

## University of the West of Scotland

## Module Descriptor

Session: 2024/25

<b>Title of Module: Manufacturing System Engineering</b>			
<b>Code:</b> ENGG10010	<b>SCQF Level: 10 (Scottish Credit and Qualifications Framework)</b>	<b>Credit Points: 20</b>	<b>ECTS: 10 (European Credit Transfer Scheme)</b>
<b>School:</b>	School of Computing, Engineering, and Physical Sciences		
<b>Module Co-ordinator:</b>	Muhammad Ayat		
<b>Summary of Module</b>			
<p>The aim of this module is to develop students' understanding of manufacturing systems engineering to analyse and (re)design manufacturing systems that maximise value to customers while minimising waste. In this module, in addition to various subjects related to the manufacturing system, students will also gain experience in using appropriate manufacturing simulation tools and techniques to support the decisions made in manufacturing planning including:</p> <ul style="list-style-type: none"> <li>• Introduction to the manufacturing system</li> <li>• Design of layouts</li> <li>• Assembly Line balancing techniques</li> <li>• Production planning and control</li> <li>• Lean manufacturing techniques</li> <li>• Group technology &amp; Cellular manufacturing.</li> <li>• Bottleneck Characterisation, buffer, and Batch-size analysis.</li> <li>• The levels and components of Smart Factory</li> <li>• Manufacturing systems modelling using Discrete-event simulation.</li> <li>• Analysis of manufacturing systems using digital techniques.</li> </ul> <p>The fundamentals of production planning and control, inventory management systems, and inventory classification are discussed in detail. Analysis of complex Manufacturing systems is discussed in detail, with consideration given to typical production planning and resource optimisation strategies. Further, during this module students will develop their critical and analytical skills, knowledge of Discrete event simulation, and relevant ICT skills. Also, there is a strong emphasis in the coursework on design, teamwork, presentation and communication skills, and project planning and management.</p>			

Module Delivery Method					
Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will <b>normally</b> be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	<input type="checkbox"/>	Term 2	<input checked="" type="checkbox"/>	Term 3	<input type="checkbox"/>

Learning Outcomes: (maximum of 5 statements) These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module. At the end of this module the student will be able to:	
L1	State the current developments in manufacturing systems
L2	Perform production planning and assembly line balancing in a manufacturing system
L3	Develop and apply lean thinking principles and techniques to industrial case studies
L4	Effectively collaborate in a team and communicate the ideas clearly in both written and verbal forms
L5	Develop a detailed computer simulation model of a manufacturing environment and use different approaches to optimize the system's performance and output.
Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level <b>10</b> A critical understanding of the key elements of a Manufacturing Planning

	<p>and Control System.</p> <p>Specific knowledge and understanding of the principal planning and control techniques and how they integrate to provide the appropriate planning information.</p> <p>A detailed knowledge of the appropriateness of computer simulation as a tool for optimizing manufacturing systems.</p>	
Practice: Applied Knowledge and Understanding	<p><b>SCQF Level 10</b></p> <p>Apply key planning techniques to develop an Aggregate plan for a range of manufacturing strategies.</p> <p>Using a Master Production Schedule (MPS) develop the Planned Order Releases (POR) for a product through the application of Materials Requirements Planning (MRP) principles.</p> <p>Making use of appropriate manufacturing and process information develop and verify a computer model of a manufacturing system and optimise its operation.</p>	
Generic Cognitive skills	<p><b>SCQF Level 10</b></p> <p>Assessing critical data and making informed judgments.</p> <p>Bringing information together from a variety of sources and applying it to the problem-solving process.</p>	
Communication, ICT and Numeracy Skills	<p><b>SCQF Level 10</b></p> <p>Ability to perform, interpret, and evaluate numerical data in problem-solving.</p> <p>Communicate effectively, orally and in writing using data analysis where appropriate.</p> <p>Use computer software and associated ICT equipment to enhance methods of communication.</p> <p>Effectively demonstrate the application of simulation software to improve the performance of a manufacturing system.</p>	
Autonomy, Accountability and Working with others	<p><b>SCQF Level 10</b></p> <p>Identifying and addressing their learning needs both during and out of class time.</p> <p>Identifying solutions and strategies in solving manufacturing problems. Work as a part of a team during practical activities.</p> <p>Display appropriate time management skills when undertaking tasks.</p>	
<b>Pre-requisites:</b>	Before undertaking this module the student should have undertaken the following:	
	<b>Module Code:</b>	<b>Module Title:</b>
	<b>Other:</b>	
<b>Co-requisites</b>	<b>Module Code:</b>	<b>Module Title:</b>

\*Indicates that module descriptor is not published.

<b>Learning and Teaching</b>	
<p><b>Learning Activities</b> During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:</p>	<p><b>Student Learning Hours</b> (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)</p>
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Independent Study	164
	200 Hours Total
<b>**Indicative Resources: (eg. Core text, journals, internet access)</b>	
<p>The following materials form the essential underpinning for the module content and ultimately for the learning outcomes:</p> <ul style="list-style-type: none"> <li>• Operations Management for Competitive Advantage, (11th Edition), Chase, R.B., Aquilano, N.J. &amp; Jacobs F.R., McGraw-Hill Irwin. (2006)</li> <li>• Fundamental of digital manufacturing, Zhou, Shane (Shengquan) Xie, Dejun Chen (2012)</li> <li>• Manufacturing System Simulation &amp; Human-Robot Interaction in VR, Adelaide Marzano, VDM Verlag (2009)</li> <li>• Modern Manufacturing Process (1<sup>st</sup> edition), Kaushik Kumar, J.Paulo Davim (2020)</li> <li>• Introduction to Manufacturing, An Industrial Engineering and Management Perspective, Michel Baudin, Torbjrn Netland (2022)</li> </ul>	
<p>(*N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)</p>	
<b>Attendance and Engagement Requirements</b>	
<p>In line with the <a href="#">Student Attendance and Engagement Procedure</a>: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.</p>	
<b>Equality and Diversity</b>	
<p>The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: <a href="#">UWS Equality, Diversity and Human Rights Code</a>.</p>	

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

### Supplemental Information

<b>Divisional Programme Board</b>	Engineering and Physical Sciences
<b>Assessment Results (Pass/Fail)</b>	No
<b>School Assessment Board</b>	Engineering
<b>Moderator</b>	Parag Vichare
<b>External Examiner</b>	Fawad Inam
<b>Accreditation Details</b>	N/A
<b>Changes/Version Number</b>	3.07 Version  Module Delivery Changed to Face-To-Face from Hybrid C. Assessment terminology updated to reflect current practice. Reading list updated Module Coordinator Change from Farhad Anvari to Muhammad Ayat Contents have been updated by adding smart factory-related content and the learning outcomes accordingly.

### Assessment: (also refer to Assessment Outcomes Grids below)

Assessment 1: Unseen Open Book Examination 60%

Assessment 2 : Portfolio of practical work (Continual Assessment) 40%

(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.

(ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

### Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of	Timetabled Contact Hours

(Footnote B.)						Assessment Element	
Unseen Open Book (standard)	✓	✓	✓			60	2

Component 2							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Portfolio of practical work				✓	✓	40	
<b>Combined Total for All Components</b>						<b>100%</b>	<b>2 hours</b>