Liverpool John Moores University

Title:	Analogue and Digital Electronics
Status:	Definitive
Code:	**4041ENG** (116956)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Wei Zhang	Y
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Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	86
Total Learning Hours:	200	**Private Study:**	114		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	21
Practical	42
Tutorial	21

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		50	2
Portfolio	Portfolio		50	

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	Gain fundamental knowledge of analogue and digital electronics.
2	Analyse and design basic sequential and combinational digital circuits
3	Use transistor characteristics for simple amplifier design
4	Design op-amp circuits for analogue signal processing
5	Use CAD tools for electronics circuit design and simulation

Learning Outcomes of Assessments

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

Exam	1			
Portfolio	2	3	4	5

Outline Syllabus

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.
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, active filter, integrator and differentiator, comparator and oscillator, A/D and D/A converters
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.
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.
Simple finite state machine design.
Use of CAD tools to carry our circuit design and simulation.
Digital and analogue electrical interfacing of simple state machines with simple electrical actuators and sensors, including an introductory understanding of the sensor and actuator characteristics.

Learning Activities

A combination of lectures, practical work and tutorials

Notes

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