



Unit Outline (Higher Education)

Institute / School:	Institute of Innovation, Science, and Sustainability
Unit Title:	Power Electronic Application to Renewable Energy Systems
Unit ID:	ENGIN4102
Credit Points:	15.00
Prerequisite(s):	(ENGIN3101)
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	031301

Description of the Unit:

This unit provides knowledge and understanding of the design, applications and use of different power electronics devices in wide range of off-grid and grid connected renewable energy systems. The unit further provides link between theories taught and practical life industry use and investigate power quality issues associated to its use in renewable energy systems.

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

Work Experience:

No work experience: Student is not undertaking work experience in industry.

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	<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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes:

Knowledge:

- K1.** Distinguish between the operational principles of different power electronic devices applicable to renewable energy systems.
- K2.** Recognise the conceptual and practical advantages of switching power electronic circuits over non-switched circuits in renewable energy applications.
- K3.** Identify the power quality issues possible from renewable energy systems and traditional energy sources and demonstrate the use of power electronic systems to reduce such power quality problems.

Skills:

- S1.** Analyse the performance of different power electronic devices used in renewable energy systems.
- S2.** Design and construct different power electronic devices for renewable energy applications.
- S3.** Evaluate and integrate the operation of power semiconductor devices in a range of operational settings within renewable energy systems.

Application of knowledge and skills:

- A1.** Analyse different power electronic devices used in renewable energy systems through translating the physical principles, fundamental theories and modelling techniques.
- A2.** Propose solutions to challenges to the electrical network with the rise in the use of renewable energy technologies and the use of power electronics to eliminate certain challenges.
- A3.** Apply computer simulation tools to analyse power electronic devices in renewable energy systems.

Unit Content:

Topics may include:

- Switch mode device operation
- Switching electronic devices
- DC-DC converters
- Rectifiers and controlled rectifiers
- Power quality issues in renewable energy systems
- Inverters and PWM control
- Multilevel converters and applications
- Integration of multiple renewable energy sources

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1 - K3, S2, S3, A1 - A3	Experimental/simulation work to verify students' ability to apply knowledge and skills acquired in the unit.	Reports, demonstrations	10% - 30%
K1 - K3, S1, S2, A1, A2	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the unit.	Assignments, quizzes	10% - 30%
K1 - K3, S1, S2, A1, A2	Questions and problems related to the materials covered in the unit.	test or exam	40% - 60%

Adopted Reference Style:

Other (IEEE)

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

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