Liverpool John Moores University

Title:	BUILDING SERVICES APPLIED ELECTRICAL SCIENCE
Status:	Definitive
Code:	**5610BEFDL** (123964)
Version Start Date:	01-08-2016
Owning School/Faculty:	Built Environment
Teaching School/Faculty:	City of Liverpool College

Team	Leader
Alfred Leung	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	84
Total Learning Hours:	200	**Private Study:**	116		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	70
Practical	6
Tutorial	5

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	FORMAL EXAMINATION	50	3
Essay	AS2	ESSAY	50	

Aims

The module is intended to enable students studying the electrical pathway of the Building Services programme to apply the analytical techniques, associated with the electrical principles of AC theory, circuit calculations and analysis of complex networks. It also provides the underpinning electrical principles to support many of the techniques and technologies implicit in electrical installations design contained within other modules of this programme, and in associated building services plant

and systems in processing analogue and digital information.

Learning Outcomes

After completing the module the student should be able to:

1	Evaluate and analyse ac networks in a series of combinations and relate the analysis to the application of complex quantities.
2	Investigate the application of circuit theorems and complex quantities techniques to practical networks met in electrical building services engineering.
3	Analyse the response of circuits to transients.
4	Investigate the effect of varying the frequency in ac circuits as related to the control of power in circuits and communication systems.
5	Investigate the principles of analogue and digital information conversion and transmission.
6	Investigate the effect of harmonics for the installation of electrical power supply.

Learning Outcomes of Assessments

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

FORMAL EXAMINATION	1	3	5
ESSAY	2	4	6

Outline Syllabus

Transformation theorems: single phase RLC circuits, series and parallel. Three Phase Star/Delta networks, balanced and unbalanced loads. Star/Delta Transformation Theorems.

Power factor: power measurement and power factor control.

Harmonics: effect on electrical power, total harmonics distortion

Applications of Complex quantities: Admittance, conductance and susceptance, complex power analysis.

DC Circuit theorems: Thevenin's theorem, Norton's theorem, Superposition theorem. Maximum power transfer theorem.

AC Circuit theorems and applications: Thevenin's theorem, Norton's theorem, application to transmission lines, T and P networks, power system configurations and reductions, complex quantities analysis. RLC networks, frequency variations, series and parallel networks, Q factor, filter circuits, bandwidth, coupled circuits, power networks, communication circuits

Transient analysis: capacitance and inductance. R/C and R/L circuits growth and decay of voltage and current. Exponential functions. Sinusoidal and step inputs.

Differentiator and integrator networks.

Transmission systems: dc and ac transmission signals, frequency and wavelength, relationships, analogue/digital signals, modulation, series/parallel data transmission, protocols.

Learning Activities

Lectures, tutorials, laboratory based practical work.

Notes

This module is a specialist module for students pursuing the electrical building services pathway. It aims to support and contextualise mathematical and analytical techniques, and other specialist scientific knowledge, such as principles of AC theory, circuit calculations and analysis of complex networks.