

Liverpool John Moores University

Title: Power Electronics, Drives and Systems
Status: Definitive
Code: **6005ELE** (120059)
Version Start Date: 01-08-2019

Owning School/Faculty: Electronics and Electrical Engineering
Teaching School/Faculty: Electronics and Electrical Engineering

Team	Leader
Emil Levi	Y
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Academic Level: FHEQ6 **Credit Value:** 20 **Total Delivered Hours:** 74
Total Learning Hours: 200 **Private Study:** 126

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	44
Practical	6
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Final exam	40	2
Exam	Test	In-class test	30	
Report	Report	Lab report	30	

Aims

To develop intellectual ability to select and apply appropriate mathematical methods for modelling and analysing problems and produce solutions to problems through the practical application of electrical power engineering.

Learning Outcomes

After completing the module the student should be able to:

- 1 Appraise types and topologies of power electronic converters and analyse their operation
- 2 Assess different methods of speed control of dc and induction motor drives
- 3 Operate and test variable speed drives supplied from power electronic converters
- 4 Apply modelling of various components of a power system as required for steady state power system analysis
- 5 Apply power system component models in analysis of normal power system operation

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Final exam	4	5
In class test	1	2
Lab report	3	

Outline Syllabus

1. Power electronic devices and basic converter topologies

*Introduction to power electronics and its applications
Thyristors, MOSFETs, IGBTs, thyristors, GTOs, MCTs.
Rectifiers, inverters, dc to dc and ac to ac converters.*

2. Variable speed electric drives

*Braking, load torque types, constant torque and constant power regions in VSDs.
Speed control methods for d.c. and induction machines.
Applications of power electronic converters in variable speed drives.*

3. Power system component modelling

*Impedance drop, voltage drop and voltage regulation.
Modelling of power system components: load, transmission lines, cables, transformers, synchronous machines.
Power electronic converters in power systems: HVDC transmission, static VAR compensation.*

4. Power system analysis

*Per unit system.
Symmetrical component theory, symmetrical impedance networks.
Symmetrical and asymmetrical short circuit analysis.*

Learning Activities

A series of lectures, tutorials and lab sessions

Notes

This module describes operation of power electronic converters, methods for variable speed operation of electric drives and examples of application of power electronic converters in electric drives and power systems. Modelling of power system components and power system analysis are also covered.