



Course Outline (Higher Education)

Institute / School:	Institute of Innovation, Science, and Sustainability
Course Title:	MICRO-GRID AND ENERGY STORAGE SYSTEMS
Course ID:	ENGIN5102
Credit Points:	15.00
Prerequisite(s):	(ENGIN3102)
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	031301

Description of the Course:

This course provides an in-depth knowledge and understandings of micro-grid and smart-grid technologies along with their design and implementation strategies. The course further introduces energy storage systems and provides a broad understanding and appreciation of the scientific principles that underpin the operation of such systems.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:

Knowledge:

- K1.** Identify the main components of a micro-grid and discern the differences between micro-grid and smart-grid systems.
- K2.** Recognise the key standards and salient operational characteristics of micro-grid and smart-grid systems.
- K3.** Explain the scientific and conceptual principles underpinning the operation of energy storage systems and key characteristics which inform their selection for use.

Skills:

- S1.** Design micro-grids and smart-grids to meet specified criteria and performance standards.
- S2.** Conduct fault analysis specific to micro-grids and smart-grids.
- S3.** Evaluate and assess solutions to problems associated with a variety of energy storage systems in micro-grids.

Application of knowledge and skills:

- A1.** Apply industry standard software analysis tools to simulate and study characteristics and behaviour of micro-grids and smart-grids.
- A2.** Interpret and appraise different challenges associated with micro-grids and smart-grids.
- A3.** Develop and analyse the key objectives and applications of energy storage in electrical networks.

Course Content:

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 which can include, electrical, chemical, mechanical, electrochemical, thermochemical, thermomechanical, etc.

Values:

- V1.** Appreciate and apply safe practices in an environment that may contain potential electrical hazards along with the applicable standards and grid codes.
- V2.** Appreciate learning as a lifelong process and the importance of development of micro-grid as part of electric power distribution system.

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1, K2, K3, S1, S2, S3, A1, A2, A3	1-3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	K3, S1, A3	1-3
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	Not applicable	Not applicable
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K3, S3, A1, A2, A3	1-3
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	K2, K3, S1, S3, A1, A2, A3	1-3

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1, K2, S1, S3, A2, A3	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the course.	assignments / quizzes	10% - 30%
K1 - K3, S1 - S3, A1 - A3	Experimental/simulation work to verify students' ability to apply knowledge and skills acquired in the course.	report	10% - 30%
K1-K3, S1-S3, A2	The test or exam tests analytical and critical thinking and a general understanding of the course materials.	test or exam	40% - 60%

Adopted Reference Style:

Other (IEEE)

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)