

### Summary Information

Module Code	4304ELE
Formal Module Title	Digital and Analogue Electronics
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

### Learning Methods

Learning Method Type	Hours
Lecture	44
Practical	22

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

Aims	To provide an introduction to transistors and the small-signal equivalent circuits, the use of operational amplifiers and the operation of combinational and sequential digital logic circuits.
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**After completing the module the student should be able to:**

## Learning Outcomes

Code	Number	Description
MLO1	1	Analyse electronics by using diode and transistor characteristics for simple amplifier design.
MLO2	2	Describe circuits design for analogue signal processing.
MLO3	3	Examine electronics through analysing and designing basic combinational digital circuits.
MLO4	4	Identify sequential digital circuits and applications.

## Module Content

Outline Syllabus	<p>1. Analogue Fundamentals Review of fundamental notations and relations, SI units, Ohms Law, measurement of voltage, current and resistance, series and parallel circuit equivalences. Quantitative discussion of capacitors, transients in R-C circuits, and time constants.</p> <p>2. Transistors and op-amps Transistor operation and simple models. Operational amplifiers and feedback; basic inverting and non-inverting amplifier; stability in feedback amplifiers; frequency response and gain-bandwidth product; input and output impedance. Operational amplifier applications such as small signal amplifier.</p> <p>3. Digital logic and combinational circuits Logic Gates and Functions, DeMorgan's Theorems and gate equivalence. Combinational Logic and Boolean Algebra' Boolean expression from logic diagrams and truth tables, truth tables from logic diagrams and Boolean expressions, commutative, associative and distributive properties, loading Karnaugh map from a truth table, multiple and overlapping groups. Applications of Karnaugh map: multiple output networks, decoders, code conversion network.</p> <p>4. Sequential circuits Latches and Flip-Flops: SR latch, Latches as contact-bounce eliminators, Edge triggered SR, D-type, J-K Flip-Flops. Digital Counters: asynchronous and synchronous counters concept, Counter design using S-R/JK/D-type flip-flops. Shift Registers: serial shift registers, serial in-parallel out shift registers, bidirectional shift registers. Use of lab equipment's and CAD tools to carry out circuit design, test and simulation.</p>
Module Overview	<p>This module aims to introduce you to transistors, the small-signal equivalent circuits, the use of operational amplifiers and the operation of combinational and sequential digital logic circuits. You will gain fundamental knowledge and practical skills in digital and analogue electronics circuit analysis and design.</p>
Additional Information	<p>This Level 4 module is devised for students to gain fundamental knowledge and practical skills in digital and analogue electronics circuit analysis and design. Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes are K2, K3, K6 and K8, the skills learning outcomes is S1</p>

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Exam	60	2	MLO1, MLO2, MLO3, MLO4
Centralised Exam	Portfolio	40	0	MLO1, MLO2, MLO3, MLO4

## Module Contacts

### Module Leader

Contact Name	Applies to all offerings	Offerings
Wei Zhang	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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