Liverpool John Moores University

Title:	Power Systems Modelling and Analysis
Status:	Definitive
Code:	**7008ELE** (120412)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
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Academic Level:	FHEQ7	**Credit Value:**	10	**Total Delivered Hours:**	38
Total Learning Hours:	100	**Private Study:**	62		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	24
Tutorial	12

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1		70	2
Report	AS2		30	

Aims

To develop an understanding of the power system component modelling for steady-state analysis and the types of problems encountered inpower system analysis.

To conisder the principles of voltage and reactive power control in power systems.

Learning Outcomes

After completing the module the student should be able to:

1	Undertake modelling of various components of a power system, as required for steady-state power system analysis
2	Apply power system component models in analysis of the power system under steady-state operating conditions.
3	Design systems for reactive power compensation and voltage control in the power system.
4	Analyse symmetrical and asymmetrical fault conditions in the power system.

Learning Outcomes of Assessments

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

Examination	1	3	4
Power system analysis	2		

Outline Syllabus

Steady state modelling of power system components:
Load modelling (constant impedance representation) and modelling of reactive power compensators. Star-delta and delta-star impedance transformation.
Impedance drop, voltage and voltage regulation.
Modelling of two-winding and three-winding three-phase transformers
Modelling of short and medium-length overhead transmission lines, cable modelling.
Modelling of synchronous generators (turbo- and hydro-machinery)
Power system analysis:
Per unit system and representation of the power system components in per unit.
Calculation of voltages in various nodes of the power system.
Symmetrical components and sequence networks of power system components.
Faults in power systems: three-phase symmetrical short-circuit
Faults in power systems: asymmetrical short circuit analysis using symmetrical Components.
Volatge and reactive power control:
Reactive power compensation using synchronous condensers and static VAr compensators.
On-load tap changing transformers.
Control of power and frequency: the turbine governor.
Control of voltage and reactive power: generator excitation systems, automatic voltage regulator, tap-changing transformers, static VAr compensators.
Power system stability: steady-state stability, transient stability, voltage collapse.

Learning Activities

Lectures supported by handouts.
Tutorials illustrating by numerical examples topics covered at lectures.

Notes

This level 7 module introduces the principles of power system modelling, analysis and control.