

# PROGRAMME SPECIFICATION

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## Master of Engineering in Mechatronics and Autonomous Systems

<b>Awarding institution</b>	Liverpool John Moores University
<b>Teaching institution</b>	LJMU
<b>UCAS Code</b>	F003
<b>JACS Code</b>	H600
<b>Programme Duration</b>	Full-Time: 4 Years, Sandwich Thick: 5 Years
<b>Language of Programme</b>	All LJMU programmes are delivered and assessed in English
<b>Subject benchmark statement</b>	Engineering Council UK Spec and AHEP 3rd Edition Engineering Subject Benchmark Statement (2015)
<b>Programme accredited by</b>	
<b>Description of accreditation</b>	
<b>Validated target and alternative exit awards</b>	Master of Engineering in Mechatronics and Autonomous Systems  Master of Engineering (SW) in Mechatronics and Autonomous Systems  Bachelor of Engineering with Honours in Mechatronics and Autonomous Systems  Bachelor of Engineering Honours (SW) in Mechatronics and Autonomous Systems  Diploma of Higher Education in Mechatronics and Autonomous Systems  Diploma in Higher Education (SW) in Mechatronics and Autonomous Systems  Certificate of Higher Education in Mechatronics and Autonomous Systems
<b>Programme Leader</b>	Clifford Mayhew

## Educational aims of the programme

The MEng programme in Mechatronics and Autonomous Systems is one of our integrated masters degree programmes which extends the technical content beyond the scope of the normal first degree programme and prepares graduates for managerial and project management roles by the increased use of group based activities.

New 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 MEng programme fulfils all the educational requirements for registration as a Chartered Engineer.

The MEng programme 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.

This programme will develop student's research and technical communication skills and awareness of the legal and ethical framework surrounding the activities of a professional engineer. This will include personnel, health, safety, and risk (including environmental risk) issues.

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.

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

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

Undertake basic mathematical analysis suitable to enable the study of engineering.

Apply the basic principles of Electrical circuits, Electronics, Programming, Measurement and Control, Communications and microprocessors to simplified engineering problems.

Design, simulate and construct, and test simple circuits.

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 and problems.

Demonstrate the application of basic principles of Electrical circuits, Electronics, Programming, Measurement and Control and microprocessors from level 4 to the solution of standard engineering problems.

Demonstrate the intermediate engineering skills.

Demonstrate a clear understanding of the business context of engineering development and activities and to demonstrate a range of business skills.

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.

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

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

Demonstrate a detailed knowledge of the core level 6 modules relating to modern engineering techniques and management skills, together with a detailed understanding of their chosen optional modules that is at the forefront of the engineering discipline and informed by research. To demonstrate the ability to use established techniques of analysis and enquiry to solve problems within the field of engineering.

Demonstrate the ability to devise and sustain arguments and solve problems using ideas and techniques that are at the forefront of the engineering discipline.

Demonstrate an appreciation of the ambiguity, uncertainty and limitations of their knowledge.

Demonstrate the ability to plan and organise a technical project whilst considering ethical, regulatory and environmental aspects of electrical engineering design.

Demonstrate the professional and personal skills necessary for effective employment within a professional environment.

### **Alternative Exit/ Interim Award Learning Outcomes - Bachelor of Engineering with Honours**

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

Demonstrate a detailed knowledge of the core level 6 modules relating to modern engineering techniques and management skills, together with a detailed understanding of their chosen optional modules that is at the forefront of the engineering discipline and informed by research. To demonstrate the ability to use established techniques of analysis and enquiry to solve problems within the field of engineering.

Demonstrate the ability to devise and sustain arguments and solve problems using ideas and techniques that are at the forefront of the engineering discipline.

Demonstrate an appreciation of the ambiguity, uncertainty and limitations of their knowledge.

Demonstrate the ability to plan and organise a technical project whilst considering ethical, regulatory and environmental aspects of electrical engineering design.

## **Target award Learning Outcomes - Master of Engineering**

*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. Use a sound theoretical approach and advanced technical knowledge to enable the introduction and exploitation of new and advancing technology.

2. Use research and communication skills to engage others in the creative and innovative development of engineering technology and continuous improvement systems.
3. Identify potential projects and opportunities.
4. Analyse problems and conduct appropriate research as a basis for undertaking design and development of engineering solutions.
5. Manage groups in the implementation of design solutions, and evaluate their effectiveness.
6. Plan for effective project implementation.
7. Plan, budget, organise, direct and control tasks, people and resources.
8. Lead teams and develop staff to meet changing technical and managerial needs.
9. Bring about continuous improvement through quality management.
10. Communicate in English about advanced engineering topics.
11. Present and discuss proposals.
12. Demonstrate personal and social skills.
13. Understand and apply relevant codes of conduct.
14. Undertake risk assessment activities and manage and apply safe systems of work.
15. Undertake engineering activities in a way that contributes to sustainable development.
16. Carry out and record CPD necessary to maintain and enhance competence of teams.
17. Demonstrate understanding of the professional, ethical and moral responsibilities of a professional engineer.

## **Alternative target awards**

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

Master of Engineering (SW) in Mechatronics and Autonomous Systems -

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:*

Teaching and learning:

Lectures

Tutorials

Laboratory work

Group projects

Individual projects

Individual and group presentations

Poster presentation

Design, build and test exercises

Computer programming exercises

On line formative quizzes

Assessment:

Written examinations

On line summative quizzes

Group design projects and reports

Individual projects and reports

Poster display

Laboratory logbook

## Programme structure - programme rules and modules

Students have the option to undertake a placement year. The placement year, module 5330ELE, 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 5331ELE. 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 7	Potential Awards on completion	Master of Engineering
Core	Option	Award Requirements
7007ELE Digital Control (10 credits) 7301ELE Professional Practice (20 credits) 7302ELE Control Systems (20 credits) 7316ELE Group Project (40 credits) 7334ELEM Modelling and Simulation (10 credits)	7009ELE Embedded Systems (20 credits) 7306ELE Artificial Intelligence (20 credits)	100 core credits at level 7 20 option credits at level 7
Level 6	Potential Awards on completion	
Core	Option	Award Requirements
6113MECH Dynamics and Control (10 credits) 6300ELE Automation (10 credits) 6312ELE Process Control (20 credits) 6313ELE Autonomous Systems and Machine Learning (20 credits) 6356ELE Mechatronics and Autonomous Systems Project (40 credits) 6365ELE Industrial Management (20 credits)		120 core credits at level 6 0 option credits at level 6
Level 5	Potential Awards on completion	
Core	Option	Award Requirements
5104MECH Applied Mechanics 2 (20 credits) 5108MECH Mechatronics (20 credits) 5304ELE Linear Electronics (10 credits) 5305ELE Control System Design and Analysis (20 credits) 5306ELE Electrical Engineering Practice 2 (20 credits) 5312ELE Applied Instrumentation (20 credits) 5321ELE Engineering Mathematics 2 (10 credits)		120 core credits at level 5 0 option credits at level 5
Level 4	Potential Awards on completion	
Core	Option	Award Requirements
4103MECH Applied Mechanics 1 (20 credits) 4302ELE Microprocessors and Software (20 credits) 4303ELE Electrical Circuit Principles (20 credits) 4304ELE Digital and Analogue		120 core credits at level 4 0 option credits at level 4

Electronics (20 credits) 4305ELE Electrical Engineering Practice 1 (20 credits) 4315ELE Engineering Mathematics 1a (10 credits) 4316ELE Engineering Mathematics 1b (10 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>

A credit imbalance between semesters, at Level 5, is permitted for 2020-21 only.

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

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. 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.

## Criteria for admission

### A/AS Level

Applicants should have or expect to obtain a total of 128 UCAS points. At A2-level, applicants should expect to obtain at least two awards and gain at least 80 points from A Level Mathematics and one of the following (Physics, Chemistry, Computing, Further Maths, Electronics or Engineering)

### BTEC National Diploma

Applicants should have or expect to obtain a BTEC National Diploma with an overall grade of MMM in a subject (including optional units relevant to the intended degree) such as Engineering, ICT Systems Support or Laboratory and Industrial Science. Alternatively, applicants may achieve an overall grade of MMP supplemented with relevant qualifications to achieve a total of 128 UCAS points. The BTEC National Diploma should include a merit in the further mathematics unit or be supplemented with appropriate Free-Standing Mathematics Qualifications.

### BTEC National Certificate

Applicants should have or expect to obtain a BTEC National Certificate with an overall grade of DD in a subject (including optional units relevant to the intended degree) such as Engineering, ICT Systems Support or Laboratory and Industrial Science. Alternatively, applicants may achieve an overall grade of MM supplemented with relevant qualifications to achieve a total of 128 UCAS points. The BTEC National Certificate should include a merit in a further mathematics unit or be supplemented with appropriate Free-Standing Mathematics Qualifications.

### BTEC National Award

Applicants should have or expect to obtain a grade M in a BTEC National Award in a subject relevant to the intended degree, such as Engineering, ICT Systems Support or Applied Physics, including a Merit in a mathematics unit or relevant Free-Standing Mathematics Qualifications, together with other relevant qualifications to obtain a total of 128 UCAS points

### Other

A level average of at least 50% is required for students to transfer from Bachelor's Degree with Honours to Integrated Master's.

### 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

Other Applicants offering other awards (e.g. Welsh Baccalaureate, European Baccalaureate, pre-2002 BTEC National Certificate/Diploma, Advanced Extension Awards, pre-curriculum 2000 A-levels etc.) or combinations of unit awards may also be accepted.

## 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](http://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.*