

### Overview

Programme Code	35561
Programme Title	Mechanical Engineering with Management
Awarding Institution	Liverpool John Moores University
Programme Type	Integrated Masters

### Awards

Award Type	Award Description	Award Learning Outcomes
Alternative Exit	Certificate of Higher Education - CHE	Undertake suitable basic mathematical analysis. Undertake suitable basic mathematical analysis. Apply the basic principles of applied mechanics, thermodynamics and fluid mechanics, materials science and electrical engineering to simplified engineering problems. 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. Design and manufacture simple engineering components and assemblies. Demonstrate key skills appropriate to the professional engineer. Demonstrate key skills appropriate to the professional engineer.
Alternative Exit	Diploma of Higher Education - DHE	Undertake advanced mathematical and computational studies of engineering systems and problems. Demonstrate the application of intermediate level applied mechanics, thermodynamics and fluid mechanics, and electrical engineering from to the solution of standard engineering problems. 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. A student who successfully completes a placement year will be eligible for the Sandwich award and will, in addition to the above, be able to demonstrate the professional and personal skills necessary for effective employment within a professional environment.
Recruitable Target	Master of Engineering (SW) - SMG	In addition to the learning outcomes above a student who is eligible for this award will be able to demonstrate the professional and personal skills necessary for effective employment within a professional environment.
Target Award	Master of Engineering - MG	N/A

Alternate Award Names	
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## External Benchmarks

Subject Benchmark Statement	UG-Engineering (2019)
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## Accreditation

### Programme Accredited by

PSRB Name	Type of Accreditation	Valid From Date	Valid To Date	Additional notes
Institution of Mechanical Engineers (IMechE)	Accredited by the Institution of Mechanical Engineers (IMechE) on behalf of the Engineering Council for the purposes of fully meeting the academic requirements for registration as an Engineering Technician and partially meeting the academic requirement for registration as an Incorporated Engineer.			

### Programme Offering(s)

Mode of Study, Mode of Delivery	Intake Month	Teaching Institution	Programme Length Programme Length Unit
Sandwich Year Out, Face to Face	September	LJMU Taught	4 Years

## Aims and Outcomes

Educational Aims of the Programme	<p>The MEng. programme in Mechanical Engineering with Management fulfils all 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 practice 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:</p> <ul style="list-style-type: none"> <li>- Develop students transferable skills and professional behavioural traits above those associated with a M.Eng graduate that will allow students that complete the programme to hold responsible technical and managerial roles within a range of mechanical engineering and associated industries.</li> <li>- 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 and in addition modern management techniques.</li> <li>- 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.</li> <li>- 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.</li> <li>- Provide engineering graduates with a range of highly relevant transferable skills such as team working, communication, management, problem solving, computing and technical computing.</li> <li>- Provide a programme of study that fully meets the requirements of the Engineering Councils UK Standard for Professional Engineering Competence (UKSpec).</li> <li>- Produce graduates with an increased depth, breadth of knowledge and understanding of mechanical engineering, modern management and teamwork to enable them to rapidly assume technical leadership and management roles.</li> <li>- Encourage students to engage with the development of employability skills.</li> <li>- For students undertaking a placement year the aim is to provide students with an extended period of work experience at an approved partner that will complement their programme of study at LJMU. This will give the students the opportunity to develop professional skills relevant to their programme of study, as well as attitude and behaviours necessary for employment in a diverse and changing environment. The programme meets the requirements of the Engineering Councils 'UK Standard for Professional Engineering Competence' (UKSpec).</li> </ul>
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### Learning Outcomes

Code	Number	Description
PLO1	1	Demonstrate their knowledge and understanding of essential facts, concepts, theories and principles of their 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.
PLO2	2	Demonstrate an ability to make general evaluations of commercial risks through some understanding of the basic of such risks.
PLO3	3	Demonstrate an extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately to strategic and tactical issues.
PLO4	4	Understand the requirement for engineering activities to promote sustainable development.
PLO5	5	Demonstrate an awareness of the framework of relevant legal requirements governing engineering and management activities, including personnel, health, safety, and risk (including environmental risk) issues.
PLO6	6	Understand the need for a high level of professional and ethical conduct in engineering.
PLO7	7	Illustrate an understanding of and the ability to apply a systems approach to engineering problems.
PLO8	8	Apply practical engineering and management skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; 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.
PLO9	9	Demonstrate a thorough understanding of current practice and its limitations and some appreciation of likely new developments.
PLO10	10	Demonstrate an extensive knowledge and understanding of a wide range of engineering materials and components.
PLO11	11	Understand the context in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc.).
PLO12	12	Demonstrate a comprehensive understanding of the scientific principles of mechanical engineering, modern management and related engineering disciplines.
PLO13	13	Demonstrate a wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
PLO14	14	Illustrate an understanding of customer and user needs and the importance of considerations such as aesthetics.
PLO15	15	Identify and manage cost drivers
PLO16	16	Generate an innovative design for products, systems, components or processes to fulfil new needs.
PLO17	17	Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal.
PLO18	18	Manage the design process and evaluate outcomes.
PLO19	19	Demonstrate transferable skills include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills.
PLO20	20	Demonstrate use technical literature and other information sources.
PLO21	21	Demonstrate an awareness of nature of intellectual property and contractual issues.

PLO22	22	Demonstrate the understanding of appropriate codes of practice and industry standards.
PLO23	23	Demonstrate comprehensive knowledge and understanding of mathematical and computer models relevant to the mechanical, management and related engineering disciplines, and an appreciation of their limitations
PLO24	24	Demonstrate an awareness of quality issues.
PLO25	25	Apply engineering and management techniques taking account of a range of commercial and industrial constraints.
PLO26	26	Demonstrate an understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects.
PLO27	27	Demonstrate an awareness of developing technologies related to mechanical engineering and management.
PLO28	28	Use fundamental knowledge to investigate new and emerging technologies
PLO29	29	Extract data pertinent to an unfamiliar problem, and apply its solution using computer based engineering tools when appropriate.
PLO30	30	Apply mathematical and computer-based models for solving problems in engineering, and the ability to assess the limitations of particular cases.
PLO31	31	Apply appropriate quantitative science, engineering and management 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.

## Course Structure

Programme Structure Description	<p>The marks from level 5, 6 and 7 assessments contribute to the final degree classification i.e.10% of Level 5 marks, 30% of Level 6 marks and 60% of Level 7 marks. Option Modules Student are required to select two option modules at L6 totalling 20 credits, one from each semester. The options are:- Semester One Fluid Dynamics and Heat Transfer Materials Engineering Manufacturing Processes and Industrial Automation Engineering Analysis (Note:- Engineering Analysis is a 20 credit module and if selected allows students only one option at L6) Semester Two Thermodynamics Structural Integrity Dynamics and Control At L7 students are required to select two option modules. Students have the option to undertake a placement year. The placement year, module 5117MECH, will follow Level 5 and students will be enrolled on a 600 credit honours sandwich programme. The Level 5 mean for the final award mark will be calculated based upon the 240 credits at Level 5. Students successfully completing the assessment of the placement year are eligible for a Sandwich award. Students not undertaking a placement year are registered on the non-sandwich version of the programme and will have the opportunity of an additional study year abroad following Level 5. Students will be enrolled on a 600 credit honours with study abroad programme. Of those 600 credits, 120 will be taken via a Level 5 study abroad module 5118MECH. The modules to be studied in the host institution must be agreed in advance. The Level 5 mean for the final award mark will be calculated based upon the 240 credits at Level 5.</p>
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<b>Programme Structure - 360 credit points</b>	
<b>Level 4 - 120 credit points</b>	
<b>Level 4 Core - 120 credit points</b>	CORE
[MODULE] 4101MECH Engineering Mathematics 1a Approved 2022.01 - 10 credit points	
[MODULE] 4102MECH Engineering Mathematics 1b Approved 2022.01 - 10 credit points	
[MODULE] 4103MECH Applied Mechanics 1 Approved 2022.01 - 20 credit points	
[MODULE] 4104MECH Thermodynamics and Fluid Mechanics 1 Approved 2022.01 - 20 credit points	
[MODULE] 4105MECH Materials Approved 2022.01 - 20 credit points	
[MODULE] 4106MECH Engineering Practice 1 Approved 2022.01 - 20 credit points	
[MODULE] 4107MECH Electrical and Electronic Engineering Approved 2022.01 - 20 credit points	
<b>Level 5 - 120 credit points</b>	CORE
<b>Level 5 Core - 120 credit points</b>	CORE
[MODULE] 5102MECH Engineering Mathematics 2 Approved 2022.01 - 10 credit points	
[MODULE] 5103MECH Materials and Processes Approved 2022.01 - 10 credit points	
[MODULE] 5104MECH Applied Mechanics 2 Approved 2022.01 - 20 credit points	
[MODULE] 5105MECH Thermodynamics and Fluid Mechanics 2 Approved 2022.01 - 20 credit points	
[MODULE] 5106MECH Mechanical Engineering Design 2 Approved 2022.01 - 20 credit points	
[MODULE] 5107MECH Engineering Practice 2 Approved 2022.01 - 20 credit points	
[MODULE] 5108MECH Mechatronics Approved 2022.01 - 20 credit points	
<b>Optional placement - 120 credit points</b>	OPTIONAL
<b>Placement Year - 120 credit points</b>	OPTIONAL

[MODULE] 5117MECH Sandwich Year - Mechanical Engineering with Management Approved 2022.01 - 120 credit points	
<b>OR Study Abroad - 120 credit points</b>	OPTIONAL
[MODULE] 5118MECH Study Year Abroad - Mechanical Engineering with Management Approved 2022.01 - 120 credit points	
<b>Level 6 - 120 credit points</b>	
<b>Level 6 Core - 100 credit points</b>	CORE
[MODULE] 6101MECH Engineering Project Approved 2022.01 - 40 credit points	
[MODULE] 6103MECH Mechanical Engineering Design 3 Approved 2022.01 - 20 credit points	
[MODULE] 6104MECH Industrial Management Approved 2022.01 - 20 credit points	
[MODULE] 6106MECH Strategic Management Approved 2022.01 - 20 credit points	
<b>Level 6 Optional - 20 credit points</b>	OPTIONAL
[MODULE] 6102MECH Engineering Analysis Approved 2022.01 - 20 credit points	
[MODULE] 6108MECH Fluid Dynamics and Heat Transfer Approved 2022.01 - 10 credit points	
[MODULE] 6109MECH Thermodynamics Approved 2022.01 - 10 credit points	
[MODULE] 6110MECH Materials Engineering Approved 2022.01 - 10 credit points	
[MODULE] 6111MECH Structural Integrity Approved 2022.01 - 10 credit points	
[MODULE] 6112MECH Manufacturing Processes and Industrial Automation Approved 2022.01 - 10 credit points	
[MODULE] 6113MECH Dynamics and Control Approved 2022.01 - 10 credit points	
<b>Level 7 - 120 credit points</b>	
<b>Level 7 Core - 80 credit points</b>	CORE
[MODULE] 7101MECH Group Project Approved 2022.01 - 40 credit points	
[MODULE] 7114MECH Risk and Reliability Approved 2022.01 - 20 credit points	
[MODULE] 7124MECH Operations Research Approved 2022.01 - 20 credit points	
<b>Level 7 Optional - 40 credit points</b>	OPTIONAL
[MODULE] 7107MECH Finite Element Analysis Approved 2022.01 - 20 credit points	
[MODULE] 7108MECH Conventional and Alternative Energy Systems Approved 2022.01 - 20 credit points	
[MODULE] 7110MECH Computational Fluid Dynamics Approved 2022.01 - 20 credit points	
[MODULE] 7111MECH Advanced Materials and Manufacturing Processes Approved 2022.01 - 20 credit points	
[MODULE] 7112MECH Structural Dynamics Approved 2022.01 - 20 credit points	
[MODULE] 7113MECH Additive Manufacturing Processes Approved 2022.01 - 20 credit points	

## Teaching, Learning and Assessment

Teaching, Learning and Assessment	<p>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. 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. The student must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgment. They must be able to comprehend the broad picture and thus work with an appropriate level of detail. Acquisition of Intellectual skills 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. Engineering Analysis, Design and Practical Skills are developed through a combination of lectures, tutorials, practical as appropriate. Fundamental principles are delivered predominantly by lectures and laboratory classes. More advanced techniques such as computational techniques are delivered by project work supported by a small number of lectures. Engineering Analysis, Engineering Design and Practical Skills are assessed through a combination of assessed coursework, laboratory work, practical and project work. Design skills are assessed by individual and group written design project reports, student presentations and presentations using computer graphics. The student must have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundation for lifelong learning/CPD. Assessment of transferable skills is varied throughout the programme but is mostly coursework based and incorporated in many key engineering modules.</p>
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## Opportunities for work related learning

Opportunities for work related learning
<p>Students are encouraged to undertake a year long industrial placement between Level 5 and 6. There is a further opportunity to undertake summer placements between academic years to gain valuable industrial experience. There are also opportunities to complete industrially based projects via individual engineering and management projects at Level 6 and 7, and group engineering project module at Level 7. This work experience will help develop understanding of the world of work environment suitable for the programme and increase a student's professional practical skills.</p>

## Entry Requirements

Type	Description
A levels	<p>Applicants should have or expect to obtain a total of 128 UCAS points. At A2-level, applicants are expect to gain at least 80 points from Mathematics and one of following; (Physics, Chemistry, Computing, Further Maths, Electronics or Engineering).</p>
BTECs	<p>BTEC National Diploma BTEC Extended Diploma Applicants should have or expect to obtain a total of 128 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 128 UCAS points when combined with other qualifications. Must be in an Engineering discipline. A Distinction grade in the Further Mathematics unit is required.</p>
Other international requirements	<p>Applicants offering other awards will be considered on an individual basis in line with the agreed entry criteria.</p>



Alternative qualifications considered	Applicants should have five GCSE (or equivalent) passes of at least grade C including Mathematics and English (or IELTS 6.0).
International Baccalaureate	Applicants should have or expect to obtain the equivalent of 128 UCAS points (26 IB Diploma points) overall with 5 IB points in HL Mathematics and 5 IB points in HL Physics.

## Programme Contacts

### Programme Leader

Contact Name
Sean Malkeson

### Link Tutor

Contact Name
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