Module specification

When printed this becomes an uncontrolled document. Please access the Module Directory for the most up to date version by clicking on the following link: Module directory

Refer to the module guidance notes for completion of each section of the specification.

Module code	ENG4AK
Module title	Electronics Technology
Level	4
Credit value	20
Faculty	FAST
Module Leader	Andrew Sharp
HECoS Code	100165
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Mechatronics Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**0** hrs
Placement / work based learning	0 hrs
Guided independent study	140 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	24/09/2020
With effect from date	24/09/2020
Date and details of revision	
Version number	1

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.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Analyse and compare the performance of typical Electronic circuit functions.
2	Produce designs and select appropriate components for analogue and digital functions.
3	Use computer modelling techniques and practical experiments to verify and assess theoretical predictions.

Assessment

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Indicative Assessment Tasks:

Assessment One is by means of a portfolio including elements of design, simulation and practical construction, covering learning outcomes 2 and 3. 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 Two is by means of an examination covering outcomes 1 and 2. It is an unseen time-constrained.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	2, 3	Portfolio	50%
2	1, 2	Examination	50%

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%.

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.

Indicative Syllabus Outline

Analogue Electronics Properties of semiconductors: P-type and N-type material: P-N junction - doping levels, majority and minority carriers. Diode characteristics: small signal, power, voltage reference diodes, circuit applications.

Operation of transistors: Bipolar and JFET transistors biasing configurations using load lines and dc models. Class A, B etc. Common emitter, common base and common collector circuits (e.g. using h parameter models, software modelling packages, practical measurements) and JFET equivalents. Gain, bandwidth, impedances, input/output loading, and Miller feedback.

Operational amplifier: ideal, open loop, closed loop, inverting, non-inverting configurations. Gain, impedance and bandwidth. Positive and negative feedback. Operational amplifiers applications: amplifiers, mixers, integrator, differentiator, comparator, low pass and high pass filters.

Digital Electronics Digital representation: number systems and codes. The transistor: as a switching element. Biasing, characteristics and properties. Combinational logic: gates, Boolean algebra, truth tables, minimisation, Karnaugh maps, static and dynamic hazards, including propagation delay.

Sequential logic: synchronous/asynchronous, flip-flops, counters, shift registers. State diagrams and tables, timing diagrams. Monostables, multiplexers, memory elements, tri-state interfaces.

Circuit analysis and comparison of different families: TTL; CMOS; ECL, BiCmos and LV, etc. Power, speed, cost, fan-out, loading, interfacing.

Power Semiconductor Devices: Operation, characteristics, ratings, applications of diodes, thyristors, MOSFETs, IGBTs. Darlington-pair configuration, transistor as a switch.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Bird, J. (2017) Electrical and Electronic Principles and Technology, 6th Edn., Routledge.

Other indicative reading

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

Key Website References: Khan Academy: http://www.khanacademy.org/

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas. Click here to read more about the Glyndwr Graduate attributes

Core Attributes
Engaged

Key Attitudes
Curiosity