Liverpool John Moores University

Title:	CIRCUIT ANALYSIS
Status:	Definitive
Code:	**4009ENG** (105267)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Emil Levi	Y

Academic Level:	FHEQ4	**Credit Value:**	12	**Total Delivered Hours:**	50
Total Learning Hours:	120	**Private Study:**	70		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Practical	6
Tutorial	18

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	AS1	Laboratory Work and Report (CW)	30	
Exam	AS2	Examination (E)	70	2

Aims

To enhance knowledge and understanding of the essential mathematics underpinning electrical and electronic engineering and to develop intellectual abilities in selecting and applying appropriate mathematical methods for analysing various electrical and electronic circuits.
To develop professional practical skills in the use of relevant test and measurement

equipment in experimental laboratory work.

Learning Outcomes

After completing the module the student should be able to:

1	Apply various methods of network analysis to dc and single-phase ac circuits.
2	Calculate various powers in ac circuits
3	Explain operating principles of a transformer.
4	Analyse and perform simple calculations related to three-phase systems.

Learning Outcomes of Assessments

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

CW	1	2		
EXAM	1	2	3	4

Outline Syllabus

Review of complex numbers and their application in ac circuits.
Introduction to electric fields: electric flux density, electric field intensity, breakdown strength, permettivity, capacitance, impedance of a capacitor.
Introduction to magnetic fields: magnetic flux density and magnetci field intensity, magneto-motive force, permeability, magnetic reluctance, inductance, impedance of an inductor.
Series and parallel ac and dc circuits, use of Kirchhoff's laws in the analysis. Voltage divider rule and current divider rule.
Powers in dc and ac circuits. Apparent, active and reactive power. Power flows in series, parallel and series-parallel circuits.
Method of mesh-current analysis and its application to dc and ac circuit.
Method of nodal potential analysis and its application to dc and ac circuits.
Thevenin's theorem and Norton's theorem. Voltage and current sources. Application to dc and ac circuits.
Resonance in simple series ac circuits. Series RLC circuit as a band-pass filter. RC circuits as low-pass and high pass filters.
Transformers: concept of an ideal transformer, impedance transformation. Real transformer: losses, leakage and magnetising flux, equivalent circuit.
Three-phase circuits: star connection of a source and a load. Delta connection of a source and load. Line and phase voltages and currents, powers in three phase circuits.

Learning Activities

A series of lectures supported by tutorials and practical laboratory work.

Notes

The module introduces methods of dc and ac circuit steady state analysis, operating principles of transformers and fundamentals of three-phase systems.