Unit Outline (Higher Education)

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

Unit Title: POWER ELECTRONICS

Unit ID: ENGIN3101

Credit Points: 15.00

Prerequisite(s): (ENGIN1007 for undergraduate Students only)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 031301

Description of the Unit:
This unit 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 unit 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 unit 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)

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						

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

Unit 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)

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment 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 unit, and then report back technical findings. This assessment task will promote communication and hands-on skills	Lab and report	20%-30%

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
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 unit materials.	test or exam	40%-70%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

Adopted Reference Style:

Other (IEEE)

Refer to the library website for more information

Fed Cite - referencing tool