

Module Outline

Part 1- as validated

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

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 robots and programmable logic controllers.

Major topics covered are:

Robotics: robot types, mobile robots, end effectors/manipulators, sensing, mapping, together with the kinematics and control of industrial robots. Health and safety, safe working practices, risk assessments, cell safety features, programming languages, programming methods.

PLC's: system operational characteristics, programming languages, programming methods, communication standards, sensors, actuators, interfacing, fault finding, de-debugging methods.

The module will provide students with the essential skills necessary to be able to develop automated manufacturing systems for practical applications.

Produce all elements of a PLC program for a given industrial task and analyse its performance
Investigate and design a safe working plan for an industrial robotic cell in a given production process to include a full risk assessment and make recommendations for improvements

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

(Add more lines if required)

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| | Specific Learning Outcomes |
| 1. | Understand and work effectively with the practical application of automated systems in manufacturing |
| 2. | Implement major control systems on a practical automated system, based on critical evaluation |
| 3. | Undertake independent research and analysis and to think creatively about engineering problems |

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| | 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 | | | | | | |
|--|---------------------------------|-------------|-----------------------|---|----------------------------------|----------|
| Pass on aggregate or Pass all components <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 | | | | | | |
| <p>Investigative report</p> <p>The student will research and report on the applications of robotic systems on the UK manufacturing industry with emphasis on cost effectiveness, sustainability and future applications of those systems.</p> <p>Practical experiment evaluation</p> <p>The student will design and produce all elements of a PLC program for a given industrial task and analyse its performance. The practical element will involve the student applying safe working practices, fault-finding and debugging methods</p> <p>In addition, Students are required to provide up to five minutes of supporting video evidence of their experiment.</p> | | | | | | |
| 8. Summary of Pre and / or Co Requisite Requirements | | | | | | |
| Not applicable | | | | | | |

9. For use on following programmes

BEng Engineering (Mechanical)

Module Specification**Part 2- to be reviewed annually**

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|-------------------------|---|
| 1. Module Leader | John Dorward, Dr Dominic Onimowo |
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2. Indicative Content

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 and programmable logic controllers.

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.

3. Delivery Method (please tick appropriate box)

| Classroom Based | Supported Open Learning | Distance Learning | E-Learning | Work Based Learning | Other (specify) |
|-----------------|-------------------------|-------------------|------------|---------------------|-----------------|
| Yes | | | | | |

If the Delivery Method is **Classroom Based** please complete the following table:

| | Activity (lecture, seminar, tutorial, workshop) | Activity Duration - Hrs | Comments | Learning Outcomes |
|----------|---|----------------------------|----------|-------------------|
| 1 | Lectures and workshops | 36h | | LO 1-5 |
| | Total Hours | 36h | | |

If delivery method is *not* 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