The University Of Sheffield.

Electronic & Electrical Engineering.

EEE6023 POWER ELECTRONICS

Credits: 10

Course Description including Aims

1. To introduce and develop an understanding of power electronic devices and circuits.
2. To develop circuit analysis techniques, circuit understanding and design capabilities for use in ac and dc power converters.

Outline Syllabus

Power Diodes : rectification, form factors, parallel and series connection, stored charge problems. **Switching Devices :** static and dynamic characteristics, loss mechanisms and drive requirements of Bipolar, Mosfet and IGBT devices, parallel operation and comparison with Thyristor and GTO devices and requirements. **Converters :** AC to DC, DC to AC and DC to DC conversion systems, basic principles and main operational considerations. Switched mode power supplies, alternative circuit configurations and outline designs. Resonant switching techniques. Snubber circuits. Noise and interference from switching circuits. Heatsinking. Control strategies.

Time Allocation

24 lectures plus 12 hours of additional support material.

Recommended Previous Courses

Background knowledge equivalent to EEE201 “Signals and Systems”, EEE204 “Electronic Devices in Circuits” EEE340 “Analogue and Switching Circuits” and EEE342 “Feedback Systems Design” will be useful

Assessment

2 Hour Examination, answer three questions from four.

Recommended Books

Lander, C.W.	*Power Electronics*	McGraw-Hill
Mohan N	*Power Electronics - Converters Applications & Design*	Wiley
Williams B.W.	*Power Electronics - Devices Drivers & Applications*	Macmillan
Kassakian, J.G	*Principles of Power Electronics*	Addison-Wesley

Objectives

By the end of the module successful students will be able to

1. Understand the terminal characteristics of, and be confident in using, power switching devices.
2. Design simple switched mode power supplies (isolated and non-isolated).
3. Produce a small signal transfer function for a simple switched mode power supply in order to stabilize its operation.
4. Design inverter bridges.
5. Understand the operation and characteristics of single phase, phase controlled rectifiers