ELEN90075 Power Electronics

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours of lecture(3X1 hour lecture per week) and up to 24 hours of workshops Total Time Commitment: 200 hours
Prerequisites:	Prerequisite for students enrolled in the MC-ENG Master of Engineering (Electrical) and (Electrical with Business) is: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN90074 Introduction to Power Engineering | Semester 1 | 12.50 Prerequisites for students enrolled in the MC-ENGYSYS Master of Energy Systems are: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN90074 Introduction to Power Engineering | Semester 1 | 12.50 **AND** Approval from the subject coordinator
Corequisites:	None
Recommended Background Knowledge:	**Subject** | **Study Period Commencement:** | **Credit Points:** ELEN90055 Control Systems | Semester 1, Semester 2 | 12.50
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Dr Iman Shames
Contact:	Email: **iman.shames@unimelb.edu.au (mailto:iman.shames@unimelb.edu.au)**
Subject Overview:	**AIMS** The aim of this subject is to understand the fundamental concepts and 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. It is expected that at the end of this subject the student has a sound understanding of 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. Furthermore this subject seeks

	to combine the fields of electronics, semiconductor devices, power system operation, power system measurement and control. It is expected that through this subject the students are exposed to examples of real electrical engineering systems where the three disciplines of electronics, power systems and control come together. **INDICATIVE CONTENT** Topics covered in this subject include: introduction to power semiconductor switches; discussion on the role of power electronics in the operation of electric power systems; models of power semiconductor devices and circuit components, including diodes, Thyristors, IGBT, Snubber circuits. Also basic concepts of single- and three-phase diode bridge rectifiers; single- and three-phase converters and inverters; operation and design of DC-AC inverters with emphases on switch-mode inverters, i.e. single- and three-phase inverters. Finally, the acquired knowledge of power electronic devices is applied to wind and PV solar systems where the design of voltage source converters and associated control loops are used to interface the wind/solar system with the power grid.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES** It is expected that on completing this subject the students should be able to: 1 Apply physical principles, fundamental abstractions and modelling techniques in the analysis of power electronic components and devices 2 Develop and demonstrate basic electrical engineering laboratory skills through simulation of practical real life electrical electronics devices and systems using software tools and analyse the performance and characteristics of each of its components 3 Compare the performance of physical power systems obtained through simulation with theoretical analysis.
Assessment:	Continuous assessment of laboratory workshop outcomes in small groups (2-3 students) in weeks 2-12, requiring approximately 25-30 hours of work per student (20%) One 90-minute mid-semester test held in week 6 or 7 (20%) One written examination, not exceeding three hours, held during the end of semester examination period (60%). Hurdle requirement: Students must pass the end of semester written exam to pass the subject. Intended Learning Outcomes (ILOs) 1 - 3 are assessed in the final written examination, the mid-semester examination, and assignments. ILOs 2-3 are assessed as part of the laboratory workshops outcomes and written reports.
Prescribed Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	# Ability to apply basic fundamentals of science and engineering to solve real life problems associated with power systems # Ability for in-depth technical competence in power systems engineering discipline # Ability to identify, formulate, analyse and solve practical engineering problems # Capacity for independent critical thought, rational assessment and self-directed learning # Ability to communicate and work effectively with teams # Ability to write technical reports in a clear and concise manner # Ability to present results of technical investigation to a large audience.
Notes:	**LEARNING AND TEACHING METHODS** This mode of delivery of this subject is through lectures supported by tutorial s and practical hands-on workshops. **INDICATIVE KEY LEARNING RESOURCES** Full set of lecture notes, tutorial sets and model solutions as well as workshops reports are provided. **CAREERS / INDUSTRY LINKS** Guest speakers from power industry are usually invited to give seminars on technical issues related to their respective companies and how these issues relate to the content of this subject.

Related Majors/Minors/ Specialisations:	Master of Engineering (Electrical with Business) Master of Engineering (Electrical)