Module specification

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Module code	ENG5AG
Module title	Mechanical Systems Design
Level	5
Credit value	20
Faculty	FAST
Module Leader	R Bolam
HECoS Code	100190
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Industrial Engineering Design (Mechanical)	Core
FdEng Industrial Engineering	Option

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	30 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	30 hrs
Placement / work based learning	0 hrs
Guided independent study	170 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	11/09/2019
With effect from date	11/09/2019

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Date and details of revision	30/01/20 admin update of derogation 4/8/20 addition to FdEng as option Oct 21 minor modification to LO wording through the revalidation and template update
Version number	3

Module aims

This module aims to develop the student's understanding of the system design process the function of system equipment elements and their applications in mechanical, pneumatic and hydraulic system designs

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

1	Use technical skills to solve real world engineering problems for the likes of pneumatic and hydraulic systems. Explain how groups of engineers can work together and combine their thoughts to solve complex engineering problems throughout the stages of an engineering project.
2	Apply conceptual design and creative style approaches to open ended engineering problems
3	Communicate design ideas and solution rationales, to project stakeholders
4	Use industry standard computational tools to aid the application of theoretical models to the quantitative design of functional systems

Assessment

Indicative Assessment Tasks:

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.

Assessment One: A single case-study to cover outcomes 1, 2, and 3. An example would be an investigation into the design of a specific system to meet a specification brief.

Assessment Two: Laboratory investigations portfolio to cover outcome 4. Examples of assessment are: two major design exercises, or investigations; one for pneumatic systems and one for hydraulic systems.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,2,3	Written Assignment	50
2	4	Portfolio	50

Derogations

A derogation from regulations has been approved for this module 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

The module will be presented to students through a specified series of lectures assisted by notes given to the student at the start of each lecture. Demonstrations will also be arranged, for example to show the operation and set up of a pneumatic and hydraulic system before the students are expected to carry out their own designs. Where possible, visits to local industries will be arranged to demonstrate actual system operations. Relevant videos will also be used to aid the learning process. Practical assignment exercises will be devised to enhance the students' learning and team working skills.

Indicative Syllabus Outline

Machine Elements: Principles, operation, and constructions of machine elements: bearings, cam, spur gears, helical gears, bevel gears, worm gears, clutches and brakes.

Mechanism Trains: Principles, operation, and constructions of parallel axis gear trains, determining tooth numbers, epicycle gear trains, Bevel-gear epicycle trains, all-wheel drive trains, applying solutions to a practical situation.

Hydraulics: Principle and operation of individual components within typical systems and examine various applications. Principle and operation of complete hydraulic systems and discuss the arrangement of the components to enable specific functions to be carried out. Analyse the operation of each component within the system. Advantages and disadvantages of hydraulic systems.

Pneumatics: Principle and operation of individual components within typical systems. Principle and operation of complete pneumatic systems. Analysis and performance of individual components and system operation.

Ventilation: Principle and operation of individual components such as fans and heat exchangers within typical systems and humidity and temperature control elements.

Indicative Bibliography:

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

Essential Reads

Parr A (2011) *Hydraulics and Pneumatics: A Technician's and Engineer's* Guide Paperback – Illustrated 3rd edition, Butterworth-Heinemann Ltd.

Junvinal, R.C. (2017) *Juvinall's Fundamentals of Machine component design*, John Wiley & Sons.

Other indicative reading

Uicker, J.J. et al., (2017), *Theory of Machines and Mechanisms*. 5th ed. Oxford: Oxford University Press.
Turner I C. (1995) *Engineering Application of Pneumatics and Hydraulics*, Butterworth Heinemann
Hanieh A.A. (2012) *Fluid Power Control: Hydraulics and Pneumatics*, Cambridge International Science Publishing
Childs, P.R.N. (2004) *Mechanical Design*, 2nd Edn, Butterworth Heinemann

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.

Core Attributes
Engaged
Enterprising
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication