Liverpool John Moores University

Title:	Electronics Design Engineering
Status:	Definitive
Code:	**5081ENG** (116960)
Version Start Date:	01-08-2016
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Jawad Kadim	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	70
Total Learning Hours:	200	**Private Study:**	130		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	20
Tutorial	24

Grading Basis: 40 %

Assessment Details

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

Aims

The module aims to broaden the students' knowledge and understanding of analogue and digital circuit design, and also to provide students with practical skills necessary to design, analyse and implement electronic circuits controlled by microcontrollers and finite state machines.

Learning Outcomes

After completing the module the student should be able to:

1	Gain knowledge of electronic circuit operations and design
2	Design, analyse and implement finite state machine based digital circuits
3	Design and analyse op-amp based analogue circuits for measurement, instrumentation and data acquisition.
4	Design, analyse and implement digital and analogue circuit applications
5	Use CAD tools for circuit design and simulation

Learning Outcomes of Assessments

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

In-class test	1	2	3	4
Practical lab	2	3	4	5

Outline Syllabus

Review of Boolean algebra and Karnaugh maps.
Synchronous sequential state machine design and analysis, including Mealy, Moore and mixed type circuits.
Introduction to the principles of programmable digital logic design.
Electronic circuit design for applications using microcontroller. Application examples include driving a stepper motor from a processor, speed control for a small DC motor based on the measured parameters, synthesizing simple square, triangle and sine waves.
Review of transistors: modeling, biasing and amplifiers.
Linear integrated circuits: differential amplifiers, current mirrors. Power control: regulation, rectification and power amplification. Feedback: positive and negative feedback, poles and zeros, polynomials, stability.
Introduction of noise: types of noise and noise power.
Design of analogue systems using op-amps: active filters, oscillators, A/D converters for measurement, instrumentation and data acquisition.
Monitoring and control systems using sensors including temperature, displacement and torque measurements, effect of feedback, frequency response and stability.
Using ADCs and DACs as input and output devices, understanding relevant parameters such as bandwidth, conversion rate, precision, slew rate, stability.

Learning Activities

A combination of lectures, practical work and tutorials

Notes

This Level 5 module will provide undergraduate students in electronic engineering with intermediate level tools and skills necessary to design, test and implement electronic systems.