

Mathematics and Data Science

Programme Specification



1. Programme title	BSc (Hons) Mathematics and Data Science
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification(s) available	BSc (Hons) Mathematics and Data Science DipHE Mathematics and Data Science
6. Year effective from	2021 - 22
7. Language of study	English
8. Mode of study	FT, PT, TKS

9. Criteria for admission to the programme

112-128 UCAS Tariff Points including GCSE Grade 4/C in English and mathematics, BBC-BBB including a C or above in mathematics.

In addition Middlesex University general entry requirements apply as outlined in the university's regulation B2. Applicants whose first language is not English are required to achieve 6.0 in IELTS overall (with a minimum of 5.5 in each component) or an equivalent qualification recognised by Middlesex University. The equivalence of qualifications from outside UK will be determined according to NARIC guidelines.

Advanced entry to the programme will be considered on a case-by-case basis.

10. Aims of the programme

The programme aims to:

- provide graduates with a broad knowledge of core areas of data science from a

mathematical perspective, including statistics, data analysis, machine learning and software development;

- support students to develop the knowledge, skills and confidence that will allow them to compete in the job market;
- stimulate students' interest in developing their knowledge and understanding of contemporary methods in data science and the flexibility to apply these to industry problems.

11. Programme outcomes*	
<p>A. Knowledge and understanding On completion of this programme the successful student will have knowledge and understanding of:</p> <ol style="list-style-type: none"> 1. core areas of applied statistics and data science including machine learning and artificial intelligence; 2. core areas of mathematics and mathematical statistics including calculus and linear algebra; 3. ethical issues related to developing and using mathematical and statistical models; 4. programming and software design principles and their application to developing statistical models in authentic settings. 	<p>Teaching/learning methods Students gain knowledge and understanding through participation and engagement in practice-based workshops and tutorials. Problem based lectures, online resources, workshops and tutorials will introduce students to content in a structured environment, whilst workshops, tutorials and labs will encourage exploration of concepts in a practical setting.</p> <p>Assessment methods Students' knowledge and understanding is assessed by small and medium sized projects and coursework assignments based on authentic data and problems. Communication is assessed via written reports, the creation of video content and the production of the final-year project. The effective use of computers is assessed in lab exercises and also on the final project.</p>
<p>B. Skills On completion of this programme the successful student will be able to:</p> <ol style="list-style-type: none"> 1. formulate and solve problems creatively using a number of practical approaches; 2. interpret and communicate results from a statistical analysis; 3. reflect on their learning and skills development, identifying opportunities for personal growth and career development; 	<p>Teaching/learning methods Students learn skills through interaction in workshops, tutorials and labs. Practical skills will be developed by working on applications to authentic, real-world situations.</p> <p>Assessment methods Students' skills are assessed by small and medium sized projects and coursework assignments based on authentic data and problems. Communication is assessed via written reports, the creation of video</p>

<p>4. work effectively as a team member in a respectful and supportive way;</p> <p>5. develop software that applies data science methodology to a concrete problem.</p>	<p>content and the production of the final-year project. The effective use of computers is assessed in lab exercises and also on the final project.</p>
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12. Programme structure (levels, modules, credits and progression requirements)

12. 1 Overall structure of the programme

Full-time/thick sandwich BSc Maths and Data Science

	Term 1	Term 2
Year 1	MSO1115 Calculus and Geometry	
	MSO1125 Mathematical Thinking	MSO1135 Introduction to Programming
	MSO1145 Probability and Data Analysis	
	MSO1165 Linear Algebra	MSO1155 Mathematical Models

	Term 1	Term 2
Year 2	MSO2145 Problem Solving and Communication	
	MSO2400 Advanced Calculus	MSO2700 Software Design
	MSO2300 Mathematical Statistics	
	MSO2510 Discrete Maths	MSO2520 Maths of Machine Learning

Placement year	MSO3800 Placement*
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	Term 1	Term 2
Final Year	MSO3900 Project	
	MSO3255 Neural Networks and Deep Learning	
	option*	option*
	option*	option*

* optional modules

MSO3550 Math. Techniques for Optimisation	MSO3340 Data Mining
MSO3300 Stochastic Processes for Finance	MSO3450 Cryptography and Blockchain
MSO3135 Graph Theory	MSO3335 Time Series

Part-time BSc Maths and Data Science

	Term 1	Term 2
Year 1	MSO1115 Calculus and Geometry	
	MSO1125 Mathematical Thinking	MSO1135 Introduction to Programming

	Term 1	Term 2
Year 2	MSO1145 Probability and Data Analysis	
	MSO1165 Linear Algebra	MSO1155 Mathematical Models

	Term 1	Term 2
Year 3	MSO2145 Problem Solving and Communication	
	MSO2400 Advanced Calculus	MSO2520 Maths of Machine Learning

	Term 1	Term 2
Year 4	MSO2300 Mathematical Statistics	
	MSO2510 Discrete Maths	MSO2700 Software Design

	Term 1	Term 2
Year 5	MSO3255 Neural Networks and Deep Learning	
	option*	option*

	Term 1	Term 2
Year 6	MSO3900 Project	
	option*	option*

* optional modules

MSO3550 Math. Techniques for Optimisation*	MSO3340 Data Mining*
MSO3300 Stochastic Processes for Finance*	MSO3450 Cryptography and Blockchain*
MSO3135 Graph Theory*	MSO3335 Time Series*

12.2 Levels and modules

Level 4

COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
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Students must take all of the following: MSO1115, MSO1125, MSO1135, MSO1145, MSO1155, MSO1165.		Students must pass all modules in order to progress
Level 5		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: MSO2145, MSO2300, MSO2400, MSO2510, MSO2520, MSO2700		Students must pass MSO2300, MSO2400, MSO2510, MSO2520, and MSO2700 in order to progress Students must pass all modules to graduate with the named DipHE
Level 6		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: MSO3255, MSO3900	Students on the Thick-Sandwich mode of this programme take MSO3800 Remaining credit must be chosen from the following: Two from: MSO3135, MSO3300, MSO3550 Two from: MSO3335, MSO3340, MSO3450	

12.3 Non-compensatable modules

Module level	Module code
6	MSO3900

13. Information about assessment regulations

University assessment regulations apply.

14. Placement opportunities, requirements and support

Students on the TKS mode take a 12-month placement at the end of year 2. The university's MDXWorks guide students to find and secure placements. They also provide students with appropriate guidance and support in preparation for, during and after placement. The placement forms the basis for an assessed report based on the organisation. At the start of the placement students are allocated an individual supervisor who provides support and advice for the duration of the project.

15. Future careers / progression

Graduates from this programme are expected to enter careers in any number of areas where data science, statistics or machine learning are applied to deal with big data.

More generally, graduate of mathematics courses are employed as professional mathematicians in many organisations, for example GCHQ, where they work on solving abstract problems that directly influence government policy.

16. Particular support for learning (if applicable)

- Maths Help Centre
- iPads and Apple Pencils for each student
- English Language Support
- Learning Resources
- Programme Handbook and Module Handbooks
- Induction and orientation programme
- Access to student counsellors
- Student e-mail and internet access

17. JACS code (or other relevant coding system)	G1G3
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18. Relevant QAA subject benchmark group(s)	MSOR (2019)
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19. Reference points

QAA Guidelines for programme specifications

QAA Subject Benchmark Statement: MSOR (2019)

UK Quality Code for Higher Education (Quality Code) (2018) and the UK Quality Code - Advice and Guidance: Assessment (2018) and External Expertise (2018).

Middlesex University Regulations, Academic Policy Statement APS18: Curriculum Design Policy (2018), Middlesex University Regulatory Framework Code of Assessment Practice, Academic Policy Statement APS29: Anonymous Marking Assessment Policy (2020), Equality and Diversity Policy and Codes of Practice (HRPS8), specifically code of practice 7: Curriculum, and Pedagogy and Assessment.

20. Other information

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the rest of your programme handbook and the university regulations.

Curriculum map for *BSc Mathematics and Data Science*

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

Knowledge and understanding	
A1	core areas of applied statistics and data science including machine learning and artificial intelligence
A2	core areas of mathematics and mathematical statistics including calculus and linear algebra
A3	ethical issues related to developing and using mathematical and statistical models
A4	programming and software design principles and their application to developing statistical models in authentic settings
Skills	
B1	formulate and solve problems creatively using a number of practical approaches
B2	interpret and communicate results from a statistical analysis
B3	reflect on their learning and skills development, identifying opportunities for personal growth and career development
B4	work effectively as a team member in a respectful and supportive way
B5	develop software that applies data science methodology to a concrete problem

Programme outcomes													
A1	A2	A3	A4	B1	B2	B3	B4	B5					
Highest level achieved by all graduates													
6	6	6	6	6	6	6	5	6					

Module Title	Module Code by Level	A1	A2	A3	A4	B1	B2	B3	B4	B5
		Linear Algebra	MSO1165	X	X					
Calculus and Geometry	MSO1115	X	X							
Mathematical Models	MSO1155	X	X		X					
Mathematical Thinking	MSO1125		X			X				
Introduction to Programming	MSO1135				X					X
Probability and Data Analysis	MSO1145	X	X		X		X			X
Problem Solving and Communication	MSO2145			X	X	X	X	X	X	
Discrete Mathematics	MSO2510		X							X
Mathematics of Machine Learning	MSO2520	X		X		X	X			
Mathematical Statistics	MSO2300	X			X	X	X			
Advanced Calculus	MSO2400	X	X							
Software design	MSO2700				X	X			X	X
Graph Theory	MSO3135	X	X							
Stochastic Processes for Finance	MSO3300	X					X			
Time Series	MSO3335	X					X			
Mathematical Techniques for Optimization	MSO3550	X	X							X
Data Mining	MSO3340	X			X		X			
Cryptography and Blockchain	MSO3450		X							
Neural Networks and Deep Learning	MSO3255	X		X	X		X			X
Project	MSO3900	X	X		X	X	X	X		X