

## MODULE DESCRIPTOR

<b>MODULE TITLE</b>	POWER ELECTRONIC SYSTEMS		
<b>MODULE CODE</b>	EL3813 (L6)	<b>CREDIT VALUE</b>	20 CREDITS (10 ECTS)
<b>CAMPUS</b>	UCLAN CYPRUS		
<b>SCHOOL</b>	SCHOOL OF SCIENCE		

### MODULE AIMS

The aim of this module is to enable students to develop a thorough understanding of the fundamental topics in the field of Power Electronics and apply these to various systems.

### MODULE CONTENT

Module content will typically include:

Power electronics devices: Diodes, thyristor, GTO thyristor, triacs, IGBTs power MOSFETs, switching characteristics, and drive circuitry. Switching losses, efficiency, protection.

Converters: Operation and analysis

AC to DC, inversion, overlap, cyclo-converters.

DC to DC, back, boost, back boost, MPPT,

DC to AC 3-Level SPWM, multilevel, efficiency and quality of output

AC to AC Converters, dc link and matrix converters

Harmonic analysis, effect of harmonics on motors and supply, interference.

Active filters and STATCOM (Static synchronous Compensator), harmonics elimination and PF correction.

PV systems: Grid connected, stand alone, batteries.

Wind generation systems: Domestic systems, wind park systems, induction and permanent magnet configurations

Application of power electronics to DC motors including; Permanent magnet dc motors: street vehicles, small rough ground vehicles, electric braking and speed control, including constant torque V/f.

AC Motor drive characteristics when controlled by power electronics elements, machine drives.

Control machine drives: Programmable logic controllers and microprocessor speed control methods.

Electronic starters, soft starters. Phase-failure and overload electronic protection.

Switched mode power supplies, uninterruptible power supplies, heating, induction heating, static switches, regulators.

Rectifier transformers: Winding arrangements, ratings, excitation, DC unbalance and AC unbalance, transformer-isolated converters.

### INTENDED LEARNING OUTCOMES

<b>On successful completion of this module a student will be able to:</b>	
1.	Investigate and critically evaluate the use of the main Power Electronics devices and their application.
2.	Discuss, evaluate, and critically analyse the different types of converters for rectification and inversion in power electronics.
3.	Deploy knowledge and skills for the control of DC and AC motors and power generation systems
4.	Demonstrate an extensive knowledge on active filters, static synchronous compensator (STATCOM) and harmonics elimination.
5.	Investigate and critically evaluate the use of Switched mode power supplies and rectifier transformers.

## **TEACHING METHODS**

The class contact will consist of lectures, tutorials, and practical sessions. Lectures will introduce new material and provide examples. During the tutorials, students will apply lecture theory to solve related problems. Practical session will be used to familiarise students with laboratory equipment and develop their practical skills. Whenever possible, guest lecturers (industry professional and/or researchers) will deliver seminars to the students in which they will share their personal and professional experience.

## **ASSESSMENT METHODS**

The module is assessed through one short test, one coursework, and one final exam.