Liverpool John Moores University

Title:	Electrical Circuit Principles
Status:	Definitive
Code:	**4303SBC** (124862)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	The Sino-British College

Team	Leader
Martin Jones	Y
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Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	57
Total Learning Hours:	200	**Private Study:**	143		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	33
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	60	2
Test	Test	Test	40	

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	Understand the fundamental relationships governing electric circuits
2	Use circuit analysis techniques to determine operating points of dc circuits
3	Derive the power relations in ac circuits and perform calculations
4	Explain the operating principles of transformers
5	Apply complex numbers and phasors to solve ac circuits.

Learning Outcomes of Assessments

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

Exam	2	3	4
Test	1	2	5

Outline Syllabus

1 Passive components, AC circuits and phasors
Scientific notation, voltage, current, power and energy. 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.

Notes

The material delivered in this module will be complemented by the practical skills module where students will undertake practical experiments to reinforce the material delivered in this module.