Programme Specification Document

Approved, 2022.02

Overview

Programme Code	36092
Programme Title	Sensors, Data and Management
Awarding Institution	Liverpool John Moores University
Programme Type	Masters
Language of Programme	All LJMU programmes are delivered and assessed in English
Programme Leader	Princy Johnson
Link Tutor(s)	

Awards

Award Type	Award Description	Award Learning Outcomes
Target Award	Master of Science - MS	See Learning Outcomes Below
Recruitable Target	Master of Science - MS240	See Learning Outcomes Below
Non Recruitable Target	Master of Science (SW) - SMS	See Learning Outcomes Below

Alternative Exit	Postgraduate Diploma - PD	Demonstrate comprehensive knowledge and critical awareness of essential facts, concepts, theories and principles of electronics surrounding sensors and mathematical concepts surrounding big data analysis, and their 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 judgement. Demonstrate a comprehensive and systematic understanding of the scientific principles of Electronics and Communication engineering and related engineering disciplines. Demonstrate comprehensive knowledge and understanding of mathematical and computer models relevant to electronics, data science and related engineering disciplines, and an appreciation of their limitations. Demonstrate a critical awareness of developing technologies related to sensors, data and their applications. Use fundamental knowledge to investigate new and emerging technologies and synthesise solutions comprising sensor and data analysis to engineering problems. Apply mathematical and computer-based models for solving problems in engineering, and the ability to critically evaluate the limitations of particular cases related to handling big data and employing sensors in practical application scenarios. Demonstrate an awareness of the limitations of current knowledge and the changing nature of technologies and society, and the need to gain new knowledge through further study and team-based project work in the field of sensors, big data and their applications. Demonstrate a comprehensive understanding of the principles of management and engineering business practice techniques for evaluation of technical and business risks and their limitations and potential pitfalls. Critically evaluate designs, processes and products, and identify and make improvements by using problem solving skills and appropriate software /and hardware. Critically evaluate and select the most appropriate research methodologies for the solution of professional and commercial problems in a timely and robust manner. Apply appropriate analytical and modelling techniques to a range of engineering problems and demonstrate the ability to apply the appropriate strategies to the application of analysis tools to solve practical engineering problems. Prepare and present technical/business reports and presentations to a professional level and to speak with authority on their engineering discipline. Produce a design/system that satisfies a given specification Instigate, plan and manage engineering/technical projects, taking into account commercial, industrial, and customer requirements. Communicate effectively in a professional manner by the means of written and spoken technical English. Display and evidence enhanced self-learning skills appropriate to the attainment of a FHEQ level 7 qualification. Work within time constraints and an ability to prioritise workloads in order to deliver to deadlines. Generate and synthesise evidence required in the solution of complex engineering problems.

Alternative Exit	Postgraduate Certificate - PC	Demonstrate knowledge and awareness of essential facts, concepts, theories and principles of electronics surrounding sensors and mathematical concepts surrounding big data analysis, and their underpinning science and mathematics. They must have an appreciation of the wider multidisciplinary engineering context and its underlying principles. Demonstrate knowledge and understanding of mathematical and computer models relevant to electronics, data science and related engineering disciplines, and an appreciation of their limitations. Evaluate designs, processes and products, and identify and make improvements by using problem solving skills and appropriate software/and hardware. Apply appropriate analytical and modelling techniques to a range of engineering problems and demonstrate the ability to apply the appropriate strategies to the application of analysis tools to solve practical engineering problems. Communicate effectively in a professional manner through the means of written and spoken technical English. Display and evidence enhanced self-learning skills appropriate to the attainment of a FHEQ level 7 qualification.

Alternate Award Names	

External Benchmarks

Subject Benchmark Statement	

Accreditation

Programme Accredited by

PSRB Name	Type of Accreditation	Valid From Date	Valid To Date	Additional Notes
Institution of Engineering and Technology (IET)	Accredited by the Institution of Engineering and Technology (IET) on behalf of the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer. Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements.			

Programme Offering(s)

Mode of Study, Mode of Delivery	Intake Month	Teaching Institution	Programme Length
Full-Time, Face to Face	January	LJMU Taught	1 Years
Full-Time, Face to Face	January	LJMU Taught	2 Years
Sandwich Year Out, Face to Face	January	LJMU Taught	2 Years
Sandwich Year Out, Face to Face	September	LJMU Taught	2 Years
Full-Time, Face to Face	September	LJMU Taught	1 Years
Full-Time, Face to Face	September	LJMU Taught	2 Years

Aims and Outcomes

Educational Aims of the Programme

The MSc programme in Sensors, Data and Management is designed to develop a high level of technical expertise together with the emotional competencies to be able to practice successfully as a professional engineer and an adaptive leader in a diverse interdisciplinary engineering industry environment. Engineers are increasingly expected to take on important technical leadership and management responsibilities early in their careers and the knowledge, skills and practical experience gained from this programme is designed to produce graduates who are able to make an immediate impact to their employers' organisations. Graduates of this programme should be able to: Demonstrate a high level understanding of the principles driving future developments in the area of Sensors, Data analytics, IoT etc. Demonstrate an advanced level of analytical and experimental skills that will allow the successful graduate to design new systems, and provide them with the skills to critically analyse existing designs, their functionality and expected performance. Demonstrate the range of soft skills underpinning the personal and social competencies and the traits of a mature leader both in their work and personal environment. Demonstrate communication skills commensurate with the achievement of a post-graduate qualification and the duties associated with the status of a chartered engineer. Demonstrate enhanced transferable skills and professional behavioural traits that will allow students that complete the programme to hold responsible technical and managerial roles involving engineering. Demonstrate a well-developed academic base that provides for further learning/research/personal and professional development. Demonstrate an ability to conduct scholarly activity and undertake self-driven research/project work and to deliver high quality results, and to provide the required skill set should students decide to undertake further academic study. In addition, the 240 credit MSc programme aims to apply engineering, technology and scientific knowledge to a real-world design problem, analysed and developed through the application of effective group team-working and project management skills.

Learning Outcomes

Code	Description
PLO1	Demonstrate comprehensive knowledge and critical awareness of essential facts, concepts, theories and principles of electronics surrounding sensors and mathematical concepts surrounding big data analysis, and their underpinning science and mathematics.

Code	Description
PLO2	Demonstrate a comprehensive understanding of the principles of management and engineering business practice techniques for evaluation of technical and business risks and their limitations and potential pitfalls.
PLO3	Critically evaluate designs, processes and products, and identify and make improvements by using problem-solving skills and appropriate software /and hardware.
PLO4	Critically evaluate and select the most appropriate research methodologies for the solution of professional and commercial problems in a timely and robust manner.
PLO5	Apply appropriate analytical and modelling techniques to a range of engineering problems and demonstrate the ability to apply the appropriate strategies to the application of analysis tools to solve practical engineering problems.
PLO6	Prepare and present technical/business reports and presentations to a professional level and to speak with authority on their engineering discipline.
PLO7	Produce a design/system that satisfies a given specification.
PLO8	Instigate, plan and manage engineering/technical projects, taking into account the commercial, industrial, and customer requirements.
PLO9	Communicate effectively in a professional manner by the means of written and spoken technical English.
PLO10	Display and evidence enhanced self-learning skills appropriate to the attainment of an FHEQ level 7 qualification.
PLO11	Work within time constraints and an ability to prioritise workloads in order to deliver to deadlines.
PLO12	Have an appreciation of the wider multidisciplinary engineering context and its underlying principles.
PLO13	Generate and synthesise evidence required in the solution of complex engineering problems.
PLO14	Conduct a research study to critically evaluate state-of-the-art from literature in a field related to the study and make suggestions for improving some of the issues encountered in the methods for specific applications.
PLO15	Work on an independent project that will add knowledge to the existing state-of-the-art in a research area related to the field of study.
PLO16	Design experimentation/simulation to model new concepts/hypothesis in a related field of study.
PLO17	Critically analyse results from experimentation in a related field and discuss the implications of those results.
PLO18	Propose methodologies to extend existing projects to achieve improvement and extended learning.
PLO19	Appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.
PLO20	Demonstrate a comprehensive and systematic understanding of the scientific principles of Electronics and Communication engineering and related engineering disciplines.

Code	Description
PLO21	Demonstrate comprehensive knowledge and understanding of mathematical and computer models relevant to electronics, data science and related engineering disciplines, and an appreciation of their limitations.
PLO22	Evaluate developing technologies related to sensors, data and their applications.
PLO23	Use fundamental knowledge to investigate new and emerging technologies and synthesise solutions comprising sensor and data analysis to engineering problems.
PLO24	Apply mathematical and computer-based models for solving problems in engineering, and the ability to critically evaluate the limitations of particular cases related to handling big data and employing sensors in practical application scenarios.
PLO25	Critically evaluate the limitations of current knowledge and the changing nature of technologies and society, and the need to gain new knowledge through further study and team-based project work in the field of sensors, big data and their applications.

Programme Structure

Programme Structure Description

Students on the 2-year programme who undertake a placement will be enrolled on module 7405MENR Sandwich Year Placement and will be awarded a further 60 credits for successful completion. Students on the 2-year programme who do not undertake a placement, will be enrolled on module 7000FETGDP Group Design Project and will be awarded a further 60 credits for successful completion. Students on the 2-year programme are not permitted to be enrolled on both 7405MENR Sandwich Year Placement and 7000FETGDP Group Design Project. The award of Postgraduate Certificate or Postgraduate Diploma may not include modules 7400MENR MSc Dissertation, 7405MENR Sandwich Year Placement, nor 7000FETGDP - Group Design Project. Students must pass 7401MENR Research Skills to be allowed to undertake 7400MENR MSc Dissertation. Students beginning the programme prior to September 2022 will remain on the previous validated version of the programme.

Programme Structure - 180 credit points	
Level 7 - 180 credit points	
Level 7 Core - 160 credit points	CORE
[MODULE] 7400MENR MSc Dissertation Approved 2022.01 - 60 credit points	
[MODULE] 7401MENR Research Skills Approved 2022.01 - 10 credit points	
[MODULE] 7402MENR Modelling and Simulation Approved 2022.01 - 10 credit points	
[MODULE] 7403MENR Professional and Leadership Skills Approved 2022.01 - 10 credit points	
[MODULE] 7404MENR Industrial Context and Relationship Approved 2022.01 - 10 credit points	
[MODULE] 7422MEPC Dynamic Systems Simulation Approved 2022.01 - 20 credit points	
[MODULE] 7440MSDM Advanced Programming Approved 2022.01 - 20 credit points	
[MODULE] 7441MSDM Sensors Networks and Data Approved 2022.01 - 20 credit points	
Level 7 Optional - 20 credit points	OPTIONAL
[MODULE] 7012DATSCI Big Data Computing Approved 2022.01 - 20 credit points	
[MODULE] 7403BEPG Project Management Fundamentals Approved 2022.01 - 20 credit points	
[MODULE] 7406BEPG Strategic Project Environment Approved 2022.01 - 20 credit points	
Level 7 Optional Year - 60 credit points	
Placement Year./MS240 - 60 credit points *Students on 2 year versions of the programme will also take one of these modules*	OPTIONAL
[MODULE] 7405MENR Sandwich Year Placement Approved 2022.01 - 60 credit points	
[MODULE] 7000FETGDP Group Design Project Approved 2022.01 - 60 credit points	

Module specifications may be accessed at https://proformas.ljmu.ac.uk/Default.aspx

Approved variance from Academic Framework Regulations

Variance

Variance approved 28/01/2022: Where a module comprises two or more assessment elements (e.g. examination and coursework), successful completion of the module should require a mark of greater than 10% less than the module pass mark in each element, as well as the overall module mark being above the normal pass mark (namely 50%). This requirement only applies to assessment elements that contribute more than 30% towards the final module mark.

Teaching, Learning and Assessment

Acquisition of 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 practical work, case-studies and simulation work. Testing of the knowledge base is through a combination of unseen written examinations, assessed coursework in the form of case-study reports and coursework assignment submissions. Intellectual skills are developed through activity-based learning, group activities, panel discussions, design case-studies, simulation work and coursework assignments. Open-ended practical and project work is designed to permit students to demonstrate achievement of all the learning outcomes in this category. Analysis, design and problem solving skills are assessed through a combination of unseen written examinations, assessed coursework in the form of case-study reports and coursework assignment submissions. Subject practical skills are developed in a coordinated manner throughout the programme. A common thread through the programme is the utilisation of a computer simulation environment to undertake modelling, design and analysis. One of the avenues of developing the soft skills is through the modules on leadership skills and industrial context. The experiential learning of both subject specific practical skills and the emotional competencies will be through the industrial placement in the second year of study. Practical skills are assessed through case-study coursework reports, group and individual projects, research reports, and through oral and written examinations. Development of practical and soft skills are assessed through portfolio, self-reflection and peer-review. In addition to the learning and development that takes place through two specific practical based modules and industrial placement experience, transferable skills permeate every activity within the programme content and assessment. Intellectual and knowledge based skills are assessed through design and problem solving coursework with reports, portfolio, self-reflective report. Soft skills such as interpersonal skills are also assessed via presentation, report writing and peer review. Application of skills are also embedded within the self-management process of the project.

Opportunities for work related learning

Case studies and examples from industry and research are used wherever appropriate, in addition to the Industrial Placement during the second year of study.

Entry Requirements

Type	Description

Alternative qualifications considered	1. A class 2.2 honours degree or above in Electrical, Electronic or Telecommunication Engineering or a related engineering discipline. 2. A class 2.2 honours degree in Mathematics or a physical science, together with experience in a relevant engineering field. 3. An unclassified degree in a relevant computing or technology-based discipline, supported by appropriate industrial and/or postgraduate experience in lieu of (1) or (2) above, would be acceptable. 4. Graduate or corporate membership of one of the following professional bodies: The Institution of Engineering and Technology, The Institute of Measurement and Control, The Institute of Mechanical Engineers or The Institute of Physics 5. Other qualifications or experience deemed to be equivalent to the above. In particular, mature students must provide evidence of adequate educational and/or industrial experience to assure a reasonable chance of success on the award programme. All applicants must provide evidence of competence in English. The level of English language required should be equivalent to 6.5 for IELTS with at least 5 in individual components, within the previous 24 months. Applicants who have studied and successfully achieved a UK Degree within the previous 24 months are exempt from the requirements to produce evidence of competence in English. The Department actively supports the University Equal Opportunities policy and strategy in its underlying philosophy to value and respect individuals, and its commitment to maximize the potential of each student. The Department is committed to complying with all relevant legislation. Applications from students with disabilities are positively welcomed. Applications are considered on the basis of academic criteria alone. Students are invited to contact the Equal Opportunities Unit for an information pack detailing the facilities, support available and physical access to the main University buildings. Students may also visit the University to discuss support strategies with the University Disability Welfare Advisor.

Extra Entry Requirements