Liverpool John Moores University

Title:	Electrical Circuit Principles
Status:	Definitive
Code:	**4503ELESBC** (120211)
Version Start Date:	01-08-2016

Owning School/Faculty: Electronics and Electrical Engineering
Teaching School/Faculty: The Sino-British College

Team	Leader
Martin Jones	Y

Academic Level:	FHEQ4	**Credit Value:**	10	**Total Delivered Hours:**	38
Total Learning Hours:	100	**Private Study:**	62		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Test	MapleTA	Continuous assessment. Computer tests	30	

Aims

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 there 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	Define the fundamental relationships governing electric circuits
2	Use circuit analysis techniques to dc and ac circuits
3	Define power 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	2	3	4
Computer tests	1	2	3

Outline Syllabus

1 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.

2 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

A series of lectures supported by tutorials and a series of on-line exercises

Notes

The material delivered in this module will be complimented by the practical skills

module where students will undertake practical experiments to reinforce the material delivered in this module.