Module Proforma

Approved, 2022.02

Summary Information

Module Code	7406ELE
Formal Module Title	Renewable Electric Power Systems
Owning School	Engineering
Career	Postgraduate Taught
Credits	10
Academic level	FHEQ Level 7
Grading Schema	50

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Martin Jones	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours

Lecture	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To build upon the knowledge already gained at levels 5 and 6 with regard to renewable energy systems, electric machines and power electronics. To develop knowledge of wind energy converters and photovoltaic energy conversion technologies and their connection to the power grid.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Discuss the need for renewable energy power generation methods in terms of process, potential, environmental need and legislative fulfilment.
MLO2	Evaluate the performance of renewable energy generation systems by applying mathematical modelling techniques.
MLO3	Design systems for reactive power compensation and voltage control in the power system.

Module Content

Outline Syllabus
General discussion surrounding global warming.Review the UK's renewable energy policy.Wind turbine - types, electric machinery – induction generator the DFIG and the PMSG, and their associated power electronic topologies.Fixed speed and variable speed wind turbines. The principles of field-oriented control.Aerodynamic aspects – blades, Betz law, pitch control.The solar resource, irradiance, direct beam radiation and diffuse radiation. Operating principles of photovoltaic cells, modules and arrays. Efficiency and energy yield of P.V. systems. Electrical characteristics of P.V. materials. Maximum power point tracking systems.Grid connection issues -Voltage oriented control, grid synchronization. Energy storage systems and reactive power compensation equipment.

Module Overview

Additional Information
UNESCO Sustainable Development GoalsQuality EducationAffordable and Clean EnergyDecent Work and Economic GrowthIndustry, Innovation and InfrastructureSustainable Cities and CommunitiesResponsible Consumption and ProductionClimate ActionUK SPEC AHEP 4CEng. M1 Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.M2 Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed.M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.M4 Select and critically evaluate technical literature and other sources of information to solve complex problems.M6 Apply an integrated or systems approach to the solution of complex problems.M13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.M18 Plan and record self-learning and development as the foundation for lifelong learning/CPD.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Centralised Exam	Examination	100	1.5	MLO2, MLO1, MLO3