Liverpool John Moores University

Title:	ANALOGUE ELECTRONICS
Status:	Definitive
Code:	**4503ICBTEL** (127013)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level:	FHEQ4	**Credit Value:**	15	**Total Delivered Hours:**	62
Total Learning Hours:	150	**Private Study:**	88		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	30
Practical	15
Tutorial	15

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Practice	AS1	Practical/ Workshop (1500 words)	30	
Exam	AS2	Exam	70	2

Aims

This module intends to develop knowledge and understanding in both the art and the science of analogue electronics.

The module explores the relationship and application of analogue circuit design as a supporting and enabling technology for other disciplines.

This module develops the students' confidence in the design and implementation of analogue electronic circuits.

This module helps to build students' competence in the characterisation of analogue electronic circuits using appropriate laboratory equipment and methodological approaches.

Learning Outcomes

After completing the module the student should be able to:

1	Explain the theory of semiconductor P-N junction and diode applications including clamping circuits and power supply.
2	Demonstrate the DC and AC operation(s) of transistors (BJT and FET), and apply transistor switching circuits, single and multistage amplifiers in a design level.
3	Explain the operation of ideal and non-ideal op-amp circuits and design op-amp applications.
4	Design and analyse analogue electronic based circuits and the application(s) such as rectifiers, amplifiers, filters and oscillators by using appropriate simulation software and laboratory equipment's.

Learning Outcomes of Assessments

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

Practical/ Workshop	4		
Exam	1	2	3

Outline Syllabus

Semiconductor device introduction
Semiconductor theory and P-N Junction
Diode characteristics
Forward and reversed bias applications
Zener diode applications

Transistor operation switching and Amplification (BJT/FET)
BJT transistor operation (PNP and NPN).
Transistor DC biasing techniques.
Transistor AC analysis (re model and H-parameter model)
Transistor switching application.
Transistor amplifier circuit single stage and multistage.
Differential amplification.

Operational amplifier
Ideal op amp characteristics.
Ideal linear op-amp circuits using negative feedback such as amplifiers. including power amplifiers.

Filter characteristics (Butterworth Chebyshev and Bessel) and filter design for low pass, high pass and band pass.
Ideal op amp circuit using positive feedback such as oscillation.
Non-ideal op amp characteristics such as bias current offset current, offset voltage.

Use of software package (such as OrCad/pspise or similar industrial based software) to simulate the diode rectifier, transistor switch and amplifier, op-amp amplifier, filter and oscillators.

Design and demonstrate the simulated circuits in the laboratory by using appropriate IC's and equipment's.

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

Analogue electronic principles and theory acquired through lectures, seminars, tutorials and group work.

Analogue electronic devices and circuit applications test using simulation by appropriate learning software in computer laboratory classes.

Analogue electronic devices and circuit application test using appropriate electronic testing equipment in laboratory classes.

Notes

This coursework content of this module will comprise of 3 laboratory practicals and 1 assignment
Lab 1: Rectifiers (5%)
Lab 2: Transistors (5%)
Lab 3: Op amps (5%)
Assignment (15%)