Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: Microgrids and Energy Storage System

Unit ID: ENGPG9209

Credit Points: 15.00

Prerequisite(s): (ENGPG9204)

Co-requisite(s): Nil

Exclusion(s): (ENGRG9206)

ASCED: 031301

Description of the Unit:

This unit provides an in-depth knowledge and understandings of micro-grid and smart-grid technologies along with their design and implementation strategies. The unit 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)

Work Experience:

No work experience

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment.

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory						

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Intermediate						
Advanced					✔	

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.

Unit Content:

Topics may include:
1. Introduction to micro-grid
2. Micro-grid - components, standards, applications, operations
3. Use of mircro-grid as smart-grid
4. Smart-grid - standards, control, communication, cyber security and energy management
5. Smart metering
6. Energy storage systems - background, application and objectives
7. Overview and study of different energy storage systems which can include, electrical, chemical, mechanical, electrochemical, thermochemical, thermomechanical, etc.

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**ttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly*

assessed in each Course.

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	**Assessment task (AT#)**
FEDTASK 1 Interpersonal	Students at this level will demonstrate an advanced ability in a range of contexts to effectively communicate, interact and work with others both individually and in groups. Students will be required to display high level skills in-person and/or online in: • Using and demonstrating a high level of verbal and non-verbal communication • Demonstrating a mastery of listening for meaning and influencing via active listening • Demonstrating and showing empathy for others • High order skills in negotiating and conflict resolution skills\\ • Demonstrating mastery of working respectfully in cross-cultural and diverse teams.	Not applicable	Not applicable
FEDTASK 2 Leadership	Students at this level will demonstrate a mastery in professional skills and behaviours in leading others. • Creating and sustaining a collegial environment • Demonstrating a high level of self -awareness and the ability to self-reflect and justify decisions • Inspiring and initiating opportunities to lead others • Making informed professional decisions • Demonstrating initiative in new professional situations.	Not applicable	Not applicable
FEDTASK 3 Critical Thinking and Creativity	Students at this level will demonstrate high level skills in working in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: • Reflecting critically to generate and consider complex ideas and concepts at an abstract level • Analysing complex and abstract ideas, concepts and information • Communicate alternative perspectives to justify complex ideas • Demonstrate a mastery of challenging conventional thinking to clarify complex concepts • Forming creative solutions in problem solving to new situations for further learning.	Not applicable	Not applicable
FEDTASK 4 Digital Literacy	Students at this level will demonstrate the ability to work competently across a wide range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: • Mastering, exploring, evaluating, managing, curating, organising and sharing digital information professionally • Collating, managing complex data, accessing and using digital data securely • Receiving and responding professionally to messages in a range of professional digital media • Contributing competently and professionally to digital teams and working groups • Participating at a high level in digital learning opportunities.	Not applicable	Not applicable
FEDTASK 5 sustainable and Ethical Mindset	Students at this level will demonstrate a mastery of considering and assessing the consequences and impact of ideas and actions in enacting professional ethical and sustainable decisions. Students will be required to display skills in: • Demonstrate informed judgment making that considers the impact of devising complex solutions in ambiguous global economic environmental and societal contexts • Professionally committing to the promulgation of social responsibility • Demonstrate the ability to evaluate ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Communicating lifelong, life-wide and life-deep learning to be open to the diverse professional others • Generating, leading and implementing required actions to foster sustainability in their professional and personal life	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, S3	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the unit.	Assessments, quizzes	10% - 30%
S2, S3, A1, A3	Experimental/simulation work to verify students` ability to apply knowledge and skills acquired in the unit.	Report, oral or written explanatory tasks.	10% - 30%
K1, K2, K3, S1, A2, A3	The test or exam tests analytical and critical thinking and a general understanding of the unit materials.	Test or exam	40% - 60%

Adopted Reference Style:

IEEE ()

Refer to the library website for more information

Fed Cite - referencing tool