

**Module Outline**

**Part 1- as validated**

1.	<b>Title</b>	<b>Engineering Automation and Manufacture</b>
2.	<b>Level *</b>	<b>6</b>
3.	<b>Credits</b>	<b>20</b>
4.	<b>Indicative Student Study Hours</b>	<b>36 hours lectures</b> <b>164 hours self-directed learning</b>
5.	<b>Core (must take and pass), Compulsory (must take) or Optional</b>	<b>Optional</b>

**5. Brief Description of Module (purpose, principal aims and objectives)**

This module is intended to present a broad outline of the technologies associated with industrial and mobile robots. Major topics covered are sensing, mapping, navigation and control of mobile robots together with the kinematics and control of industrial robots.

The module will provide students with the essential skills necessary to be able to develop robotic systems for practical applications. During the course of the module, students will become acquainted with sensor technologies relevant to robotic systems; the conventions used in robot kinematics and dynamics; the dynamics of mobile robotic systems and how they are modelled and will implement navigation, sensing and control algorithms on a practical robotic system.

**6. Learning Outcomes - On successful completion of this module a student will be able to:**

*(Add more lines if required)*

	Specific Learning Outcomes
1.	Understand and work effectively with the practical application of robotic systems in manufacturing
2.	Implement major control systems on a practical robotic system, based on critical evaluation
3.	Undertake independent research and analysis and to think creatively about engineering problems
	Generic Learning Outcomes
4.	Take responsibility for own learning and development using reflection and evaluation
5.	Work with ideas and concepts by evaluating information from a range of perspectives

**7. Assessment**

<b>Pass on aggregate or Pass all components</b> <i>(modules can only be pass all components if this is a PSRB requirement)</i>	Pass on aggregate
---	-------------------

**Summary of Assessment Plan**

	Type	% Weighting	Anonymous Yes / No	Word Count/ Exam Length	Learning Outcomes Coverage	Comments
1.	Investigative report	50%	Yes	2000	LO 3, 4, 5	
2.	Practical experiment evaluation	50%	Yes	2000 and supporting video (up to 5 minutes)	LO 1, 2, 5	

**Further Details of Assessment Proposals**  
Give brief explanation of each assessment activity listed

Investigative report

The student will research and report on the applications of robotic systems on the UK manufacturing industry with particular emphasis on cost effectiveness, sustainability and future applications of those systems.

Practical experiment evaluation

The practical element will involve the student experimenting with industrial robots and applying major control systems such as sensor technologies and navigation protocols. Problems associated with the implementation of robotic systems should be analysed and evaluated effectively. In addition, Students are required to provide up to five minutes of supporting video evidence of their experiment.

**8. Summary of Pre and / or Co Requisite Requirements**

Not applicable

**9. For use on following programmes**

**Module Specification**

**Part 2- to be reviewed annually**

<b>1.</b>	<b>Module Leader</b>	<b>John Dorward, Dr Dominic Onomowo</b>
-----------	----------------------	---

<b>2.</b>	<b>Indicative Content</b>
	<p>This module is intended to cover the fundamentals of automation and control, where an understanding of how processes are controlled and automated will be achieved through the study of fundamental control theory, motion control and process control. An understanding of modelling and control of modern automated equipment through the study of industrial robots, robot modelling overview including forward and inverse kinematics, Programming of industrial robots 4. Sensing and mapping will also be achieved as part of robotics. Approaches to equipment control and data acquisition including, SCADA and PLC, automated assembly, design and operation of automated manufacturing systems, selection, specification and justification of an automated system including a robot system will be covered as part of manufacturing systems to focus on the justification, design and operation of manufacturing systems that comprise of automated equipment.</p>

<b>3. Delivery Method</b> <i>(please tick appropriate box)</i>					
Classroom Based	Supported Open Learning	Distance Learning	E-Learning	Work Based Learning	Other (specify)
Yes					
<i>If the Delivery Method is <b>Classroom Based</b> please complete the following table:</i>					
	<b>Activity (lecture, seminar, tutorial, workshop)</b>	<b>Activity Duration - Hrs</b>	<b>Comments</b>	<b>Learning Outcomes</b>	
<b>1</b>	Lectures and workshops	36h		LO 1-5	
	<b>Total Hours</b>	<b>36h</b>			
If delivery method is <i>not</i> classroom based state lecturer hours to support delivery				Two 20 minutes academic tutorials per student per module	

**4. Learning Resources**

*To include contextualised Reading List.*

**Highly Recommended**

Boutros, T and Cardella, J. (2016) *The Basics of Process Improvement*. Boca Raton: CRC Press

Jones, P. and Robinson, P. (2012) *Operations Management*. Oxford: OUP

Page, S. (2015) *The Power of Business Process Improvement: 10 Simple Steps to Increase Effectiveness, Efficiency, and Adaptability*. New York: AMACOM

Schaeffer, E. and Sovie, E. (2019) *Reinventing the Product: How to Transform your Business and Create Value in the Digital Age*. N.L.: Kogan Page

Slack, N., Brandon-Jones, R., Johnson, R. (2016) *Operations Management*. Harlow: Pearson