PROGRAMME SPECIFICATION

Bachelor of Engineering with Honours (Fnd) in Mechanical Engineering

Awarding institution	Liverpool John Moores University
Teaching institution	LJMU
UCAS Code	8M17
JACS Code	H300
Programme Duration	Full-Time: 4 Years, Sandwich Thick: 5 Years
Language of Programme	All LJMU programmes are delivered and assessed in English
Subject benchmark statement	QAA Engineering subject benchmark statement. Engineering Council UK Spec (AHEP 4)
Programme accredited by	IMechE
Description of accreditation	Fulfilling the academic requirements for Incorporated Engineer status. Partially fulfilling the academic requirements for Chartered Engineer status.
Validated target and alternative exit awards	Bachelor of Engineering with Honours (Fnd) in Mechanical Engineering Bachelor of Engineering Honours (SW) (Fnd) in Mechanical Engineering Diploma of Higher Education (Fnd) in Mechanical Engineering Diploma in Higher Education (SW) (Fnd) in Mechanical Engineering Certificate of Higher Education (Fnd) in Mechanical Engineering
Programme Leader	Sean Malkeson

Educational aims of the programme

The BEng. programme in Mechanical 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 and fundamental underpinning subjects such as mathematics and computation.

- Develop graduates who have the confidence to analyse complex 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.

- Develop engineering graduates with a keen sense of ethical responsibility who are aware of issues of sustainability, safety and security in whatever engineering role they are performing. They will recognise the

importance of equality, diversity and inclusivity in the workplace, and in the engineered solutions that they provide.

- Provide a programme of study that meets the requirements of the Engineering Councils UK Standard for Professional Engineering Competence (UKSpec) and qualifies the successful graduate for the attainment of the Engineering Council Incorporated Engineer status after completion of an appropriate period of post-graduate industrial experience.

- Produce graduates with an increased depth, breadth of knowledge and understanding of mechanical engineering, management and teamwork to enable them to rapidly assume technical leadership and management roles.

- Encourage students to plan and record self learning and personal development as the foundation for lifelong learning/CPD.

-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 is currently accredited by the Institution of Mechanical Engineers and meets the requirements of the Engineering Councils 'UK Standard for Professional Engineering Competence' (UKSpec). This version of the program has been updated to match the outcomes of the Engineering Council UK AHEP, 4th Edition, standards (December 2021).

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

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

Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study

Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.

Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

Apply an integrated or systems approach to the solution of complex problems.

Appreciate how risk assessment is used to identify, evaluate and mitigate hazards associated with a particular activity.

Use practical laboratory and workshop skills to investigate engineering problems.

Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

Communicate effectively on engineering matters with technical and non-technical audiences.

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

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

Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.

Select and evaluate technical literature and other sources of information to address complex problems.

Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

Apply an integrated or systems approach to the solution of complex problems.

Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.

Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.

Use practical laboratory and workshop skills to investigate complex problems.

Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.

Function effectively as an individual, and as a member or leader of a team.

Communicate effectively on complex engineering matters with technical and non-technical audiences.

Plan and record self learning and development as the foundation for lifelong learning/CPD.

Alternative Exit/ Interim Award Learning Outcomes - Bachelor of Engineering Honours (SW) (Fnd)

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

In addition to the learning outcomes for the main target award, demonstrate the professional and personal skills necessary for effective employment within a professional environment.

Target award Learning Outcomes - Bachelor of Engineering with Honours (Fnd)

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

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

1. Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study.

2. Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.

3. Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed.

4. Select and evaluate technical literature and other sources of information to address complex problems.

5. Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards.

6. Apply an integrated or systems approach to the solution of complex problems.

7. Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts.

8. Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct.

9. Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.

10. Adopt a holistic and proportionate approach to the mitigation of security risks.

11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.

12. Use practical laboratory and workshop skills to investigate complex problems.

13. Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.

14. Discuss the role of quality management systems and continuous improvement in the context of complex problems.

15. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights.

16. Function effectively as an individual, and as a member or leader of a team.

17. Communicate effectively on complex engineering matters with technical and non-technical audiences.

18. Plan and record self learning and development as the foundation for lifelong learning/CPD.

Alternative target awards

A student who is eligible for the following awards will be able to:

Bachelor of Engineering Honours (SW) (Fnd) in Mechanical Engineering -

In addition to the learning outcomes for the main target award, demonstrate the professional and personal skills necessary for effective employment within a professional environment.

Teaching, Learning and Assessment

The methods used to enable outcomes to be achieved and demonstrated are as follows:

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

Acquisition of Intellectual skills is acheived 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.

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.

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

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

Programme structure - programme rules and modules

The marks from Level 5 and 6 assessments contribute to the final degree classification i.e. 25% of Level 5 marks and 75% of Level 6.

Students have the option to undertake a placement year. The placement year, module 5111MECH, 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 5112MECH. 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.

Level 6	Potential Awards on completion	Bachelor of Engineering with Honours (Fnd)
Core	Option	Award Requirements
6301MECH Engineering Project (40 credits) 6303MECH Engineering Design 3 (20 credits) 6304MECH Industrial Management (20 credits)	6302MECH Finite Element Analysis (10 credits) 6308MECH Fluid Dynamics and Heat Transfer (10 credits) 6309MECH Thermodynamics (10 credits) 6310MECH Materials Engineering (10 credits) 6311MECH Structural Integrity (10 credits) 6312MECH Manufacturing Systems (10 credits) 6313MECH Dynamics and Control (10 credits) 6314MECH Computational Fluid Dynamics (10 credits) 6315MECH Sensors and Robotics (10 credits)	80 core credits at level 6 40 option credits at level 6

Level 5	Potential Awards on completion	
Core	Option	Award Requirements
5302MECH Engineering Mathematics 2 (20 credits) 5303MECH Materials and Processes (10 credits) 5304MECH Applied Mechanics 2 (20 credits) 5305MECH Thermodynamics and Fluid Mechanics 2 (20 credits) 5307MECH Engineering Design 2 (20 credits) 5308MECH Mechatronics 2 (20 credits) 5311MECH Modelling and Simulation (10 credits)		120 core credits at level 5 0 option credits at level 5

Level 4	Potential Awards on completion	
Core	Option	Award Requirements
4301MECH Engineering Mathematics 1a (10 credits) 4302MECH Engineering Mathematics 1b (10 credits) 4303MECH Applied Mechanics 1 (20 credits) 4304MECH Thermodynamics and Fluid Mechanics 1 (20 credits) 4305MECH Materials (20 credits) 4306MECH Engineering Practice (20 credits) 4307MECH Mechatronics 1 (20 credits)		120 core credits at level 4 0 option credits at level 4

Level 3	Potential Awards on completion	
Core	Option	Award Requirements
3100FNDET Algorithms and Computing (10 credits) 3101FNDMEC Engineering and Technology Practice (20 credits) 3102FNDET Foundation Mathematics for Engineering and Technology 1 (20 credits) 3103FNDET Foundation Mathematics for Engineering and Technology 2 (20 credits) 3107FNDET Introductory Foundation Physics (20 credits) 3108FNDET Additional Foundation Physics (20 credits) 3116FNDET Programming for Engineers (10 credits)		120 core credits at level 3 0 option credits at level 3

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

A variance permits the use of more than 2, but not more than four, 10 credit modules at level 6.

Variance Approved on October 6th 2021

Opportunities for work-related learning (location and nature of

activities)

Students are encouraged to undertake a year's 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 projects at Level 6.

Criteria for admission

A/AS Level
Applicants should have or expect to obtain a total of 88 UCAS points, of which at least 20 should come from A2.

BTEC National Diploma
BTEC Extended Diploma

To the value of 88 UCAS points

BTEC Diploma / 90 Credit Diploma / Subsidiary Diploma /Certificate

To the value of 88 UCAS points when combined with other qualifications.

AVCE
Applicants should have or expect to obtain a total of 88 UCAS points overall.

Irish Leaving Certificate
Applicants should have or expect to obtain a total of 88 UCAS points overall.

Scottish Higher
Applicants should have or expect to obtain a total of 88 UCAS points overall.

International Baccalaureate
Applicants should have or expect to obtain a total of 88 UCAS points overall.

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

Mature entry
Mature applicants will be considered on a case-by-case basis. The admissions team will be particularly concerned with the length of time since any relevant academic study and relevant background from work experience or 'Access' courses.

Admissions to the Foundation Year will follow the University Admissions policies on widening participation, equal opportunities, and students with disabilities.

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.