

## Module specification

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Module Code	ENG5A9
Module Title	Machine Design and Manufacturing
Level	5
Credit value	20
Faculty	FAST
HECoS Code	100202
Cost Code	GAME

### Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng / MEng Mechanical Engineering	Core

### 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
<b>Total active learning and teaching hours</b>	<b>30 hrs</b>
Placement / work based learning	0 hrs
Guided independent study	170 hrs
<b>Module duration (total hours)</b>	<b>200 hrs</b>

<b>For office use only</b>	
Initial approval date	22/08/2022
With effect from date	September 2022
Date and details of revision	
Version number	1

## Module aims

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- To develop an understanding of and an overall appreciation of the knowledge of machine elements.
- To develop an understanding and an overall appreciation of the knowledge and processes that lead to developing appropriate pneumatic and hydraulic systems.
- To develop knowledge and skills on machine system design.

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

1	Critically understand mechanical system and machine design and performance analysis.
2	Analysis, plan, design and implement the integrated manufacturing systems.
3	Analyse the stages of planning and implementing integrated manufacturing systems besides the basic principles of machine tool operation and fixture design for automated operations and be able to design simple fixtures and robot end effectors.

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C1, C2, C3, C4, C5, C6, C17, M1, M2, M3, M4, M5, M6, and M17.

## Assessment

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Indicative Assessment Tasks:

More details will be made available in the relevant academic year module handbook.

The module will be assessed via a 4000-word portfolio in which all the module learning outcomes will have to be covered/demonstrated.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3	Portfolio	100%

## Derogations

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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

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The module will be taught through a combination of lectures and workshops. An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can

accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

## **Indicative Syllabus Outline**

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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 aeronautical/mechanical systems. Analysis of performance of individual components and system operation.

Manufacturing systems engineering: Planning and implementing integrated manufacturing systems, principles of machine tool operation (including maintenance, repair and condition monitoring), principles of tool and fixture design for automated operations, robotics in automation, the different types of sensor used in automation, control strategies of machining processes (errors mitigation), machining cells integration, production machines management and planning.

## **Indicative Bibliography:**

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

### **Essential Read**

J.J. Uicker Jr, et al., Theory of Machines and Mechanisms, 5th ed. Oxford University Press, USA, 2016.

### **Other indicative reading**

M.P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing. Harlow: Pearson, 2015,

## **Employability skills – the Glyndŵr Graduate**

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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  
Creative  
Ethical

**Key Attitudes**

Commitment  
Curiosity  
Resilience  
Confidence  
Adaptability

**Practical Skillsets**

Digital Fluency  
Critical Thinking  
Communication