Assessment Task 1a: Practical / Laboratory Skills, and Written Piece

GOAL:	Experimental work on Micro-grid and Energy Storage Systems to verify students' ability to apply knowledge and skills acquired in the course.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Draft report via word or equivalent (see Canvas) . This is in preparation for final submission in Task 1b.

CRITERIA:

No.		Learning Outcome assessed
1	Analysis of key objectives and applications of energy storage in electrical networks.	1 2 5 6
2	Evaluation of a variety of energy storage systems solutions in micro-grids.	2 3
3	Application of industry standard software analysis tools to the simulation and study of characteristics and behaviour of micro-grids and smart-grids.	2 3
4	Demonstration of advanced technical knowledge on micro-grid and smart-grid systems and their applications.	5

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

All - Assessment Task 1b: Practical / Laboratory Skills, and Written Piece

GOAL:	Experimental work on Micro-grid and Energy Storage Systems to verify students' ability to apply knowledge and skills acquired in the course.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Experimental work on Micro-grid and Energy Storage Systems to verify students' ability to apply knowledge and skills acquired in the course.

CRITERIA:

No.		Learning Outcome assessed
1	Analysis of key objectives and applications of energy storage in electrical networks.	1 2 5 6
2	Evaluation of a variety of energy storage systems solutions in micro-grids.	2 3
3	Application of industry standard software analysis tools to the simulation and study of characteristics and behaviour of micro-grids and smart-grids.	2 3
4	Demonstration of advanced technical knowledge on micro-grid and smart-grid systems and their applications.	5

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

All - Assessment Task 2a: Oral and Written Piece

GOAL:	Practical group projects on Micro-grid and Energy Storage Systems topics to verify students' ability to apply knowledge and skills acquired in the course in a collaborative environment. Working in a team, students record methods and results of the project and communicate them in a professional manner through a final report and oral presentation.
PRODUCT:	Oral and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Draft report via word or equivalent (see Canvas) . This is in preparation for final submission in Task 2b.
CRITERIA:	

No.		Learning Outcome assessed
1	Application of industry standard software analysis tools to the simulation and study of characteristics and behaviour of micro-grids and smart-grids.	1 2 3 6
2	Design of micro-grids and smart-grids to meet specified criteria and performance standards and conducting fault analysis specific to micro-grids and smart-grids.	1 2 3 4
3	Demonstration of advanced technical knowledge on micro-grid and smart-grid systems and their applications.	2 5 6

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

All - Assessment Task 2b: Oral and Written Piece

GOAL:	Final group projects on Micro-grid and Energy Storage Systems and oral presentation are submitted, culminating results from the trimester.
PRODUCT:	Oral and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Report via word or equivalent; powerpoint or equivalent (see Canvas)
CRITERIA:	

No.		Learning Outcome assessed
1	Application of industry standard software analysis tools to the simulation and study of characteristics and behaviour of micro-grids and smart-grids.	1 2 3 6
2	Design of micro-grids and smart-grids to meet specified criteria and performance standards and conducting fault analysis specific to micro-grids and smart-grids.	1 2 3 4
3	Demonstration of advanced technical knowledge on micro-grid and smart-grid systems and their applications.	2 5 6

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

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?

Health and safety risks for this course have been assessed as low. It is 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

Eligibility for Supplementary Assessment Your eligibility for supplementary assessment in a course is dependent of the following conditions applying: - The final mark is in the percentage range 47% to 49.4% - The course is graded using the Standard Grading scale - You have not failed an assessment task in the course due to academic misconduct

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