

MODULE SPECIFICATION PROFORMA

Module Title:	Applied Analogue and Digital Electronics	Level:	5	Credit Value:	20
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Module code:	ENG563	Is this a new module?	No	Code of module being replaced:	
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Cost Centre:	GAEE	JACS3 code:	
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Trimester(s) in which to be offered:	1 & 2	With effect from:	September 17
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School:	Applied Science, Computing & Engineering	Module Leader:	Andrew Sharp
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BEng (Hons) Electrical and Electronic Engineering	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval February 17

APSC approval of modification

Have any derogations received Academic Board approval?

Version 1

Yes No

Module Aims

To enhance the knowledge of analogue and digital electronic elements and circuits in typical engineering applications, by evaluating the design and performance of a range of circuit functions analytically, by computer simulation, and by practical investigation.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Analyse and compare the performance of typical Electronic circuit functions	KS4	
2	Produce designs and select appropriate components for analogue and digital functions	KS3	
3	Use computer modelling techniques and practical experiments to verify and assess theoretical predictions.	KS4	

Transferable/key skills and other attributes

1. Self-learning
2. Practical application of theory to design
3. Solving engineering problems

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Assessment:

Assessment is by means of a portfolio including elements of design, simulation and practical construction. This evidence should be gathered throughout the duration of the module. An example of such evidence to be included in the portfolio would be the design, modelling and building of analogue and a digital electronic system.

The portfolio will cover all learning outcomes.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Portfolio	100		4000

Learning and Teaching Strategies:

This module will be presented to the students through a series of lectures, tutorials, practical experiments and ECAD investigations.

Learning materials will include in-class and on-line lecture notes, exercises and tutorials, and The students will have access to practical Laboratory facilities and ECAD.

The assignment will provide an element of formative assessment, enabling students to improve their understanding of circuit design, whilst providing the student with the opportunity to demonstrate their skills of circuit design, computer modelling and testing.

Extensive use will be made of VLE (Moodle) to supplement learning materials

Syllabus outline:

Analogue to Digital and Digital to Analogue Conversion:

Properties of A-D convertors: Resolution, accuracy, linearity, bandwidth, conversion time, output coding, noise. Sample and Hold. Flash, Successive approximation, Dual slope, Comparator loop, V-F, Sigma delta.

Properties of D-A convertors: R2R and weighted resistor types.

Interfacing:

Analogue I/O: impedance / bandwidth matching, S/N ratios. (transducer interfacing, line drivers etc)

Digital I/O: voltage/current/speed matching, noise, emi. (switch/sensor/relay display interfacing etc)

Opto-isolation: Analogue and digital signal isolation (for I/O and feedback / safety etc)

Oscillators and Waveform generators:

Oscillators: Sinusoidal oscillators eg: Wien Bridge, Colpitts, etc, analysis and design

Asymmetrical waveform generators eg: Astable, Bistable, etc.

AWG: Arbitrary waveform generation using digital techniques

Linear Power supplies:

Design : Rectification, smoothing, regulators, heatsinks

Protection: overvoltage, overcurrent, overtemperature, etc.

Bibliography:

Essential reading

Green, D.C. (1999) *Applied Digital Electronics*, 4th Edn., London: Longman.

Other indicative reading

Analogue Devices Inc. (2005) *The Data Conversion Handbook*, 3rd Edn., Oxford: Newnes.

Hughes, E. et al. (2012) *Electrical and Electronic Technology*, 11th Edn., Pearson.