Programme Specification Document

Approved, 2022.02

Overview

Programme Code	40197
Programme Title	Mathematics
Awarding Institution	Liverpool John Moores University
Programme Type	Degree with Foundation
Language of Programme	All LJMU programmes are delivered and assessed in English
Programme Leader	Ian Malabar
Link Tutor(s)	

Awards

Award Type	Award Description	Award Learning Outcomes
Target Award	Bachelor of Science with Honours (SW) (Fnd) - SBSHF	See Learning Outcomes Below
Recruitable Target	Bachelor of Science with Honours (Fnd) - BSHF	See Learning Outcomes Below
Alternative Exit	Certificate of Higher Education (Fnd) - CHEF	Develop a thorough grounding in the basic mathematical concepts and methods needed to solve a range of problems with scientific, business and statistical applications. Appropriately use mathematical and other software to support conceptual understanding and problem solving. Explore and analyse a set of data either 'by hand' or using statistical software, e.g. Minitab. Develop the required background knowledge of probability and random variables so that they can make use of a number of formal statistical models in their analyses. Develop computer programs using elementary programming constructs. Apply the theoretical techniques of linear algebra in a practical context. Formulate and solve a variety of real-world modelling problems.
Alternative Exit	Bachelor of Science (Fnd) - BSF	Demonstrate a broad and comparative knowledge of the general scope of the subject, its different areas and applications, and its interactions with related subjects. A detailed knowledge of a defined subject or a more limited coverage of a specialist area balanced by a wider range of study. In each case, specialised study will be informed by current developments in the subject. Demonstrate a critical understanding of the essential theories, principles and concepts of the subject(s) and of the ways in which these are developed through the main methods of enquiry in the subject.
Alternative Exit	Diploma of Higher Education (Fnd) - DHEF	Develop a thorough grounding in Mathematical methods in the areas of multidimensional calculus such as partial differentiation and applications, together with elements of discrete mathematics such as graph theory, linear programming, etc. Use simple and multiple linear regression models and one-way and two-way Analysis of Variance models. Apply probability distributions to tests of statistical inference. Appreciate the importance of career management in terms of both personal and professional development. Employ techniques of risk management through which they can assist decision makers in making informed decisions in the face of uncertainty. Understand computing in an increasingly sophisticated technological world. Develop mathematical skills in an independent manner.

Alternative Exit	Diploma in Higher Education (SW) (Fnd) - SDHEF	Develop a thorough grounding in Mathematical methods in the areas of multidimensional calculus such as partial differentiation and applications, together with elements of discrete mathematics such as graph theory, linear programming, etc. Use simple and multiple linear regression models and one-way and two-way Analysis of Variance models. Apply probability distributions to tests of statistical inference. Appreciate the importance of career management in terms of both personal and professional development. Employ techniques of risk management through which they can assist decision makers in making informed decisions in the face of uncertainty. Understand computing in an increasingly sophisticated technological world. Develop mathematical skills in an independent manner. 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	Bachelor of Science (SW) (Fnd) - SBSF	Demonstrate a broad and comparative knowledge of the general scope of the subject, its different areas and applications, and its interactions with related subjects. A detailed knowledge of a defined subject or a more limited coverage of a specialist area balanced by a wider range of study. In each case, specialised study will be informed by current developments in the subject. Demonstrate a critical understanding of the essential theories, principles and concepts of the subject(s) and of the ways in which these are developed through the main methods of enquiry in the subject.

Alternate Award Names	

External Benchmarks

Subject Benchmark Statement	UG-Mathematics, Statistics and Operational Research (2019) - Annex to Mathematics, statistics and operational research to cover integrated master's degrees (2009)

Accreditation

Programme Accredited by

PSRB Name	Type of Accreditation	Valid From Date	Valid To Date	Additional Notes

Institute of Mathematics and its Applications (IMA)	This programme will meet the educational requirements of the Chartered Mathematician designation, awarded by the Institute of Mathematics and its Applications, when it is followed by subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught masters degrees.		

Programme Offering(s)

Mode of Study, Mode of Delivery	Intake Month	Teaching Institution	Programme Length
Sandwich Year Out, Face to Face	September	LJMU Taught	5 Years
Full-Time, Face to Face	September	LJMU Taught	4 Years

Aims and Outcomes

Educational Aims of the Programme

This programme focuses on the application of mathematics and statistics in industry, business and research organisations, and employment therein. Hence it may be characterised as 'practice-based' (as referred to in the MSOR benchmark statement). Its main aims are:

• to provide students with an opportunity to enhance their mathematical and statistical education by studying broad, yet integrated subjects which have application in industry, business and research.

• to produce graduates with the mathematical and statistical knowledge to model, solve and analyse problems using the increasingly sophisticated quantitative techniques adopted by major commercial institutions.

• the development in students of skills which can be utilised in unfamiliar situations, e.g. the ability to conjecture, justify and evaluate.

• to enhance students' key and transferable skills such as communication, applications of IT, working with others, improving their own learning, etc.

• to develop in students an awareness of knowledge and skills necessary for a career as a quantitative analyst in the workplace.

• to produce graduates capable of progression to postgraduate areas of study in mathematical and statistical disciplines.

• to encourage students to engage with the development of employability skills by completing a self-awareness statement.

• 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.

Learning Outcomes

Code	Description
PLO1	Demonstrate their knowledge and understanding of a range of fundamental areas of mathematics and statistics applied to business and commerce.
PLO2	Formulate and model real-world situations and evaluate for accuracy and usefulness.
PLO3	Use a wide range of appropriate software packages for the analysis/synthesis of information.

Code	Description
PLO4	Write and test computer programs.
PLO5	Communicate technical issues in non-technical language.
PLO6	Plan and manage course/project work.
PLO7	Present their work in a professional manner using appropriate I.T. and graphical software.
PLO8	Use information technology, e.g. Internet, for effective information retrieval.
PLO9	Apply higher order problem solving skills: conjecture, hypothesis, analysis, inference, conclusion, interpretation, evaluation.
PLO10	Communicate effectively by written or verbal means.
PLO11	Plan and manage learning and development.
PLO12	Apply analytical techniques and algorithms to solve quantitative problems relating to business and commerce.
PLO13	Use and apply a range of mathematical and statistical software to solve problems.
PLO14	Evaluate the role of computers and I.T. in business and apply programming techniques in the solution of problems.
PLO15	Represent and explore relationships between algebraic, numerical and graphical forms of representation.
PLO16	Model stochastic/deterministic systems in a business context.
PLO17	Apply appropriate problem-solving strategies and select appropriate tools.
PLO18	Synthesise a balanced viewpoint from a variety of (potentially contradictory) evidence and perspectives.
PLO19	Demonstrate the skills necessary to plan, undertake and report on a project of original research.

Programme Structure

Programme Structure Description

Students MUST select one option module from each semester at Level 6. The placement year, module 5100APMATH, 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 480 credits, 120 will be taken via a Level 5 study abroad module 5104APMATH. 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. Students who commenced the programme prior to September 2021 will follow the previously approved programme version.

Programme Structure - 600 credit points	
Level 3 - 120 credit points	
Level 3 Core - 120 credit points	CORE
[MODULE] 3100FNDET Algorithms and Computing Approved 2022.02 - 10 credit points	
[MODULE] 3101FNDAPM Engineering and Technology Practice Approved 2022.01 - 20 credit points	
[MODULE] 3102FNDET Foundation Mathematics for Engineering and Technology 1 Approved 2022.02 - 20 credit points	
[MODULE] 3103FNDET Foundation Mathematics for Engineering and Technology 2 Approved 2022.03 - 20 credit points	
[MODULE] 3106FNDET Programming Approved 2022.01 - 10 credit points	
[MODULE] 3107FNDET Introductory Foundation Physics Approved 2022.01 - 20 credit points	
[MODULE] 3108FNDET Additional Foundation Physics Approved 2022.01 - 20 credit points	
Level 4 - 120 credit points	
Level 4 Core - 120 credit points	CORE
[MODULE] 4100MATHS Introduction to Modelling Approved 2022.01 - 20 credit points	
[MODULE] 4100STATS Data Exploration and Analysis Approved 2022.01 - 20 credit points	
[MODULE] 4101MATHS Mathematical Methods Approved 2022.02 - 20 credit points	
[MODULE] 4110MATHS Linear Algebra Approved 2022.02 - 20 credit points	
[MODULE] 4112MATHS Mathematical Computer Programming Approved 2022.02 - 20 credit points	
[MODULE] 4114MATHS Fundamentals of Mathematics Approved 2022.02 - 20 credit points	
Level 5 - 240 credit points	
Level 5 Core - 120 credit points	CORE
[MODULE] 5100MATHS Further Mathematical Methods Approved 2022.04 - 20 credit points	
[MODULE] 5101STATS Statistical Modelling Approved 2022.01 - 20 credit points	
[MODULE] 5103MATHS Numerical Methods Approved 2022.03 - 20 credit points	
[MODULE] 5103STATS Probability and Risk Approved 2022.01 - 20 credit points	
[MODULE] 5104MATHS Personal and Professional Development Approved 2022.02 - 20 credit points	
[MODULE] 5105MATHS Differential Equations Approved 2022.01 - 20 credit points	
Optional Study Semester - 120 credit points	OPTIONAL
Placement Year - 120 credit points	OPTIONAL
[MODULE] 5100APMATH Sandwich Year - Mathematics Approved 2022.01 - 120 credit points	

OR Study Semester - 120 credit points	OPTIONAL
[MODULE] 5104APMATH Study Year Abroad - Mathematics Approved 2022.01 - 120 credit points	
Level 6 - 120 credit points	
Level 6 Core - 80 credit points	CORE
[MODULE] 6100MATHS Project Approved 2022.01 - 40 credit points	
[MODULE] 6105STATS Statistics in the Workplace Approved 2022.02 - 20 credit points	
[MODULE] 6113MATHS Advanced Calculus and Partial Differential Equations Approved 2022.01 - 20 credit points	
Level 6 Optional - 40 credit points	OPTIONAL
[MODULE] 6101MATHS Operational Research Approved 2022.05 - 20 credit points	
[MODULE] 6107STATS Introduction to Data Science Approved 2022.01 - 20 credit points	
[MODULE] 6109STATS Multivariate Analysis and Time Series Approved 2022.01 - 20 credit points	
[MODULE] 6110MATHS Mathematical Biology Approved 2022.02 - 20 credit points	

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

Teaching, Learning and Assessment

Core knowledge and understanding is acquired via lectures, tutorials, practical computing sessions, team working and guided independent study. Independent study is used where appropriate resource material is available and increases as the programme progresses. Assessment methods are specified in each module specification. All learning outcomes in a module are assessed and the type of assessment specified for each outcome. Each module is assessed by examination and/or course work (individual or group). The nature of the course work varies for each module. Intellectual skills are developed and applied through class discussion, individual and group practical work, tutorials and course work assignments. Intellectual skills are assessed via formal examinations and through course work assessment. The final year project, involving a major report and oral presentation, allows a student to demonstrate their cognitive skills. Practical skills are developed throughout the programme, and are reinforced in practical sessions at each level. The basic skills are provided at the lower levels. These are supplemented at higher levels by more advanced tools and techniques. Some of these skills are practised in the placement year. Specialist software is available in School labs or from specified PCs in the libraries. Assessment is normally by course work and formal, written, timed examination. The placement year is assessed, by portfolio, on a pass / fail basis. Key skills are developed throughout the programme in a variety of forms, specifically through a combination of research related coursework, guided independent study and projects, examinations, group work and presentations.

Opportunities for work related learning

5104MATHS Personal and Professional Development - This module provides students with an opportunity to consider their future role as an applied mathematician and develop a plan to enable them to progress in their chosen career. 5100APMATH Sandwich Year Mathematics - 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 students the opportunity to develop professional skills relevant to their programme of study as well as the attitude and behaviours necessary for employment in a diverse and changing environment. 6105STATS Statistics in the Workplace - This module aims to give students an experience of campus-based work related learning focusing on the role of a statistician in industry and how statistical methods are applied. Real projects derived from the work setting will be used as case studies to enable students to use their statistical knowledge and skills to solve real-world problems. Actual work-place data and constraints will be used to simulate work problems.

Entry Requirements

Type	Description
Alternative qualifications considered	Qualifications deemed equivalent to the above upon completion of appropriate assessment will be considered acceptable. Applicants should have five GCSE (or equivalent) passes of at least grade 4 including Mathematics and English (or IELTS 6.0).
International Baccalaureate	Applicants should have or expect to obtain a total of 88 UCAS points overall.
Other international requirements	Applicants offering other awards will be considered on an individual basis in line with the agreed entry criteria. All applicants should have achieved IELTS 6 or equivalent.
BTECs	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.
A levels	Applicants should have or expect to obtain a total of 88 UCAS points with a maximum of 20 points from AS level qualifications.

Extra Entry Requirements