Module specification

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

Module code	ENG4AT
Module title	Manufacturing Technology
Level	4
Credit value	20
Faculty	FAST
Module Leader	Dr N. Luhyna
HECoS Code	100209
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
HNC Mechanical Engineering	Option

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	**60** 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	6 July 2021
With effect from date	September 2021

For office use only	
Date and details of revision	6 July 2021, revalidated
Version number	Version 1

Module aims

To provide students with a broad and in-depth knowledge of a range of manufacturing processes and techniques that can be applied to a variety of materials for a variety of manufacturing applications. Develop an understanding of manufacturing technologies with some analytical skills in equipment design.

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

1	Apply knowledge to select suitable conventional machining processes techniques for generating various geometrical forms to a given specification.
2	Apply knowledge to select suitable casting and forming processes for a given component specification.
3	Apply knowledge to select suitable non-conventional machining techniques for a given component specification.

Assessment

Indicative Assessment Tasks:
Assessment is 100% in-course.

Assessment One: Outcome 1 would be assessed using an in-class test (1 hr 30 mins).

Assessment Two: Outcomes 2, 3 would be assessed by the student producing a portfolio of short reports on a discussion of suitable technology for a given product specification (2000 words).

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

Derogations

None.

Learning and Teaching Strategies

The module will be presented to students through a specified series of lectures assisted by notes via VLE platform. Lectures will deliver key concepts, ideas, theories and examples. Relevant videos will also be used to aid the learning process.

The learning element will be evaluated by carrying out the assessment laid out above which will ensure the learner has the opportunity to achieve all the stipulated outcomes.

Indicative Syllabus Outline

Conventional machining processes and techniques.
Selection criteria: appropriate machining processes and techniques for a given component specification, criteria tolerances, types of material, surface texture, material removal rates.
Categorise machining processes: machining techniques that produce a flat and cylindrical geometries, such as milling, surface grinding, lapping, planing, turning, cylindrical grinding, centerless grinding, honing, superfinishing, thread milling techniques, jig boring, horizontal boring, vertical boring, and transfer machines.
Tooling requirements: processes utilising multi-tooth cutting e.g. milling, grinding, hobbing, drilling, reaming and broaching, processes utilising single-point cutting e.g. turning, planning and slotting, advantages and disadvantages of using coolants and cutting fluids, appropriate cutting angles for given materials. Advantages should include prolonging tool life, increased material removal rates and improved surface finish. Limitations should include fumes and possible irritations to operators, information on the types of cutting fluid used for various materials and processes.
Workholding devices and techniques: three and four jaw chucks, vices, jigs, fixtures, clamping arrangements, vee blocks, angle plates and magnetic chucks.

Casting and forming processes
Selection criteria: appropriate forming processes and techniques for a given component specification, criteria-tolerances, complexity of shape, properties of materials being formed, surface texture, cost factors, post forming operations required including machining, clipping, welding.
Categorise forming processes: forming processes that can be used with sheet metal, plastics, composite materials, variants of primary forming processes such as casting, rolling, forging, extrusion, pressing.
Changes to material properties: changes to the molecular structure, and hence the properties, which may proceed a forming operation, including grain growth, work hardening, cracking, orientation of grain flow.
Forming techniques that can be performed on ceramic materials: describe the sintering process for ceramic materials, materials suitable for sintering, components that lend themselves to the sintering process.
Tooling requirements: appropriate tooling required to produce components by forming techniques, e.g. press tools, dies, and press capacity calculations in terms of tonnage, re-usable moulds and non-permanent moulds, suitable casting materials for a particular casting process. High-speed production flow techniques.

Non-conventional machining techniques
Categorise non-conventional machining techniques: electro-discharge machining (EDM), wire erosion, ultrasonic machining, etching of electronic printed circuit boards (PCBs), laser beam machining, and plasma jet machining, rapid prototyping.

Techniques of non-conventional machining: the principles of operation of the nonconventional machining techniques listed above.
Tooling requirements: tooling requirements and ancillary equipment needed to perform the non-conventional machining techniques listed above.
Components that can be manufactured by these processes: suitable components and materials which lend themselves to manufacture by non-conventional techniques.

Indicative Bibliography:

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

Essential Reads

Black J. T., Kosher, R. A. (2019) DeGarmo's Materials and Processes in Manufacturing. 13th ed., Wiley

Other indicative reading

Kalpakjian, S., Schmid, S. R. (2019) Manufacturing Engineering and Technology. 8th ed., Pearson

Krar, S., Gill, A. (2005) Exploring Advanced Manufacturing Technologies. Industrial Press

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
Enterprising
Creative
Ethical

Key Attitudes
Curiosity
Confidence
Adaptability

Practical Skillsets
Organisation
Critical Thinking
Communication