Liverpool John Moores University

Title:	Electrical Circuit Principles
Status:	Definitive
Code:	**4303CIT** (125299)
Version Start Date:	01-08-2020
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Changshu Institute of Technology

Team	Leader
Martin Jones	Y
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Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	82
Total Learning Hours:	200	**Private Study:**	118		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	64
Practical	16

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	60	2
Report	Prog	Programming	30	
Essay	Coursework	Coursework	10	

Aims

By learning this module, the students can acquire much knowledge of circuit, including the basic principles, basic methods of analysis and fundamental experimental ability. What's more, it can also enhance the students' capacity of logical analyzing and ability to solve practical circuit problems, which serves as a solid foundation for the learning of further relevant specialized courses.

Learning Outcomes

After completing the module the student should be able to:

1	Describe the relationship between the basic control circuits;
2	Use circuit analysis technology to set static working point;
3	Calculate the power in the ac circuit
4	Apply plural and phasor to analysis ac circuits.

Learning Outcomes of Assessments

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

Exam	1	2	3	4
Programming	1	2	3	4
Coursework	1	2	3	4

Outline Syllabus

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1. Circuit Variables and Circuit Elements
• Circuit Analysis: an Overview
• Voltage, Current, and the Basic Circuit Elements
• The Ideal Basic Circuit Element
• Power and Energy
• Voltage and Current Sources
• Electrical Resistance (OHM's Law)
• Kirchhoff's Laws
• Analysis of a Circuit Containing Dependent Sources
2. Some Circuit Simplification Techniques
• Source Transformations
• Superposition
3. Techniques of Circuit Analysis
• Introduction to the Node-Voltage Method
• The Node-Voltage Method and Dependent Sources
• The Node-Voltage Method: Some Special Cases
• Introduction to the Mesh-Current Method
• The Mesh-Current Method and Dependent Sources
• The Mesh-Current Method: Some Special Cases
• The Node-Voltage Method Versus the Mesh-Current Method
• Thevenin and Norton Equivalents
• Maximum Power Transfer
4. The Natural and Step Response of RL and RC Circuits

• *The Inductor*
• *The Capacitor*
• *Series-Parallel Combinations of Inductance and Capacitance*
• *Natural Response of RL and RC Circuits*
• *Step Response of RL and RC Circuits*
5. Sinusoidal Steady-State Analysis
• *The Sinusoidal Source*
• *The Sinusoidal Response*
• *The Phasor*
• *Kirchhoff's Laws in the Frequency Domain*
• *Circuit Simplifications*
• *The Node-Voltage Method*
• *The Mesh-Current Method*
• *Instantaneous, Average, and Reactive Power*
• *The rms Value and Power Calculations*
• *Complex Power and Power Calculations*
6. Introduction to Frequency Selective Circuits
• *Low-Pass Filters*
• *High-Pass Filters*
• *Bandpass Filters*
• *Bandreject Filters*

Learning Activities

A series of lectures with some laboratory activities using Multisim.

Notes

This module will introduce the basic theory, principles, phenomena, analysis methods of the circuit. It contains: the basic circuit components; the analysis of linear DC circuit; the theorems of circuits and its applications; the analysis of sine stationary state circuit; the analysis of linear dynamic circuit in time-domain and complex frequency-domain; the network graph theory and network equations.