Summary Information

Module Code	7420MEPC
Formal Module Title	Modelling and Control of Electric Machines and Drives
Owning School	Engineering
Career	Postgraduate Taught
Credits	20
Academic level	FHEQ Level 7
Grading Schema	50

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	To develop an understanding of principles and acquire working knowledge of mathematical modelling of electrical machines.To introduce the principles of control of variable speed electric drives using power electronic converters.To introduce the concept of vector control as applied to induction machines.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Analyse steady state behaviour of grid supplied and inverter supplied induction machines
MLO2	2	Formulate MATLAB functions to design programs for steady state analysis
MLO3	3	Synthesise models of various transients of grid-supplied and inverter-supplied ac machines
MLO4	4	Create a working simulation in Simulink/MATLAB for the analysis of AC machine's dynamics

Module Content

Outline Syllabus	1. Steady state modelling of induction machines and supply:Principles of AC machine steady state modelling.Steady state characteristics of grid supplied induction machine.Variable-speed of operation using V/f control.Voltage source inverter - power circuit and operation in six-step mode.PWM control of a voltage source inverter.2. Transient modelling of induction machines:Modelling of a three-phase squirrel-cage induction machine in terms of phase variables.Common reference frame transformations: Model in arbitrary d-q reference frame.Concept of space vectors and induction machine model in terms of space vectors.Modelling of the three-phase sinusoidal power supply and voltage source inverter using space vectors.High-performance AC drives: The idea of vector control and field orientation possibilities in an induction machine. Principles of rotor flux oriented control.
Module Overview	
Additional Information	This level 7 module introduces the advanced concepts of electrical machine modelling and high performance dynamic control of variable speed AC drives.United Nations Sustainable Development Goals:4. Quality Education7. Affordable and Clean Energy8. Decent Work and Economic Growth9. Industry, Innovation and Infrastructure11. Sustainable Cities and Communities12. Responsible Consumption and Production13. Climate Action

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Technology	Simulation	100	0	MLO1, MLO2, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Obrad Dordevic	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings