

## Module specification

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

Module code	ENG5AR
Module title	Mechanical and Manufacturing Systems and Business Management
Level	5
Credit value	20
Faculty	FAST
Module Leader	Man Wang
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 (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
<b>Total active learning and teaching hours</b>	<b>0 hrs</b>
Placement / work based learning	0 hrs
Guided independent study	140 hrs
<b>Module duration (total hours)</b>	<b>200 hrs</b>

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

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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 manufacturing system planning, design and management.

To develop and enhance the student's awareness of himself/herself as an engineer within the wider context in which an engineer must work, with specific emphasis on the development and operation of small, medium and large enterprises.

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

1	Evaluate business practices within a company and the roles of engineers as team members contributing to the success and further development of that company; including activities such as planning and scheduling, evaluating outcomes, quality control and improvement in relation to engineering management.
2	Apply principles of Business finance and accounting to justify the value of engineering technology investments and apply benefits management.
3	Critically understand mechanical system and machine design and performance analysis.
4	Analysis, plan, design and implement the integrated manufacturing systems.
5	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.

## Assessment

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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:** A single case-study report to cover outcomes 1, and 2. An example would be an investigation into the value of engineering technology investments in an industry and role of data science in decision making.

**Assessment Two:** A portfolio to cover outcomes 3, 4 and 5. The assessment is about critical understanding of mechanical principles, mechanical design, and different electronics and mechanical systems in an integrated manufacturing system.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2	Report	20%
2	3, 4, 5	Portfolio	80%

## 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 presented to students through lectures, tutorials, and industrial visits and investigations.

## Indicative Syllabus Outline

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Company development: Small, medium, large-scale enterprises; analysis of growth (case study). Case for rationalisation.

People in Organisations: Relationship between own job role and that of others at work; legal framework (Health and Safety, etc); authority/delegation; leadership and motivation; setting/achieving realistic goals/targets; human resource management; operation of personnel activities.

Customer/Client Relationship: Identification of market; customer satisfaction; changes in customers, e.g. social, demographic and economic changes; new product development, patent protection; cost-effectiveness and pricing; communication skills.

Control/Management Activities: Planning, organising/control techniques; management of projects and continuous operations; obtaining finance; budgetary control, cost effectiveness; cost-benefit analysis, budget proposals.

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.

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.

## **Indicative Bibliography:**

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

### **Essential Reads**

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

### **Other indicative reading**

Uicker J.J. et al. (2011) Theory of Machines and Mechanisms 4th Edn, OUP USA

Nicholas, J.M. & Steyn, H. (2011) Project Management for Engineering, Business, and Technology, 4th Edn., Butterworth-Heinemann.

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.

Alasdair Gilchrist (2016) Industry 4.0: The Industrial Internet of Things; Apressa

## **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. [Click here to read more about the Glyndwr Graduate attributes](#)

### **Core Attributes**

Enterprising

Ethical

### **Key Attitudes**

Resilience

Confidence

Adaptability

**Practical Skillsets**

Organisation

Leadership and Team working

Emotional Intelligence