Liverpool John Moores University

Title:	Electrical Engineering and Electrical Circuit Principles
Status:	Definitive
Code:	**4501ENGIYO** (120261)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Study Group

Team	Leader
Christian Matthews	

Academic Level:	FHEQ4	**Credit Value:**	10	**Total Delivered Hours:**	46.5
Total Learning Hours:	100	**Private Study:**	53.5		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	30
Tutorial	15

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	1.5 hour Exam	70	1.5
Test	AS2	Series of VLE tests	30	

Aims

To enable students to develop an understanding of the physical principles of electrical and electronic systems, and to analyse simple circuits which incorporate passive and active components.

To enhance knowledge and understanding of the essential mathematics underpinning electrical and electronic engineering.

To develop intellectual abilities in selecting and applying appropriate circuit analysis techniques for analysing various electrical and electronic circuits.

To introduce passive electronic components and understand their operating characteristics.

To introduce the operating principles of transformers and electronic filters.

Learning Outcomes

After completing the module the student should be able to:

1	Describe and model the physical principles of electrical and electronic systems
2	Analyse ac and dc circuits which include passive and active electronic components
3	Understand the different powers in ac circuits and perform calculations
4	Explain the operating principles of transformers

Learning Outcomes of Assessments

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

Exam	1	2	3	4
VLE Tests	1	2	3	4

Outline Syllabus

Passive components, AC circuits and phasors
Introduction to electric fields, permittivity, Capacitance, impedance of a capacitor. Introduction to magnetic fields, self and mutual inductance, impedance of an inductor. Operating principles of transformers.
Alternating current fundamentals, period, frequency and angular frequency. Peak, and rms values. Complex representation of sinusoidal quantities. Phasors. Application of complex numbers in simple ac circuits. Powers in ac circuits. Complex-waveforms and introduction to the Fourier series.
Resonance in simple series ac circuits. Series RLC circuit as a band-pass filter. RC circuits as low-pass and high pass filters.
Basic Operational Amplifiers

Circuit analysis techniques
Steady-state dc and ac circuit analysis:
Kirchhoff's laws. Voltage and current divider rules. The superposition principle. Mesh current analysis. Nodal potential analysis.
Non-ideal current and voltage sources, Thevenin's and Norton's equivalent circuits. Maximum power transfer theory.

Learning Activities

Lectures and tutorials

Notes

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