

Title of Programme: MSc Data Science

Programme Code: PMDSM

# Programme Specification

This programme specification is relevant to students entering:  
01 September 2022

Associate Dean of School (Academic Quality Assurance):  
Mariana Lilley



A programme specification is a collection of key information about a programme of study (or course). It identifies the aims and learning outcomes of the programme, lists the modules that make up each stage (or year) of the programme, and the teaching, learning and assessment methods used by teaching staff. It also describes the structure of the programme, its progression requirements and any programme-specific regulations. This information is therefore useful to potential students to help them choose the right programme of study, to current students on the programme, and to staff teaching and administering the programme.

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## Summary of amendments to the programme

Date	Section	Amendment
25.10.2021	1	Addition of 'Sandwich' and 'With Advanced Research' awards.
25.10.2021	C	Addition of learning outcomes A4 and B4.
25.10.2021	D	Addition of Semester B entry.
28.10.2021	D	Addition of three (3) modules: <ul style="list-style-type: none"><li>Advanced Research Topics in Data Science 7PAM2016</li><li>Research Methods in Data Science 7PAM2015</li><li>Professional Work Placement for MSc Data Science 7PAM2017</li></ul>

11.03.2022	D	<b>7PAM2020 Fundamentals of Data Science</b> replaces 7COM1073 Foundations of Data Science.
11.03.2022	D	<b>7PAM2021 Machine Learning and Neural Networks</b> replaces 7COM1033 Neural Networks and Machine Learning.
27.03.2022	D	<b>7PAM2022 Professional Work Placement for MSc Data Science</b> replaces 7PAM2017 Professional Work Placement for MSc Data Science.
27.03.2022	D, Table 1b	MSc Data Science (Sandwich) award requires 240 credit points including at least 210 at level 7, passing the individual project (60 credits), and a year's approved and satisfactory industrial placement (60 credit points).

If you have any queries regarding the changes please email [AQO@herts.ac.uk](mailto:AQO@herts.ac.uk)

# Programme Specification MSc Data Science

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended 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 teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

## Section 1

<b>Awarding Institution/Body</b>	University of Hertfordshire
<b>Teaching Institution</b>	University of Hertfordshire
<b>University/partner campuses</b>	College Lane
<b>Programme accredited by</b>	N/A
<b>Final Award (Qualification)</b>	MSc
<b>All Final Award titles</b>	MSc Data Science
<b>(Qualification and Subject)</b>	MSc Data Science (Sandwich) MSc Data Science with Advanced Research
<b>FHEQ level of award</b>	7
<b>Language of Delivery</b>	English

### A. Programme Rationale

There is an urgent need to train competent data scientists to meet the demands of an economy that is increasingly reliant on a workforce skilled in data engineering, data processing and analysis. These skills are relevant to a wide range of sectors, from healthcare to finance to retail and beyond. Demand is expected to grow in the coming years, with at least some level of data science becoming embedded throughout the global economy. With this in mind, this MSc Data Science programme aims to provide students with a comprehensive grounding in the knowledge and expertise expected of data engineers and data scientists, with a curriculum that includes not only fundamental concepts and theoretical background, but also the practical skills that are widely transferrable and desirable to employers.

This programme is distinctive in its philosophy of widening participation; that is, providing a route to gain skills and training in data science to those from a background not traditionally associated with the STEM-themes of mathematics, statistics and programming. The programme is designed to be appealing to a broad range of students who are seeking training or up-skilling in data science. The reason for this is to address the growing skills gap in data science, especially where it is applied in sectors not fed by STEM graduates. This programme offers two points of entry (September/Semester A and January/Semester B), with both one- and two-year pathways.

We consider two intake streams: 'near-STEM' and 'far-STEM'.

Near-STEM students will already have competency in the core mathematics, statistics and programming skills (beyond Level 3 or equivalent) that define pre-requisite knowledge that is central to the curriculum. An example near-STEM student could be a recent Mathematics graduate.

Far-STEM students will generally not have an equivalent grounding in mathematics, statistics and programming (i.e. below Level 3 or equivalent), however may well have the aptitude to complete the MSc Data Science. An example far-STEM student could be an Accounting and Finance graduate, or a mature student already working in industry looking to upskill.

The reasoning for opening access to MSc training for far-STEM students is the recognition of the clear trend emerging where skills in data science are becoming ever more relevant to a diverse range of professional sectors - including those not traditionally associated with STEM - but nevertheless require the handling, processing, visualization and analysis of data in various forms.

Another distinctive feature of the programme – intended to ensure far-STEM students are equipped with the appropriate basic level of knowledge to engage with the course – is the Data Science Core Skills bootcamp. The bootcamp will be available to all enrolling students, but it is anticipated that, generally, far-STEM students will benefit from a preparatory, intensive module. In the bootcamp students will gain a solid grounding in fundamental skills, focusing on the key mathematical (e.g. calculus) and statistical (e.g. probability distributions) principles relevant to data science, as well as a basic level of competency in programming (e.g. Python scripting). The bootcamp is delivered initially through online material, providing some familiarity with key concepts, and in an intensive two-week series of lectures and workshops prior to the commencement of the core modules. The bootcamp provides the necessary grounding for students, not only those from a far-STEM background, but also students from near-STEM backgrounds who wish to ‘brush up’ in a particular area (e.g. prospective students who are in employment, and completed their undergraduate degree some time ago). Again, this is part of a widening participation agenda.

The curriculum is structured such that students are provided with a thorough exposure to the fundamental mathematical, statistical and algorithmic principles underpinning all data science. These themes will always be relevant in what is a constantly evolving field. Throughout, theoretical work will be reinforced with practical application, with students recognizing and appreciating how the fundamental principles are reflected in a broad range of data processing and analyses. The goal is to provide a comprehensive ‘end-to-end’ training such that students become competent not only in the processing and analysis of data, but also manipulating and preparing data from a raw state as well as interpreting results and effectively communicating findings to others. This is vital to ensure students are well-prepared to tackle a broad range of challenges in their on-going or future careers.

There is a strong emphasis on hands-on learning, with students engaging with learning material through practice. This is designed not just to help embed learning, but also to instill confidence and independence in students’ technical capabilities, which will mature to a professional standard and encompass an increasing range of skills as the course develops. We also aim to ensure students develop independence in their analytical and critical thinking, bringing their own initiative and creativity to solve problems. This will be nurtured in ‘practical’ exercises, where students will be encouraged to use their new skills to develop creative solutions to interesting problems, presented as real-world relevant “data challenges”.

In the one-year pathway, this will culminate in a project in which students will have the opportunity to embark on a major piece of work that will showcase their skills. This will be of their own design, working independently or within a small team, and potentially in collaboration with a member of University staff (from across the University, in order to provide a rich variety of applications) or an external stakeholder (e.g. an industry partner). In the two-year pathway, students can gain valuable experience with a professional placement, or continue with a research-focus in the ‘advanced research’ modules.

Communication skills are taken seriously and addressed directly in the programme. They are supported by requirements for written coursework, oral presentations, individual work and teamwork and the final Project. Electronic communication is introduced at the outset and is used thereafter both in the taught modules, laboratory work and projects.

### **Sandwich award**

There is the opportunity for students to undertake a period of industrial placement, and so develop their understanding and skills within a professional environment. In order to be eligible for a placement, students must have completed 120 credits if they are Semester A (September) entrants of the programme, or 60 credits if they are Semester B (January) entrants and achieved a pass from their first attempt at the first 60 credits.

All students who have become eligible for a placement will be issued a statement of eligibility from the Department of Physics, Astronomy and Mathematics.

Students who do not pass at their first attempt all of the first 60 credits attempted are not eligible to continue on the placement route. Students who have outstanding deferrals from their first attempt at their first 60 credits, are not eligible to progress to a placement until they meet the placement eligibility criteria.

## With Advanced Research award

There is the opportunity for students to study advanced research topics in data science, including training in research methods, and to undertake an extended masters project on a cutting-edge research topic. Graduates obtaining these awards will be equipped to pursue research to PhD level, or to enter specialist employment in technically advanced and unpredictable working environments requiring sound judgment and the exercise of personal responsibility and initiative.

## B. Educational Aims of the Programme

The programme has been devised in accordance with the University's graduate attributes of programmes of study as set out in [UPR TL03](#).

### Additionally this programme aims to:

- offer an education and training based on fundamental theoretical principles and current industry-standard software and hardware platforms that is suited to the abilities and career aspirations of students and which will help them realise their own potential, preparing them for employment in a wide range of sectors;
- offer students a platform which will enable them to embark upon further study in data-intensive disciplines;
- develop competence in communicating technical findings to other experts and to non-specialists, including the use of computers and software packages for information retrieval and presentation;
- develop the ability to approach problem-solving activities using mathematical and statistical insight and identify the most appropriate technical solutions using software and hardware.

## C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (2014), and relate to the typical student.

Additionally, the SEEC Credit Level Descriptors for Further and Higher Education (2016) have been used as a guiding framework for curriculum design.

Knowledge and Understanding:	Teaching/learning methods & strategies	Assessment
A1- the fundamental mathematics and statistics underpinning data science.	Acquisition of knowledge and understanding is through a combination of lectures, workshops, problem-based learning, electronic resources, small group tutorials, coursework, directed study, feedback from assessment and practical and project work.	Knowledge and understanding are assessed through a combination of unseen examinations (A1, A2), practical examinations (A1), in-course assessments (A1-A3) in the form of reports and computer codes (A2, A3), class tests (A1), coursework assignments (A1-A3), project reports (A2, A3), oral and presentation (A1-A4).
A2- the programming skills and computational techniques used to ingest, manipulate, prepare, process, analyse, interpret and visualise data.	Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learned and to broaden their individual knowledge and understanding of the subject.	
A3- the analysis and presentation techniques required to critically assess and communicate results of data operations		
For the <b>Sandwich Award</b> , students should be able to:	Additional support is provided by StudyNet and the Mathematics Support Service	
A4- Build contextual knowledge of practical and operational aspects of a data science related role through a substantive		

work placement experience.		
Intellectual skills:	Teaching/learning methods & strategies	Assessment
B1- formulate and tackle problems in data science using theoretical tools and computational techniques.	Intellectual skills are developed through the programme by the methods and strategies outlined in section A above.	Intellectual skills are assessed through a combination of unseen examinations (B1), practical examinations (B1-3), assessed individual in-course assignments (B1-B3), workshop and laboratory code and reports (B1-B4), class tests (B1-B3), presentations (B1-B4) and project report (B1-B4).
B2- critically and quantitatively assess the outputs of data operations and analyses	Learning Outcomes B1-B3 are developed through tutorial exercises, workshops, coursework, group-work, laboratory and project work.	
B3- interpret the meaning of the outputs of data operations and analyses.	Throughout, the learner is encouraged to develop intellectual skills further by independent study	
B4- designing, executing, analysing and presenting research associated with a data science-related problem or challenge		
Practical skills:	Teaching/learning methods & strategies	Assessment
C1- develop robust computational code to tackle problems in data science and data engineering using appropriate algorithms, software frameworks and hardware architectures.	Practical skills are developed through workshops and practical classes and independent project.	Practical skills are assessed through workshop and laboratory reports and code (C1, C2) and coursework and assignments (C1, C2).
C2- apply appropriate methodology to assess, interpret and communicate the outputs of data operations and analyses.	Throughout, the learner is expected to consolidate their development of practical computing skills by use of appropriate personal computers available in the Learning Resources Centre.	
Transferable skills:	Teaching/learning methods & strategies	Assessment
D1- communicate effectively, both orally and in writing.	Transferable skills are developed through problem solving workshops and group presentations (D1-D3), individual assignments (D1, D3), writing practical reports (D1) and project work (D1-D3).	Transferable skills are assessed through a combination of group presentations (D1-D3), individual assignments (D1, D3), written practical reports (D1-D3), project reports) (D1-D3).
D2- work effectively in a team.		
D3- demonstrate time, personal management and IT skills.		
	Throughout, the learner is encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.	

## D. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time and part-time modes, and leads to the award of a MSc degree in Data Science. Other award outcomes are listed in Table 1b. Entry is normally at Masters (7) level (with related qualifications). Intake is normally semester A (September) or semester B (January).

Entry is at Level 7, with two intake streams:

- Near-STEM: generally greater than Level 3 or equivalent qualification or experience in relevant mathematics, statistics, programming skills
- Far-STEM: generally Level 3 or equivalent qualification or experience in relevant mathematics, statistics, programming skills

Each student will be initially assessed to determine which stream they should be placed on. In the first instance this assessment will be based on evidence of qualification in the relevant area. Far-STEM students will be required to take part in a compulsory zero-credit preparatory 'bootcamp' prior to or at the start of Semester A or B where they will gain the required level of knowledge in the key mathematical and statistical concepts that will feature in the main curriculum, as well as attaining an adequate level of competency in programming. The bootcamp will not be exclusive to Far-STEM students if it is deemed a 'Near-STEM' student has a specific knowledge gap (e.g. programming), or simply wants to take part in the bootcamp to 'brush up' prior to the main programme. The bootcamp will be delivered via online material and completed just before the start of Semester A or B as appropriate.

The course is structured to have a core modular curriculum. The total number of credits is 180 for the MSc Data Science, and 240 for the MSc Data Science 'Sandwich' and MSc Data Science 'with Advanced Research' awards.

### Professional and Statutory Regulatory Bodies

No accreditation.

### Advanced Research

The "with Advanced Research" route, which incorporates a second year of modules on advanced research and longer period of MSc dissertation, is 24 months for Semester A (September) entrants and 24 months for Semester B (January) entrants. The "with Advanced Research" award is for full time study only.

### Work-Based Learning, including Sandwich Programmes

Sandwich awards offer the opportunity for students to undertake a period of industrial placement, and so develop their understanding and skills within a professional environment. The duration of sandwich programmes, which incorporates a substantive work placement, in full-time study mode is 24 months for Semester A (September) entrants and 24 months for Semester B (January) entrants. Sandwich awards are for full time study only.

A sandwich award requires the successful completion of at least 30 weeks full-time equivalent placement activity from a maximum of two separate approved placements, neither of which will be normally less than 12 weeks in duration as defined in UPR AS11. Students are supported by the Careers and Placements Office in finding a placement.

### Programme Structure

The programme structure and progression information below (Table 1a and 1b) is provided for the award. Any interim awards are identified in Table 1b. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.



Table 1a Outline Programme Structure

**MSc Data Science****Mode of study** Full-time/part-time**Entry point** Semester A

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B (“Pre-A” and “Pre-B” in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for “far-STEM” students, but “near-STEM” students are welcome to attend.

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-A
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	A
Applied Data Science 1	7PAM2000	15	English	0	100	0	A
Machine Learning and Neural Networks	7PAM2021	30	English	0	100	0	B
Applied Data Science 2	7PAM2001	15	English	0	100	0	B
Data Science Project	7PAM2002	60	English	0	80	20	C

**Optional Modules: Choose ONE module in Semester A and ONE module in Semester B**

Module Titles	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

**Entry point** Semester B

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B (“Pre-A” and “Pre-B” in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for “far-STEM” students, but “near-STEM” students are welcome to attend.

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-B
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	B
Applied Data Science 1	7PAM2000	15	English	0	100	0	B
Machine Learning and Neural Networks	7PAM2021	30	English	0	100	0	A
Applied Data Science 2	7PAM2001	15	English	0	100	0	A
Data Science Project	7PAM2002	60	English	0	80	20	B



<b>Optional Modules: Choose ONE module in Semester A and ONE module in Semester B</b> Module Titles	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

### **MSc Data Science (Sandwich)**

**Mode of study** Full-time

**Entry point** Semester A

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B (“Pre-A” and “Pre-B” in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for “far-STEM” students, but “near-STEM” students are welcome to attend.

<b>Compulsory Modules</b> Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-A
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	A
Applied Data Science 1	7PAM2000	15	English	0	100	0	A
Machine Learning and Neural Networks	7PAM2021	30	English	0	100	0	B
Applied Data Science 2	7PAM2001	15	English	0	100	0	B
Professional Work Placement for MSc Data Science	7PAM2022	60	English	0	100	0	CAB
Data Science Project	7PAM2002	60	English	0	80	20	C

<b>Optional Modules: Choose ONE module in Semester A and ONE module in Semester B</b> Module Titles	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

**MSc Data Science (Sandwich)****Mode of study** Full-time**Entry point** Semester B

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B (“Pre-A” and “Pre-B” in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for “far-STEM” students, but “near-STEM” students are welcome to attend.

<b>Compulsory Modules</b>	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Title							
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-B
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	B
Applied Data Science 1	7PAM2000	15	English	0	100	0	B
Professional Work Placement for MSc Data Science	7PAM2022	60	English	0	100	0	CAB
Data Science Project	7PAM2002	60	English	0	100	0	C
Applied Data Science 2	7PAM2001	15	English	0	100	0	A
Machine Learning and Neural Networks	7PAM2021	30	English	0	80	20	A

<b>Optional Modules: Choose ONE module in Semester A and ONE module in Semester B</b>	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Titles							
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

## MSc Data Science With Advanced Research

**Mode of study** Full-time

**Entry point** Semester A

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B ("Pre-A" and "Pre-B" in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for "far-STEM" students, but "near-STEM" students are welcome to attend.

Compulsory Modules	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Title							
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-A
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	A
Applied Data Science 1	7PAM2000	15	English	0	100	0	A
Machine Learning and Neural Networks	7PAM2021	30	English	0	100	0	B
Applied Data Science 2	7PAM2001	15	English	0	100	0	B
Advanced Research Topics in Data Science	7PAM2016	30	English	0	100	0	A
Research Methods in Data Science	7PAM2015	30	English	0	100	0	B
Data Science Project	7PAM2002	60	English	0	80	20	C

Optional Modules: Choose ONE module in Semester A and ONE module in Semester B	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Titles							
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

## MSc Data Science With Advanced Research

**Mode of study** Full-time

**Entry point** Semester B

**Note:** the Data Science Core Skills Bootcamp (7PAM2003) is a zero credit module that is delivered over 2-weeks just prior to the start of Semester A and B ("Pre-A" and "Pre-B" in the table below), with exact dates to be confirmed by the Programme Leader. This module is compulsory for "far-STEM" students, but "near-STEM" students are welcome to attend.

Compulsory Modules	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Title							
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	0	100	Pre-B
Fundamentals of Data Science	7PAM2020	30	English	0	100	0	B
Applied Data Science 1	7PAM2000	15	English	0	100	0	B
Machine Learning and Neural Networks	7PAM2021	30	English	0	100	0	A
Applied Data Science 2	7PAM2001	15	English	0	100	0	A
Advanced Research Topics in Data Science	7PAM2016	30	English	0	100	0	B
Research Methods in Data Science	7PAM2015	30	English	0	100	0	C
Data Science Project	7PAM2002	60	English	0	80	20	A

Optional Modules: Choose ONE module in Semester A and ONE module in Semester B	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Module Titles							
Data Mining & Discovery	7PAM2005	15	English	0	100	0	A
Linear Modelling	6PAM1037	15	English	0	100	0	A
Data Handling & Visualisation	7PAM2004	15	English	0	100	0	B
Multivariate Statistics	6PAM1036	15	English	0	100	0	B

**Table 1b Final and interim awards available**

The programme provides the following final and interim awards:

Final Award	Award Title	Minimum requirements	Available at end of (normally):	Programme Learning Outcomes developed (see above)
Masters	MSc Data Science	180 credit points including at least 150 at level 7 and the individual project (60 credits).	3 Semesters	All programme learning outcomes (see Table 2) except A4 and B4.
Masters	MSc Data Science (Sandwich)	240 credit points including at least 210 at level 7, passing the individual project (60 credits), and a year's approved and satisfactory industrial placement (60 credits).	6 Semesters	All programme learning outcomes (see Table 2) except B4.
Masters	MSc Data Science with Advanced Research	240 credit points including at least 210 at level 7, passing the modules Advanced Research Topics in Computer Science (30 credits), Research Methods (30 credits) and the individual project (60 credits).	2-year programme which incorporates a second year of modules on advanced research and a double Semester of MSc dissertation	All programme learning outcomes (see Table 2) except A4.
Postgraduate Diploma	Data Science	120 credit points, including at least 90 at level 7.	2, 3 Semesters	A1, A2, B1, B2, C1, D1
Interim Award	Award Title	Minimum requirements	Available at end of:	Programme Learning Outcomes developed (see above)
Postgraduate Certificate	Untitled award	60 credit points, including at least 45 at level 7	1-2 Semesters	See UPR AS11, section 13: <a href="http://sitem.herts.ac.uk/secreg/upr/AS11.htm">http://sitem.herts.ac.uk/secreg/upr/AS11.htm</a>

Masters and Diploma awards can be made "with Distinction" or "with Commendation" where criteria as described in UPR AS14, Section D.

## Programme-specific assessment regulations

The programme is compliant with the University's academic regulations (in particular, UPR AS11, UPR AS12/UPR AS13 and UPR AS14).

To be eligible for the award of MSc, students must have met the general requirements set out in Table 1b, and pass (without compensation) the corresponding 60 credit major individual project.

Additional Requirements for the Sandwich Award	To be eligible for the award of MSc Sandwich Award, students must have met the general requirements set out in Table 1b and met the requirement for Masters Awards (set out above). In addition, graduates must pass the "Professional Work Placement for MSc Data Science" module (7PAM2022).
Additional Requirements for the 'with Advanced Research' Award	To be eligible for the award of MSc Data Science with Advanced Research award, students must have met the general requirements set out in Section 1D and met the requirement for Masters Awards (set out above). In addition, graduates must pass the "Advanced Research Topics in Data Science" module (7PAM2016) and the "Research Methods in Data Science" module (7PAM2015). If a student is not eligible for the 'with Advanced Research' award, the Board of Examiners may offer the standard MSc award shall the student be eligible for the corresponding standard MSc award.
Enrolling on the project module	To enrol on the project module, students must typically have studied 120 credits of taught modules from the programme and passed at least 60 credits of taught modules (in order to satisfy UPR AS14, D5.2.3). Semester B Sandwich Entrants will typically start their project when they return from placement, followed by their second semester of taught modules.
Progression to Placement	<p>MSc placement awards offer the opportunity for students to undertake a period of industrial placement, and so develop their understanding and skills within a professional environment. In order to be eligible for a placement, students must normally have passed 120 credits if they are Semester A (September) entrants of the programme, or 60 credits if they are Semester B (January) entrants and achieved a pass in the first attempt at the first 60 credits. All students who have become eligible for a placement will be issued a statement of eligibility from the Department of Physics, Astronomy and Mathematics. Students who have not met these progression requirements, including those with outstanding deferrals from the first attempt at their first 60 credits, will normally be transferred from the sandwich course to the corresponding 2-year 'with Advanced Research' course.</p> <p>Students are responsible for securing their placement. Students are usually required to secure their placement by the School's published deadline (typically end of April).</p> <p><b>Students who do not secure a placement by the deadline, will normally be automatically transferred from the Sandwich award to the corresponding 2-year 'With Advanced Research' course. Students may also be eligible to transfer to the 1-year MSc Data Science pathway, following consultation with the programme leader.</b></p>
Transfer between awards	Students who are registered on the standard 1-year full time course normally are not allowed to change their study pattern to the corresponding 2-year full time Sandwich course or the 2-year full time 'With Advanced Research' course.
Period of Registration	<p>The typical duration of learning, teaching and assessment activities for the programme as follows:</p> <ul style="list-style-type: none"> <li>September starters on the full-time route: 12 months (September to September, with the conferment of awards in late October or early November)</li> </ul>

- September starters on the sandwich route: 24 months (September to September, with the conferment of awards in late October or early November)
- September starters on the 'With Advanced Research' route: 24 months (September to September, with the conferment of awards in late October or early November)
- January starters on the full-time route: 16 months (January to June, with the conferment of awards in later June or early July)
- January starters on the sandwich route: 24 months (January to June, with the conferment of awards in later June or early July)
- January starters on the 'with Advanced Research' route: 24 months (January to June, with the conferment of awards in middle February)
- September starters on the part time route: 32 months (September to May, with the conferment of awards in later June or early July)
- January starters on the part time route: 32 months (January to September, with the conferment of awards in late October or early November)

**For registration to continue, students should have met the requirements for the PG Dip award within three years and the MSc award within four years (all periods calculated from date of registration on the Programme).**

## E. Management of Programme & Support for student learning

### Management

The programme is managed and administered through:

- Dean of School;
- Associate Dean (Academic Quality Assurance);
- Associate Dean (Learning, Teaching and Student Experience);
- A Programme Leader, who has overall responsibility for the effective operationalization of the programme, and ensuring that academic standards are maintained and an effective student learning experience is provided;
- Student representatives on programme committees;
- Module Leaders who are responsible for individual modules.

### Support

Students are supported by:

- An induction week at the beginning of each new academic session;
- Personal Tutors to provide academic and pastoral support;
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters, accommodation, and international student support;
- Office of Dean of Students, incorporating Chaplaincy, Counselling and nursery;
- StudyNet, a versatile on-line inter-active intranet and learning environment;
- Guided student-centred learning on StudyNet module sites;
- Access to extensive digital and print collections of information resources;
- Attractive modern study environments in 2 Learning Resources Centres;
- A Mathematics Drop-in Centre;
- Medical Centre;
- University Disability Advisors;
- An Equality Office;
- Careers Enterprise and Employment Services;
- A Programme Handbook to explain the programme, the support services available and to provide a calendar of events for the year;
- Online induction week to assist in starting the programme and settling into it;
- A range of online learning materials and activities specially designed to support students in their studies;



- StudyNet/Canvas VLE (Virtual Learning Environment);
- Provision of other learning resources at the start of modules, as appropriate, for instance software providing programming environments or modelling tools, text-based material via suitable media, and downloadable software from a centralised school online resource;
- Module delivery information provided online at the commencement of each module;
- Student representation in the procedures for management and delivery of the programme, through the online programme forum, the University's managed learning environment and the student feedback questionnaire mechanisms;
- Tutorial support which will be provided by tutors who have individual responsibility for a group of students on a module;
- A project tutor who offers one-to-one tutoring during projects;
- The Students' Union.

## F. Other sources of information

In addition to this Programme Specification, the University publishes guidance to registered students on the programme and its constituent modules:

- A Programme (or Student) Handbook;
- A Definitive Module Document (DMD) for each constituent module.

The Ask Herts website provides information on a wide range of resources and services available at the University of Hertfordshire including academic support, accommodation, fees, funding, visas, wellbeing services and student societies.

As a condition of registration, all students of the University of Hertfordshire are required to comply with the University's rules, regulations and procedures. These are published in a series of documents called 'University Policies and Regulations' (UPRs). The University requires that all students consult these documents which are available on-line, on the UPR web site, at: <http://www.herts.ac.uk/secreg/upr/>. In particular, UPR SA07 'Regulations and Advice for Students' Particular Attention - Index provides information on the UPRs that contain the academic regulations of particular relevance for undergraduate and taught postgraduate students.

In accordance with section 4(5) of the Higher Education and Research Act 2017 (HERA), the UK Office for Students (OfS) has registered the University of Hertfordshire in the register of English higher education providers. The Register can be viewed at: <https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/>.

## G. Entry requirements

The normal entry requirements for the programme are:

For Near-STEM students, the normal entry requirements for the programme are a good (2.1 or above) Honours Degree (or equivalent) in a STEM subject (e.g. Mathematics, Engineering, Physical Sciences etc). If a student has a relevant STEM degree, then they will be considered 'Near-STEM'. They will be offered the opportunity to participate in the Data Science Core Skills bootcamp but will not be required to participate.

For Far-STEM students, the normal entry requirements for the programme are a good (2.1 or above) Honours Degree (or equivalent). The subject of the degree is not defined, since (a) many different, disparate subjects might have a Data Science relevance (e.g. Business, Geography), and (b) some students might possess a non-STEM degree but have relevant experience (e.g. from employment). For far-STEM students who do not possess a good Honours Degree or equivalent, applications will be assessed on a case-by-case basis. Applicants may be asked to submit a short portfolio providing evidence of

- A basic level of numeracy (e.g. GCSE maths)
- Experience and competency with IT / software (e.g. use of Microsoft Excel)

- Experience of a basic interaction with data of any form (e.g. inputting values, making calculations, examining imaging, etc.)

Applicants will have to meet these criteria – as assessed by the admissions team – to be allowed entry onto the programme. The nature of the portfolio will be determined by the Programme Leader in consultation with the PGT Admissions Team.

For current entry tariff point requirements, please refer to the relevant page for the Course on the University website or on the online prospectus.

The programme is subject to the University's Principles, Policies and Regulations for the Admission of Students to Undergraduate and Taught Postgraduate Programmes (in [UPR SA03](#)), along with associated procedures. These will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

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If you would like this information in an alternative format please contact:  
[hadmin@herts.ac.uk](mailto:hadmin@herts.ac.uk)

If you wish to receive a copy of the latest External Examiner's Report for the programme, please email a request to [aqo@herts.ac.uk](mailto:aqo@herts.ac.uk)

## MSc Data Science

**Table 2: Development of Intended Programme Learning Outcomes in the Constituent Modules**

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

		Programme Learning Outcomes (as identified in section 1 and the following page)												
		Knowledge & Understanding				Intellectual Skills				Practical Skills		Transferable Skills		
Module Title	Module Code	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	D1	D2	D3
Data Science Core Skills Bootcamp*	7PAM2003	x	x			x				x		x		x
Fundamentals of Data Science	7PAM2020	x	x			x	x				x	x		x
Machine Learning and Neural Networks	7PAM2021	x	x			x	x	x		x	x			x
Applied Data Science 1	7PAM2000	x	x	x		x	x	x	x	x	x	x	x	x
Applied Data Science 2	7PAM2001	x	x	x		x	x	x	x	x	x	x	x	x
Data Handling and Visualisation	7PAM2004		x	x			x	x			x	x		x
Data Mining and Discovery	7PAM2005		x	x			x	x			x	x		x
Linear Modelling	6PAM1037	x						x						
Multivariate Statistics	6PAM1036	x						x						
Data Science Project	7PAM2002	x	x	x		x	x	x	x	x	x	x		x
Professional Work Placement for MSc Data Science	7PAM2022	x	x	x	x	x	x	x		x	x	x		x
Research Methods In Data Science**	7PAM2015		x	x		x	x	x	x		x	x		x
Advanced Research Topics In Data Science**	7PAM2016	x	x	x		x	x	x	x		x	x		x

\* Compulsory for Far-STEM students and optional for Near-STEM students

\*\* Compulsory for 'With Advanced Research' award. Not available for other awards.

## KEY TO PROGRAMME LEARNING OUTCOMES

### Knowledge and Understanding

- A1. The fundamental mathematics and statistics underpinning data science.
- A2. The programming skills and computational techniques used to ingest, manipulate, prepare, process, analyse, interpret and visualise data.
- A3. The analysis and presentation techniques required to critically assess and communicate results of data operations.
- A4. Build contextual knowledge of practical and operational aspects of a data science related role through a substantive work placement experience.

### Intellectual Skills

- B1. Formulate and tackle problems in data science using theoretical tools and computational techniques
- B2. Critically and quantitatively assess the outputs of data operations and analyses.
- B3. Interpret the meaning of the outputs of data operations and analyses.
- B4. Designing, executing, analysing and presenting research associated with a data science-related problem or challenge

### Practical Skills

- C1. Develop robust computational code to tackle problems in data science and data engineering using appropriate algorithms, software frameworks and hardware architectures.
- C2. Apply appropriate methodology to assess, interpret and communicate the outputs of data operations and analyses

### Transferable Skills

- D1. Communicate effectively, both orally and in writing.
- D2. Work effectively in a team.
- D3. Demonstrate time, personal management and IT skills.

## Section 2

### Programme management

**Relevant QAA subject benchmarking statements**

Mathematics, Statistics and Operational Research Computing

**Type of programme**

Taught Postgraduate

**Date of validation/last periodic review**

October 21

**Date of production/ last revision of PS**

October 21

**Relevant to level/cohort**

Level 7 entering January 2023

**Administrative School**

School of Physics, Engineering & Computer Science

Table 3 Course structure

Course details		
Course code	Course description	HECOS
PMDSM	MSc Data Science	100400 (20%) 101030 (20%) 101034 (10%) 100956 (25%) 100992 (25%)
PSDSMARM	MSc Data Science with Advanced Research	100400 (20%) 101030 (20%) 101034 (10%) 100956 (25%) 100992 (25%)