Module Descriptor

Title	Manufacturing System Engineering		
Session	2025/26	**Status**	Published
Code	ENGG10010	**SCQF Level**	L10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	M Ayat		

Summary of Module

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. The summary is as given

- Introduction to the manufacturing system
- Design of layouts
- Assembly Line balancing techniques
- Production planning and control
- Lean manufacturing techniques
- Group technology & Cellular manufacturing.
- Bottleneck Characterisation, buffer, and Batch-size analysis.
- Introduction to Digital Manufacturing , Smart factory and its components
- Manufacturing systems modelling using Discrete-event simulation.
- Analysis of manufacturing systems using digital techniques.

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.

During the course of this module students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current-students/your-graduate-attributes/).

Universal: Academic attributes - critical thinking and analytical & inquiring mind;

Work-Ready: Academic attributes – knowledgeable, problem-solving;

Successful: autonomous, driven, and innovative.

This module is updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging tutorial activity with contemporary industry examples of modular content, module assessment which reflects industry activities, learning synergies across modules and levels of study and lecture content supporting students to organise their own study time. Due to some of the unique content, this module is of particular importance in relation to PSRB AHEP-4 learning outcomes

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☐	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Develop demand forecasting and capacity planning strategies for optimised production scheduling.
L2	Apply Lean Thinking Principles and Techniques to industrial case studies
L3	Assess the impact of Industry 4.0 technologies, including Digital twins, simulations, 3D visualisation and AI for smart manufacturing
L4	Effectively collaborate in a team and communicate the ideas clearly in both written and verbal forms
L5	Construct discrete-event simulation models and optimise for manufacturing environments

Employability Skills and Personal Development Planning (PDP) Skills

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	**SCQF 10** A critical understanding of the key elements of a Manufacturing Planning and Control System. Specific knowledge and understanding of the principal planning and control techniques and how they integrate to provide the appropriate planning information. Understanding the basics of the Smart factory A detailed knowledge of the appropriateness of computer simulation as a tool for optimising manufacturing systems
Practice: Applied Knowledge and Understanding	**SCQF 10** Apply key planning techniques to develop an Aggregate plan for a range of manufacturing strategies. Using a Master Production Schedule (MPS) develop the Planned Order Releases (POR) for a product through the application of Materials Requirements Planning (MRP) principles. Making use of appropriate manufacturing and process information develop and verify a computer model of a manufacturing system and optimise its operation
Generic Cognitive skills	**SCQF 10** Assessing critical data and making informed judgments. Bringing information together from a variety of sources and applying it to the problem-solving process.
Communication, ICT and Numeracy Skills	**SCQF 10** Ability to communicate effectively, orally and in writing using data analysis where appropriate. Use computer software and associated ICT equipment to enhance methods of communication. Effectively demonstrate the application of simulation software to improve the performance of a manufacturing system
Autonomy, Accountability and Working with Others	**SCQF 10** Identifying and addressing their learning needs both during and out of class time. Identifying solutions and strategies in solving manufacturing problems. Work as a part of a team during practical activities. Display appropriate time management skills when undertaking tasks

Prerequisites	Module Code	Module Title
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching

In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.

The learning and teaching for this module will be delivered via weekly lectures and tutorials. Lectures will introduce the basic concepts of manufacturing. Tutorials will be in class using Simulation tools to further develop students' practical skill set. The approach is learner-centred with students actively engaged in a range of tasks to promote engagement with. Students will be given sufficient time and support to work on assignments.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	24
Tutorial / Synchronous Support Activity	12
Independent Study	164
n/a	0
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Chase, R.B., Aquilano, N.J. & Jacobs F.R. (2006) Operations Management for Competitive Advantage, McGraw-Hill Irwin

Zhou, Z., Xie, S., & Chen, D. (2012) Fundamentals of digital manufacturing science (pp. 291-336). Springer London.

Marzano, A. (2009). Manufacturing system simulation & human robot interaction in VR. VDM Verlag

Kumar, K., & Davim, J. P. (Eds.). (2020) Modern Manufacturing Processes. Woodhead Publishing.

Baudin, M., & Netland, T. (2022) Introduction to manufacturing: An industrial engineering and management perspective. Routledge.

(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)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, 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.

For the purposes of this module, academic engagement equates to the following:

Students are expected to attend every element of the programme of study. This refers to lectures, tutorial sessions and completing assessments and submiting these on time. UWS is committed to a proactive approach which focuses on formal and informal early warning indicators and will provide tools to track student attendance and engagement.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. In line with current legislation (Equality Act, 2010) and the UWS Equality, Diversity, and Human Rights Code, our modules are accessible and inclusive, with reasonable adjustment for different needs where appropriate. Module materials comply with University guidance on inclusive learning and teaching, and specialist assistive equipment, support provision and adjustment to assessment practice will be made in accordance with UWS policy and regulations. Where modules require practical and/or laboratory based learning or assessment required to meet accrediting body requirements the University will make reasonable adjustment such as adjustable height benches or assistance of a 'buddy' or helper.
(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

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☒ **Yes** ☐ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Engineering
Moderator	P Vichare
External Examiner	B Bryant
Accreditation Details	N/A
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	3.08 version Module Descriptor copied to 2025/26 template, LOs verb and resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated. Exam changed from online Unseen open Book to Unseen Closed Book Class Test. 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 in 2023. v3.06 Moderator details updated v3.05-graduate attributes added,campus updated, distance learning added v2.3-Fixed Assessment section 10 to separate course works to reflect actual practice

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Unseen Closed Book Class Test- 60%
Assessment 2
Portfolio of practical work (Continuous Assessment)- 40%
Assessment 3
N/A
(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Unseen Closed Book Class Test	☒	☒	☒	☐	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Portfolio	☐	☐	☐	☒	☒	40	0

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	2 hours

Change Control

What	When	Who
3.08 version Module Descriptor copied to 2025/26 template, LOs verb and resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated. Exam changed from online Unseen open Book to Unseen Closed Book Class Test.. EE updated to B Bryant from F Inam	March 2025	Muhammad Ayat
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	2023	Muhammad Ayat