Liverpool John Moores University

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Title:	Electrical and Electronic Principles
Status:	Definitive
Code:	**4513NCCG** (129432)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Nelson Campus, Nelson and Colne College

Team	Leader
Christian Matthews	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	48
Total Learning Hours:	200	**Private Study:**	164		

Delivery Options
Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	48
Placement/Practice	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	Test	Online Test	50	
Report	Assignment	Assignment	50	

Aims

This module builds up from physical principles including our understanding of the atom, the concept of electrical charge, electric fields, and the behaviour of the electron in different types of material. This understanding is applied to electric circuits of different types, and the basic circuit laws and electrical components emerge. Another set of principles is built around semiconductor devices, which

become the basis of modern electronics. An introduction to semiconductor theory leads to a survey of the key electronic components, primarily different types of diodes and transistors. The amplifier and its characteristics are introduced and simple circuits made from logic gates are considered.

Learning Outcomes

After completing the module the student should be able to:

1	Apply an understanding of fundamental electrical quantities to evaluate circuits with constant voltages and currents
2	Evaluate circuits with sinusoidal voltages and currents
3	Describe the basis of semiconductor action, and its application to simple electronic devices.
4	Explain the difference between digital and analogue electronics, describing simple applications of each.

Learning Outcomes of Assessments

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

Online Test	1	2
Assignment	3	4

Outline Syllabus

Fundamental electrical quantities and concepts
Circuit laws: voltage sources, Ohm's law, resistors in series and parallel, the potential divider, Kirchhoff's and Thevenin's laws; superposition
Energy and power
Fundamental quantities of periodic waveforms: frequency, period, peak value, phase angle, waveforms
Mathematical techniques: trigonometric representation of a sinusoid, rotating phasors and the phasor diagram, complex notation applied to represent magnitude and phase
Reactive components: inductor and capacitor, current and voltage phase relationships with steady sinusoidal quantities, representation on phasor diagram
Circuits with sinusoidal sources: series and parallel RL, RC and RLC circuits, frequency response and resonance, power, root-mean-square power quantities, power factor
Ideal transformer and rectification: the ideal transformer, half-wave and full-wave rectification, use of smoothing capacitor, ripple voltage
Semiconductor materials: characteristics of semiconductors; impact of doping, p-type and n-type semiconductor materials, the p-n junction in forward and reverse bias
Bipolar and field effect transistor types, the bipolar transistor as switch and amplifier
Simple semiconductor applications
Analogue concepts: analogue quantities
Amplifier: gain, frequency response, input and output resistance, effect of source and

load resistance
Digital concepts: logic circuits implemented with switches or relays
Use of voltages to represent logic 0 and 1, binary counting Logic Gates (AND, OR, NAND, NOR) to create simple combinational logic functions, truth tables

Learning Activities

Lectures
These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.
The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.
Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Independent Study
Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

VLE support
This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

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