

Module specification

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Module Code	ENG5D3
Module Title	Manufacturing Technology and Automation
Level	5
Credit value	20
Faculty	FACE
HECoS Code	100202
Cost Code	GAME
Pre-requisite module	N/A

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
FdEng Industrial Engineering (Mechanical) BEng (Hons) Mechanical Engineering with Manufacture BEng (Hons) Mechanical Engineering	Core

Breakdown of module hours

Learning and teaching hours	18 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	18 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	36 hrs
Placement hours	0 hrs
Guided independent study hours	164 hrs
Module duration (Total hours)	200 hrs

Module aims

This module develops applied understanding through a balance of theory and practice. Learners undertake both classroom study and supervised practical activity to explore design, implementation, and evaluation processes. Collaborative work and enquiry-based learning foster communication, teamwork, and the confidence to apply problem-solving techniques in varied contexts.

This module aims to develop students' understanding of modern manufacturing technologies and automated production systems, equipping them with the analytical, practical, and problem-solving skills needed to meet the demands of contemporary engineering industries.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Apply mathematical, scientific, and engineering principles to conduct detailed analysis of manufacturing processes and automated systems, interpreting data and performance behaviour to address broadly defined engineering problems (AHEP-4 F1).
2	Deploy a structured and evidence based engineering methodology to evaluate, select, and refine manufacturing and automation solutions, demonstrating systematic reasoning when addressing broadly defined industrial challenges (AHEP-4 F6).
3	Integrate advanced subject knowledge with systems-level thinking to design, justify, and optimise solutions to manufacturing and automation problems, including those involving interconnected or emerging industrial technologies.

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 1: Coursework

Students will produce a written report that critically analyses a selected manufacturing technology and/or automated process. The report requires the application of relevant engineering principles, evaluation of alternative technical solutions, and justification of decisions supported by clear and appropriate evidence.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1-3	Coursework	3000	100	N/A

Derogations

Credits shall be awarded by an Assessment Board for those modules in which a pass mark 40% has been achieved, with a minimum mark of 30% in each assessment element.

Learning and Teaching Strategies

Learning integrates conceptual study with practical investigation to deepen understanding and enhance problem-solving ability. Students participate in lectures, laboratory work, and team-based projects that encourage collaboration and communication. Online materials, recordings, and discussion forums support blended engagement. Tutorials promote reflective learning and increasing autonomy in preparation for advanced study.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate. To further promote bilingual learning, all students have the opportunity to take the 20-credit *Welsh for STEM* short course, designed to develop confidence and subject-specific language skills in both English and Welsh.

Indicative Syllabus Outline

Manufacturing Technology Fundamentals: Introduction to traditional and advanced manufacturing processes, focusing on how material properties, process parameters, tooling, and equipment selection influence product quality, performance, accuracy, and precision.

Process Behaviour and Performance Analysis: Application of engineering principles and statistical analysis to evaluate process behaviour, efficiencies, variability, and constraints using industrial data to address broadly defined manufacturing problems.

Automation Principles and Industrial Control: Overview of automation hardware and control architectures, including sensors, actuators, programmable logic controllers (PLCs), and machine interfacing within industrial environments.

Evaluation and Selection of Automation Solutions: Use of structured, evidence-based methods to assess and select automation and control solutions based on performance, reliability, operational requirements, and statistically informed decision-making.

Manufacturing Systems and Integration: Exploration of group technology, cellular manufacturing, and flexible manufacturing systems (FMS), examining how system configuration supports efficiency, flexibility, and productivity.

Systems Integration in Modern Manufacturing: Systems-level analysis of modern manufacturing environments incorporating robotics, Industry 4.0 technologies, and digital manufacturing tools, focusing on the interaction between mechanical, electrical, and information subsystems to enable optimisation and coordinated operation.

Indicative Bibliography

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

Essential Reads:

S. Kalpakjian and S. Schmid, *Manufacturing Processes for Engineering Materials*, 6th ed. Harlow, UK: Pearson Education, 2022.

Other indicative reading:

W. Bolton, *Instrumentation and Control Systems*, 2nd ed. Oxford: Newnes, 2015

RealPars, *Sensors and Actuators Explained*, YouTube Playlist, 2025. [Online]. Available: <https://www.youtube.com/playlist?list=PLIn3BHg93SQ812ihcqWb9OOWbZ-09DLW6>

Administrative Information

For office use only	
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