Programme Specification Document

Approved, 2022.02

Overview

Programme Code	36182
Programme Title	Embedded Systems and IC Design
Awarding Institution	Liverpool John Moores University
Programme Type	Masters
Language of Programme	All LJMU programmes are delivered and assessed in English
Programme Leader	Gerard Edwards
Link Tutor(s)	

Awards

Award Type	Award Description	Award Learning Outcomes
Target Award	Master of Science - MS	See Learning Outcomes Below
Alternative Exit	Postgraduate Certificate - PC	Demonstrate knowledge and awareness of essential facts, concepts, theories and principles of nanoelectronic engineering, and its 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 nanoelectronic engineering disciplines, and an appreciation of their limitations Apply appropriate analytical and modelling techniques to a range of nanoelectronic engineering problems and demonstrate the ability to apply the appropriate strategies to the application of analysis tools to solve practical engineering problems. Evaluate designs, processes and products, and identify and make improvements by using problem solving skills and appropriate software /and hardware. 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.

Alternative Exit	Postgraduate Diploma - PD	Demonstrate comprehensive knowledge and critical awareness of essential facts, concepts, theories and principles of nanoelectronic engineering, 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 Demonstrate a comprehensive and systematic understanding of the scientific principles of nanoelectronic engineering and related engineering disciplines Demonstrate comprehensive knowledge and understanding of mathematical and computer models relevant to nanoelectronic and related engineering disciplines, and an appreciation of their limitations Demonstrate a critical awareness of developing technologies related to nanoelectronic engineering Use fundamental knowledge to investigate new and emerging technologies and sythesise solutions to nanoelectronic engineering problems Apply mathematical and computer-based models for solving problems in engineering, and the ability to critically evaluate the limitations of particular cases 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 nanoelectronic engineering 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

Alternate Award Names	

External Benchmarks

Subject Benchmark Statement	PGT-Engineering (2020)

Programme Offering(s)

Mode of Study, Mode of Delivery	Intake Month	Teaching Institution	Programme Length
Part-Time, Face to Face	January	LJMU Taught	2 Years
Part-Time, Face to Face	September	LJMU Taught	2 Years

Aims and Outcomes

Educational Aims of the Programme

- To explore future developments in nanoelectronics - To develop advanced analytical and experimental skills that will allow the successful graduate to design new devices and systems, and provide them with the skills to critically analyse existing designs, their functionality and expected performance - To develop in the students a strong understanding of the capabilities and limitations of design and modelling tools - To develop in the students and provide opportunities for practicing communication skills commensurate with the achievement of a post-graduate qualification and the duties associated with the status of a chartered engineer - To develop enhanced transferable skills and professional behavioural traits that will allow students that complete the programme to hold responsible technical and managerial roles involving nanoelectronic system design - To provide students with a well-developed academic base that provides for further learning/research/personal and professional development - To develop in the students 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.

Learning Outcomes

Code	Description
PLO1	Demonstrate comprehensive knowledge and critical awareness of essential facts, concepts, theories and principles of nanoelectronic engineering, and its underpinning science and mathematics.
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.

Code	Description
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 nanoelectronics engineering and related engineering disciplines.
PLO21	Demonstrate comprehensive knowledge and understanding of mathematical and computer models relevant to nanoelectronics and related engineering disciplines, and an appreciation of their limitations.
PLO22	Evaluate developing technologies related to nanoelectronic engineering.
PLO23	Use fundamental knowledge to investigate new and emerging technologies and synthesise solutions to nanoelectronic 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.
PLO25	Critically evaluate 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 nanoelectronic engineering.

Programme Structure

Programme Structure Description

The award of Postgraduate Certificate or Postgraduate Diploma may not include module 7400MENR MSc Dissertation. Normally, modules will be delivered in the year specified below, although the right is reserved to amend the scheduled year of delivery for operational requirements. Year 1 - 7430MESI, 7450MWCS, 7431MESI, 7432MESI Year 2 - 7401MENR, 7402MENR, 7403MENR, 7433MESI, 7400MENR Students must pass 7401MENR Research Skills to be allowed to undertake 7400MENR MSc Dissertation.

Programme Structure - 180 credit points	
Level 7 - 180 credit points	
Level 7 Core - 180 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] 7430MESI Embedded Systems Approved 2022.01 - 20 credit points	
[MODULE] 7431MESI IC System Design Approved 2022.01 - 20 credit points	
[MODULE] 7432MESI Nano Devices, Fabrication and Testing Approved 2022.01 - 20 credit points	
[MODULE] 7433MESI Digital Design & Test Approved 2022.01 - 10 credit points	
[MODULE] 7450MWCS Advanced Signal Processing Approved 2022.01 - 20 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 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. Practical skills are assessed through case-study coursework reports, group and individual projects, research reports, and through oral and written examinations. Transferable skills permeate every activity within the programme content and assessment.

Opportunities for work related learning

Case studies and examples from industry and research are used wherever appropriate.

Entry Requirements

Type	Description
Alternative qualifications considered	The normal requirements for entry to the award Programme are as follows: 1. A Class 2.2 honours degree or above in Electrical/Electronic/Communication 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