

PROGRAMME SPECIFICATION

Bachelor of Engineering with Honours in Manufacturing Systems Engineering

Awarding institution	Liverpool John Moores University
Teaching institution	LJMU
JACS Code	H710
Programme Duration	Part-Time: 5 Years
Language of Programme	All LJMU programmes are delivered and assessed in English
Subject benchmark statement	Engineering council UK Spec
Programme accredited by	IET
Description of accreditation	The programme partially fulfils the educational requirements for CEng http://www.engc.org.uk
Validated target and alternative exit awards	Bachelor of Engineering with Honours in Manufacturing Systems Engineering Diploma of Higher Education in Manufacturing Systems Engineering Certificate of Higher Education in Manufacturing Systems Engineering
Programme Leader	Andy Pettit

Educational aims of the programme

The BEng. Honours programme in Manufacturing Systems Engineering is designed to partially fulfil the educational requirements for Chartered Engineer status. It is designed to develop a high level of technical expertise together with the emotional intelligence to be able to practise successfully as a professional engineer in a modern interdisciplinary engineering environment. Graduate engineers are increasingly expected to take on important technical leadership and management responsibilities early in their careers and the knowledge and skills gained from this programme are designed to produce graduates who are able to make an immediate contribution to their employers organisations.

The programme aims to:

- Deliver the educational experience in which students can develop their knowledge of engineering science, core engineering principles, fundamental underpinning subjects such as mathematics and computation in addition to modern manufacturing techniques.
- Develop students confidence to analyse challenging technical problems and to further develop their core engineering knowledge and skills through the investigation and development of credible and robust solutions.
- Provide students with appropriate support and encouragement to develop the necessary skills such that they can study independently and take responsibility for their own learning and subsequent professional development.
- Provide engineering graduates with a range of highly relevant transferable skills such as team working, communication, management, problem solving, computing and technical computing.
- Provide a programme of study that fully meets the requirements of the Engineering Councils UK Standard for Professional Engineering Competence (UKSpec) and partially qualifies the successful graduate for the attainment of the Engineering Council Chartered Engineer status after completion of further study at M level and an appropriate period of industrial experience.
- Produce graduates with a depth, breadth of knowledge and understanding of manufacturing systems engineering, management and teamwork to enable them to rapidly assume technical leadership and management roles.
- Encourage students to fully engage with the World of Work programme, including World of Work Skills Certificate and, as a first step towards this, to complete Bronze (Self Awareness) Statement.

The programme meets the requirements of the Engineering Councils 'UK Standard for Professional Engineering Competence' (UKSpec).

Alternative Exit/ Interim Award Learning Outcomes - Certificate of Higher Education

A student who is eligible for this award will be able to:

Undertake suitable basic mathematical analysis to enable their study of engineering modules at Level 4 and prepare for study at Level 5.

Apply the basic principles of applied mechanics, thermodynamics and fluid mechanics, materials science and electrical engineering to simplified engineering problems.

Design and manufacture simple engineering components and assemblies.

Demonstrate key skills appropriate to the professional engineer.

Alternative Exit/ Interim Award Learning Outcomes - Diploma of Higher Education

A student who is eligible for this award will be able to:

Undertake advanced mathematical and computational studies of engineering systems.

Demonstrate the application of intermediate level mechanical and thermal systems, materials science, control & instrumentation and CAD/CAM to the solution of standard engineering problems.

Students must demonstrate the intermediate engineering skills that will be required for further study.

Demonstrate a competence in technical reporting and an ability to analyse and present engineering data.

Target award Learning Outcomes - Bachelor of Engineering with Honours

A student successfully completing the programme of study will have acquired subject knowledge and understanding as well as skills and other attributes.

Knowledge and understanding

A student who is eligible for this award will be able to:

A1. Demonstrate their knowledge and understanding of essential facts, concepts, theories and principles of their manufacturing systems engineering discipline, and its underpinning science and mathematics. They must have an appreciation of the wider multidisciplinary engineering context and its underlying principles. They must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgment.

A2. Demonstrate a knowledge and understanding of scientific principles and methodology necessary to underpin their education in manufacturing systems engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies.

A3. Illustrate a knowledge and understanding of mathematical principles necessary to underpin their education in manufacturing systems engineering and related engineering disciplines and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.

A4. Apply and integrate knowledge and understanding of other engineering disciplines to support study of manufacturing systems and related engineering disciplines.

A5. Understand engineering principles and the ability to apply them to analyse key engineering processes.

A6. Identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.

A7. Apply quantitative methods and computer software relevant to manufacturing systems and related engineering disciplines to solve engineering problems.

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

Acquisition of underpinning knowledge is achieved mainly through lectures and directed student-centred learning. Student-centred learning is used where appropriate resource material is available. Understanding is reinforced through case-studies.

Assessment

Testing of the knowledge base is through a combination of unseen written examinations, coursework in the form of case-study reports and coursework assignment submissions.

Skills and other attributes

Intellectual Skills

A student who is eligible for this award will be able to:

B1. Apply appropriate quantitative science and engineering tools to the analysis of problems. They must be able to demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs. They must be able to comprehend the broad picture and thus work with an appropriate level of detail.

B2. Demonstrate an understanding of and ability to apply a systems approach to engineering problems.

B3. Demonstrate a knowledge and understanding of the commercial and economic context of engineering processes.

B4. Illustrate a knowledge of management techniques which may be used to achieve engineering objectives within that context.

B5. Understand the requirement for engineering activities to promote sustainable development.

B6. Demonstrate an awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues.

B7. Understand the need for a high level of professional and ethical conduct in engineering.

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

The students must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.

Assessment

Acquisition of Intellectual skills is achieved mainly through lectures and direct student-centred learning. Student-centred learning is used where appropriate resource material is available. Understanding is reinforced through case-studies

Professional practical skills

A student who is eligible for this award will be able to:

C1. Apply practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control. Evidence of group working and of participation in a major project is expected.

C2. Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues.

C3. Understand customer and user needs and the importance of considerations such as aesthetics.

C4. Identify and manage cost drivers.

C5. Demonstrate creativity to establish innovative solutions.

C6. Illustrate creativity to establish innovative solutions.

C7. Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal.

C8. Manage the design process and evaluate outcomes.

C9. Demonstrate a knowledge of the characteristics of particular equipment, processes or products.

C10. Develop engineering workshop and laboratory skills.

C11. Demonstrate an understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc.).

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

Engineering design, analysis and practical skills are taught almost exclusively by individual and group project work supported by a lecture programme appropriate to the demands of the project.

Assessment

Engineering design and practical skills are assessed by individual and group written design project reports, student presentations and presentations using computer graphics.

Transferable / key skills

A student who is eligible for this award will be able to:

D1. Demonstrate transferable skills including problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills.

D2. Understand the use of technical literature and other information sources.

D3. Demonstrate an awareness of nature of intellectual property and contractual issues.

D4. Demonstrate an understanding of appropriate codes of practice and industry standards.

D5. Illustrate an awareness of quality issues.

D6. Demonstrate an ability to work with technical uncertainty.

Teaching, learning and assessment methods used to enable outcomes to be achieved and demonstrated

The economic, Social and Environmental context of engineering operations is delivered by means of lectures and case studies. The use of appropriate case study material is an essential part of teaching in this area.

Assessment

Assessment is via a combination of unseen written examinations and coursework in the form of case-study reports.

Programme structure - programme rules and modules

Programme rules

Level 6	Potential Awards on completion	Bachelor of Engineering with Honours
Core	Option	Award Requirements
6101MAN Engineering Project (40 credits) 6104MAN Applications of Quality Systems and Project Management (20 credits) 6107MAN Manufacturing Operations Management (20 credits) 6110MAN Materials Engineering (10 credits) 6112MAN Manufacturing Processes and Industrial Automation (10 credits)	6102MAN Engineering Analysis (20 credits) 6312MAN Process Control (20 credits)	100 core credits at level 6 20 option credits at level 6
Level 5	Potential Awards on completion	
Core	Option	Award Requirements
5102MAN Engineering Mathematics 2 (10 credits) 5103MAN Materials and Processes (10 credits) 5104MAN Mechanical and Thermal Systems 2 (20 credits) 5106MAN Design and Manufacture (20 credits) 5107MAN Engineering Practice 2 (20 credits) 5108MAN Mechatronics (20 credits) 5305MAN Control System Design and Analysis (20 credits)		120 core credits at level 5 0 option credits at level 5
Level 4	Potential Awards on completion	
Core	Option	Award Requirements
4101MAN Engineering Mathematics 1a (10 credits) 4102MAN Engineering Mathematics 1b (10 credits) 4103MAN Mechanical and Thermal Systems 1a (20 credits) 4104MAN Mechanical and Thermal		120 core credits at level 4 0 option credits at level 4

Systems 1b (20 credits) 4105MAN Materials (20 credits) 4106MAN Engineering Practice 1 (20 credits) 4107MAN Electrical and Electronic Engineering (20 credits)		
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Information about assessment regulations

All programmes leading to LJMU awards operate within the University's Academic Framework.
<https://www.ljmu.ac.uk/about-us/public-information/academic-quality-and-regulations/academic-framework>

Opportunities for work-related learning (location and nature of activities)

The students on this course are normally already employed in the engineering industry. However, real life case studies are used throughout the programme and students are expected to undertake their final year project in their place of work. If students are not employed or are made redundant they will be provided with a suitable University based final year project.

Criteria for admission

A/AS Level

Applicants should have or expect to obtain a total of 112 UCAS points. At A2-level, applicants are expect to gain at least 64 points from Mathematics and one of following; (Physics, Chemistry, Computing, Further Maths, Electronics or Engineering).

BTEC National Diploma

BTEC Extended Diploma

Applicants should have or expect to obtain a total of 112 UCAS points (DDM), in an Engineering discipline with a distinction grade in the Further Mathematics unit. Specific optional units must also be completed, please contact the Faculty of Engineering and Technology (FET) for more information

BTEC Diploma / 90 Credit Diploma / Subsidiary Diploma /Certificate

To the value of 112 UCAS points when combined with other qualifications. Must be in an Engineering discipline.

A Distinction grade in the Further Mathematics unit is required.

AVCE

Applicants should have or expect to obtain a total of 112 UCAS points. At A2-level, applicants should expect to obtain at least two awards and gain at least 64 points from mathematics and a scientific or technical subject relevant to the intended degree (e.g. Physics).

Irish Leaving Certificate

Applicants should have or expect to obtain a total of 112 UCAS points overall including a grade A1 in Higher Level Mathematics and grade A1 in another relevant technical subject at Higher Level eg. Physics.

Scottish Higher

Applicants should have or expect to obtain a total of 112 UCAS points. At higher-level or advanced higher-level, applicants should expect to obtain at least two awards and gain at least 64 points, from Mathematics and one of the following; Physics, Chemistry, Computing, Further Maths, Electronics or Engineering.

International Baccalaureate

Applicants should have or expect to obtain the equivalent of 112 UCAS points (26 IB Diploma points) overall with 5 IB points in HL Mathematics and 5 IB points in HL Physics.

Higher national diploma

Applicants with a relevant HNC or HND will be considered for the award of RPEL in accordance with University procedures.

Other

Applicants should have five GCSE (or equivalent) passes of at least grade C including Mathematics and English (or IELTS 6.0).

Mature entry

We welcome applications from highly motivated mature students with relevant experience but without the necessary formal qualifications. All applications will be considered on an individual basis.

Overseas qualifications

Applicants offering other awards will be considered on an individual basis in line with the agreed entry criteria.

External Quality Benchmarks

All programmes leading to LJMU awards have been designed and approved in accordance with the UK Quality Code for Higher Education, including the Framework for Higher Education Qualifications in the UK (FHEQ) and subject benchmark statements where applicable.

The University is subject to periodic review of its quality and standards by the Quality Assurance Agency (QAA). Published review reports are available on the QAA website at www.qaa.ac.uk

Programmes which are professionally accredited are reviewed by professional, statutory and regulatory bodies (PSRBs) and such programmes must meet the competencies/standards of those PSRBs.

Support for students and their learning

The University aims to provide students with access to appropriate and timely information, support and guidance to ensure that they are able to benefit fully from their time at LJMU. All students are assigned a Personal Tutor to provide academic support and when necessary signpost students to the appropriate University support services.

Students are able to access a range of professional services including:

- Advice on practical aspects of study and how to use these opportunities to support and enhance their personal and academic development. This includes support for placements and careers guidance.
- Student Advice and Wellbeing Services provide students with advice, support and information, particularly in the areas of: student funding and financial matters, disability, advice and support to international students, study support, accommodation, health, wellbeing and counselling.
- Students studying for an LJMU award at a partner organisation will have access to local support services

Methods for evaluating and improving the quality and standards of teaching and learning

Student Feedback and Evaluation

The University uses the results of student feedback from internal and external student surveys (such as module evaluations, the NSS and PTES), module evaluation questionnaires and meetings with student representatives to improve the quality of programmes.

Staff development

The quality of teaching is assured through staff review and staff development in learning, teaching and assessment.

Internal Review

All programmes are reviewed annually and periodically, informed by a range of data and feedback, to ensure quality and standards of programmes and to make improvements to programmes.

External Examining

External examiners are appointed to programmes to assess whether:

- the University is maintaining the threshold academic standards set for awards in accordance with the FHEQ and applicable subject benchmark statements
- the assessment process measures student achievement rigorously and fairly against the intended outcomes of the programme(s) and is conducted in line with University policies and regulations
- the academic standards are comparable with those in other UK higher education institutions of which external examiners have experience
- the achievement of students are comparable with those in other UK higher education institutions of which the external examiners have experience

and to provide informative comment and recommendations on:

- good practice and innovation relating to learning, teaching and assessment observed by external examiners
- opportunities to enhance the quality of the learning opportunities provided to students

Please note:

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content, teaching, learning and assessment methods of each module can be found in module and programme guides.