



Course Outline (Higher Education)

Institute / School:	Institute of Innovation, Science, and Sustainability
Course Title:	POWER ELECTRONIC APPLICATION TO RENEWABLE ENERGY SYSTEMS
Course ID:	ENGIN4102
Credit Points:	15.00
Prerequisite(s):	(ENGIN3101)
Co-requisite(s):	Nil
Exclusion(s):	Nil
ASCED:	031301

Description of the Course:

This course 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 course 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)

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 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.

Course 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

Values:

- V1.** Appreciate the critical role of power electronics in achieving desired stability, reliability and safety of renewable energy systems.
- V2.** Appreciate learning as a lifelong process and the recent development and challenges associated with the use power electronic devices within various renewable energy systems.

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-K3, S1-S3	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.	K1-K3, S1-S3, A1-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.	K1-K3, S1-S3, A1-A3	1-3
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.	K1-K3, S1-S3, A1-A2	1,2
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.	K1-K3, S1-S3, A1-A2	1-3

Learning Task and Assessment:

Learning Outcomes Assessed	Learning 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 course.	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 course.	Assignments, quizzes	10% - 30%
K1 - K3, S1, S2, A1, A2	Questions and problems related to the materials covered in the course.	test or exam	40% - 60%

Adopted Reference Style:

Other (IEEE)

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

Fed Cite - [referencing tool](#)