Course Outline (Higher Education)

Institute / School: Institute of Innovation, Science, and Sustainability

Course Title: POWER ELECTRONICS

Course ID: ENGIN3101

Credit Points: 15.00

Prerequisite(s): (ENGIN1002)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 031301

Description of the Course:
This course facilitates development of fundamental concepts and understanding of basic theory involved in modelling and analysis of the power electronic components that comprise power electronic devices such as power supplies, inverters, converters and their control systems. The course covers the physical concepts and mathematical models behind each of the basic components and of their functionality within a system, such as a high voltage DC transmission system. The course further demonstrates use of power electronics to real world engineering applications and provide links with the theories covered.

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						
Intermediate						
Advanced			✔			

Learning Outcomes:

Knowledge:

K1. Discern between and explain the operational principles of different power electronic systems and devices.

K2. Explain the principles of different power converters and switching power supplies.

K3. Interpret theoretical concepts covering building blocks of power electronic conversions under different operational environments.

Skills:

S1. Investigate performances of different power electronic devices.

S2. Design, construct and analyse different power electronic systems.

S3. Evaluate the operation of power semiconductor devices in a range of operational settings.

Application of knowledge and skills:

A1. Analyse different power electronic devices by translating principles, fundamental theories and modelling techniquies.

A2. Interpret the knowledge and understanding of power electronics theory to design circuits to meet specifications.

A3. Apply computer simulation tools to analyse power electronic systems and devices.

Course Content:

Topics may include:

- Power semiconductor devices
- Driver and trigger circuit for power devices
- Converters (AC-DC, DC-DC DC-AC, AC-AC)
- Switching Mode Power Supplies
- DC and AC Drives
- Principles of regenerative braking
- Application of power electronics (e.g. in power systems, renewable energies, smart grids)

Values:

V1. Appreciate the critital role of power electronics in achieving desired stability, reliability and safety of industrial engineering systems.

V2. Appreciate learning as a lifelong process and the recent development and challenges of power electronic devices.

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

Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1 - K3, S1, S2, A1, A2	Tasks are developed as assessed (graded) checkpoints to verify the students' level of understanding of different power electronic technologies. The questions will be based upon the contents covered during lectures and tutorials.	Quizzes and assignments	10%-30%
S2, S3, A1-A3	The task is aimed to develop students` ability to appropriately model, analyse, design, simulate and test important concepts in this course, and then report back technical findings. This assessment task will promote communication and hands-on skills	Lab and report	20%-30%
K1 - K3, S1, S2, A1, A2	Thorough knowledge of these topics is essential to answer the exam questions. The examination tests analytical and critical thinking and a general understanding of the course materials.	test or exam	40%-70%

Adopted Reference Style:

Other (IEEE)

Refer to the library website for more information

Fed Cite - referencing tool