Liverpool John Moores University

Title:	Digital and Analogue Electronics
Status:	Definitive
Code:	**4607IYO** (124219)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Study Group

Team	Leader
Michael Shaw	Y
Jack Mullett	

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	68
Total Learning Hours:	200	**Private Study:**	132		

Delivery Options
Course typically offered: Semester 2 and Summer

Component	Contact Hours
Lecture	44
Practical	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	60	2
Portfolio	Portfolio	Portfolio	40	

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.

Learning Outcomes

After completing the module the student should be able to:

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

Learning Outcomes of Assessments

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

Exam	1	2	3	4
Portfolio	1	2	3	4

Outline Syllabus

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.

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.

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.

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 equipments and CAD tools to carry out circuit design, test and simulation.

Learning Activities

A combination of lectures and practical work.

Notes

This Level 4 module is devised for students to gain fundamental knowledge and practical skills in digital and analogue electronics circuit analysis and design.