

Course unit title:	Power Electronics		
Course unit code:	AEEE456		
Type of course unit:	Elective		
Level of course unit:	Bachelor (1 st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	8 (Spring)		
Number of ECTS credits allocated:	5		
Name of lecturer(s):	Dr. Antonis Papadakis		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> 1. Describe the fundamental theory and application of Power Electronics. 2. Explain the operation of fundamental power electronic devices. 3. Describe the different power electronic devices' range of operation. 4. Clarify the ideal characteristics of power electronic devices and limitations. 5. Analyze basic power electronic circuits that include power diodes, thyristors and transistors. 6. Solve problems involving power electronic converters. 		
Mode of delivery:	Face-to-face		
Prerequisites:	None	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<ul style="list-style-type: none"> ● Introduction to Power Electronics: Applications of Power Electronics, History of Power Electronics, Power Semiconductor Devices- Power Diodes, Thyristors, Power Transistors. ● Control Characteristics of Power Devices: Characteristics and Specifications of Switches- Ideal Characteristics, Characteristics of Practical Devices, Switch Specifications, Types of Power Electronic Circuits. ● Design of Power Electronics Equipment: Square Values of Waveforms, Peripheral Effects, Power Modules, Intelligent Modules. ● Power Diodes: Diode characteristics and its models, Types of diodes, Series and parallel operation of diodes, Unidirectional device like a diode on RLC circuits, Freewheeling and stored-energy recovery. ● Power Thyristors: Introduction, Basic Structure and Operation, Static Characteristics, Switching Characteristics, Thyristor Parameters, Types of Thyristors, Gate Drive Requirements, Applications. ● Power Transistors: Introduction, Basic Structure and Operation, Static Characteristics, Dynamic Switching Characteristics, Transistor Base Drive Applications, BJT Applications. ● Applications and Problems: Chopper Circuits, Step Down Converters, Step Up Converters, Ideal Power Rectifiers 		

Recommended and/or required reading:	
Textbooks:	<ul style="list-style-type: none"> • Rashid Muhammed H, Power Electronics-Circuits Devices and Applications, Prentice Hall, 4th Edition, Prentice Hall, 2013.
References:	<ul style="list-style-type: none"> • Rashid Muhammed H, Power Electronics Handbook - Devices, Circuits and Applications, 2nd edition, Prentice Hall, 2006. • Rashid Muhammed H, Power Electronics Handbook, Prentice Hall, 2009. • Harish C Rai, Textbook of Power Electronics Devices Circuits Systems & Applications, Galgotia Publications Pvt Ltd, 2009.
Planned learning activities and teaching methods:	<p>Teaching is based on lectures.</p> <p>The course delivery will be based on theoretical lecturing, assignments and exercises solved in class. Exercises will be handed to students and their solutions shall be analysed at lecture periods. Additional tutorial time at the end of each lecture will be provided to students. Students are expected to demonstrate the necessary effort to become confident with the different concepts and topics of the course.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> • Assignments 10% • Tests: 30% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No