



Programme Specification (PG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and title:	Applied Statistics and Data Science MSc
Name of interim award(s):	PG Cert and PG Dip
Duration of study / period of registration:	1 year full time
Queen Mary programme code(s):	
QAA Benchmark Group:	N/A
FHEQ Level of Award:	Level 7
Programme accredited by:	N/A
Date Programme Specification approved:	
Responsible School / Institute:	School of Mathematical Sciences

Schools / Institutes which will also be involved in teaching part of the programme:

Collaborative institution(s) / organisation(s) involved in delivering the programme:

Programme outline

The programme includes courses on probability theory, statistical inference, linear and multivariate regression, experimental design, time series analysis, and machine learning. Students are also trained in using statistical software such as R and Python to analyse and visualize data. In addition, the programme offers options for specialization both in taught modules as in the Summer Dissertation module in areas such as biostatistics, econometrics, or social statistics, depending on the students' interests.

The programme is structured in three semesters.

In the first two semesters students receive the basic core subject training providing them with the fundamental ideas of Applied Statistics including topics such as Bayesian Statistics, Computational Statistics, Biostatistics and Time series analysis amongst other, together with some of the relevant technology.

In the second semester the student can specialise in their specific areas of academic or professional interest, again with ample coverage of the practical technology used by industry to create revenue from insight in applied statistics.

The summer semester is the culmination of a year of learning when students will be involved in projects in areas directly related to industry practice, and in some instances in direct collaboration with our industry partners. This hands-on experience equips students with the skills they need to work as statisticians in various industries, government agencies, or academic institutions,

or to pursue further study in a PhD programme in Statistics or a related field

Aims of the programme

The Applied Statistics and Data Science MSc programme aims to equip students with advanced knowledge and practical skills in the field of statistical analysis and data science. This comprehensive programme is designed to meet the increasing demand for professionals who can harness the power of data to drive informed decision-making in a variety of industries and domains.

The primary aim of this programme is to provide students with a solid foundation in statistical principles, methodologies, and techniques, and to enable them to apply this knowledge to real-world problems. Students will develop a deep understanding of statistical modelling, data analysis, and data interpretation, allowing them to extract meaningful insights from complex datasets.

The programme also focuses on enhancing students' proficiency in data science tools and technologies. Students will gain hands-on experience with cutting-edge statistical software and programming languages, enabling them to effectively manipulate, analyse, and visualize data. They will acquire practical skills in data preprocessing, data cleaning, and feature engineering, ensuring data integrity and quality for accurate analysis.

Furthermore, the programme aims to foster critical thinking and problem-solving abilities in students. They will learn to design and execute research projects, formulate research questions, and select appropriate statistical methodologies. Through practical exercises and projects, students will develop the ability to apply statistical techniques and algorithms to solve real-world challenges, spanning a wide range of domains such as finance, healthcare, marketing, and social sciences.

In addition to academic content, the programme places emphasis on developing essential disciplinary skills and abilities. Students will learn to collaborate effectively in interdisciplinary teams, bringing their statistical expertise to contribute to collective decision-making processes. They will also cultivate strong communication skills, enabling them to present complex statistical concepts and findings to both technical and non-technical audiences in a clear and concise manner.

Ethical considerations are another key aspect of the programme. Students will be educated on the responsible and ethical use of data, emphasizing principles such as data privacy, confidentiality, and unbiased analysis. They will gain an understanding of the ethical challenges that may arise in data science projects and learn how to navigate and mitigate potential risks.

Upon completion of the Applied Statistics and Data Science MSc, graduates will be well-prepared to pursue careers in diverse industries such as healthcare, finance, technology, and consulting. They will possess the knowledge, skills, and attributes necessary to thrive as data scientists, statisticians, data analysts, or research professionals, contributing to evidence-based decision-making and driving innovation through the effective utilization of data.

What will you be expected to achieve?

As a student pursuing the Applied Statistics and Data Science MSc, you are expected to achieve the following:

1. **Acquire a Comprehensive Understanding:** You will develop a comprehensive understanding of statistical concepts, methodologies, and techniques relevant to data analysis and interpretation. You will grasp the fundamental principles that underpin statistical modelling and be able to apply them effectively.
2. **Apply Advanced Statistical Methods:** You will learn to apply advanced statistical models, algorithms, and techniques to analyse complex datasets. You will gain the ability to select and implement appropriate statistical methodologies based on the characteristics of the data and research questions at hand.
3. **Conduct Rigorous Data Analysis:** You will develop the skills to collect, preprocess, and analyze data rigorously. This involves ensuring data quality, cleaning and transforming data, and utilizing appropriate statistical software and programming languages to perform data analysis and visualization.
4. **Draw Meaningful Insights:** Through your data analysis, you will be able to draw meaningful insights and interpretations from the results. You will learn to critically evaluate and interpret statistical findings, identify limitations, and communicate them effectively.

5. Design and Execute Research Projects: You will acquire the knowledge and skills to design and execute research projects in the field of applied statistics and data science. You will learn to formulate research questions, select appropriate methodologies, and plan and execute data-driven investigations.

6. Collaborate Effectively: Collaboration is essential in data science. You will develop strong teamwork and collaboration skills, working effectively in interdisciplinary teams. You will be able to contribute your statistical expertise while integrating diverse perspectives to solve complex problems.

7. Communicate Findings Clearly: You will develop effective communication skills to convey complex statistical concepts and findings to both technical and non-technical audiences. You will be able to present your work in a clear, concise, and compelling manner, using appropriate visualizations and explanations.

8. Uphold Ethical Practices: Ethical considerations are paramount in data science. You will understand the ethical challenges in data analysis and demonstrate a commitment to responsible practices. This includes ensuring data privacy, confidentiality, and unbiased analysis throughout your work.

9. Continuously Update Knowledge: As the field of statistics and data science evolves rapidly, you will be expected to stay updated with emerging methodologies, technologies, and trends. You will cultivate a mindset of continuous learning and professional development to adapt to the evolving landscape of data science.

By achieving these objectives, you will be well-prepared to embark on a successful career in applied statistics and data science, equipped with the knowledge, skills, and attributes required to make data-driven decisions, contribute to research and innovation, and tackle real-world challenges effectively.

Academic Content:	
A 1	Demonstrate a comprehensive understanding of statistical concepts, methodologies, and techniques commonly used in data analysis and interpretation.
A 2	Apply advanced statistical models and algorithms to analyze complex datasets and draw meaningful conclusions.
A 3	Critically evaluate and interpret statistical results, identifying limitations, assumptions, and potential sources of bias.

Disciplinary Skills - able to:	
B 1	Apply data collection and preprocessing techniques to ensure data integrity and quality for analysis.
B 2	Utilize a variety of statistical software and programming languages to perform data analysis, visualization, and modeling.
B 3	Design and execute research projects, including formulating appropriate research questions, selecting suitable methodologies, and conducting data-driven investigations.

Attributes:	
C 1	Demonstrate effective communication skills, both orally and in writing, to convey complex statistical concepts and findings to both technical and non-technical audiences.
C 2	Display a strong ability to work collaboratively in interdisciplinary teams, contributing statistical expertise and effectively integrating diverse perspectives.

C3	Exhibit a commitment to ethical practices in data science, including data privacy, confidentiality, and responsible use of statistical techniques.
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How will you learn?

In the Applied Statistics and Data Science MSc programme, your learning experience will be comprehensive and supported by various methods. Here's how you will learn:

- 1. Formal Lessons:** You will attend structured formal lessons delivered by experienced lecturers who are experts in their respective fields. These lessons will provide you with the necessary theoretical foundations, concepts, and methodologies in applied statistics and data science. The curriculum will be designed to cover a wide range of topics, ensuring a well-rounded understanding of the subject matter.
- 2. Tutorials:** Alongside formal lessons, you will have the opportunity to participate in tutorials. Tutorials offer a smaller group setting where you can engage in interactive discussions, ask questions, and receive further clarification on complex topics. Tutorials provide a supportive environment for deeper exploration of course materials and facilitate peer-to-peer learning.
- 3. Assignments:** Throughout the programme, you will be assigned various coursework and assignments. These assignments will challenge you to apply the knowledge and techniques learned in the classroom to practical scenarios. They will involve hands-on data analysis tasks, problem-solving exercises, and the application of statistical models and algorithms to real-world datasets.
- 4. MSc Dissertation Project:** As part of your MSc journey, you will undertake a summer dissertation project. This project will be a culmination of your learning, where you will have the opportunity to demonstrate your ability to conduct independent research, apply statistical methods, and generate valuable insights. You will work closely with a supervisor who will guide and support you throughout the project.
- 5. Access to State-of-the-Art Software and Hardware:** The programme ensures that you have access to cutting-edge software and hardware resources. You will have the opportunity to work with industry-standard statistical software packages, programming languages, and data analysis tools. Access to advanced hardware and computing resources will enable you to handle large datasets and perform computationally intensive analyses effectively.
- 6. Personal Academic Advisor:** Each student will be assigned a personal academic advisor who will serve as a mentor and guide throughout your academic journey. Your advisor will provide support and advice on course selection, academic progress, and career development. They will assist you in navigating the programme requirements and help you make informed decisions regarding your academic and professional goals.
- 7. Office Hours:** Lecturers and teaching staff will hold regular office hours, during which you can schedule one-on-one meetings to seek clarification, discuss coursework, receive feedback, and address any questions or concerns. Office hours provide an opportunity for personalized interaction, allowing you to receive individualized attention and guidance from faculty members.

Overall, the learning experience in the Applied Statistics and Data Science MSc will combine formal lessons, interactive tutorials, practical assignments, independent research, access to advanced technology, and personal support from academic advisors and lecturers. This holistic approach will foster a dynamic and engaging learning environment, enabling you to develop a strong foundation in applied statistics and data science and prepare you for successful careers in this rapidly evolving field.

How will you be assessed?

In the Applied Statistics and Data Science MSc programme, your progress and understanding of the subject matter will be assessed through a variety of methods. Here's how you will be assessed:

- 1. Midterm Assignments:** Throughout the programme, you will be assigned midterm assignments that will assess your understanding of specific topics and concepts covered in the coursework. These assignments may involve data analysis tasks, problem-solving exercises, theoretical questions, or the application of statistical models and techniques to practical scenarios. Midterm assignments serve as checkpoints to gauge your progress and provide valuable feedback on your performance. Midterm assessments will be thoughtfully planned to ensure a balanced distribution, preventing any overwhelming concentration of assessments in a particular week.

2. Examinations: Written examinations will be conducted to assess your knowledge and comprehension of the material covered in the programme. These exams may include a combination of multiple-choice questions, short-answer questions, and essay-style questions. Examinations will test your ability to apply statistical principles, methodologies, and techniques to solve problems and analyze data accurately. They will assess your understanding of key concepts, your critical thinking skills, and your ability to communicate statistical findings effectively.

3. Projects: In addition to assignments and exams, you will undertake projects that allow you to apply your knowledge and skills to real-world scenarios. These projects may involve data analysis, modeling, and interpretation, where you will work on complex datasets to derive meaningful insights and make data-driven recommendations. Projects provide an opportunity to demonstrate your ability to integrate various statistical techniques, work independently or collaboratively, and communicate the results effectively.

4. MSc Dissertation: The MSc dissertation project represents a significant component of your assessment. This independent research project allows you to investigate a specific research question or problem in depth. You will design and execute a research study, analyze data, and present your findings in a formal written dissertation. The dissertation will be assessed based on the quality of research design, data analysis, interpretation, and the clarity and coherence of your written work.

The assessment methods employed in the programme are designed to evaluate your understanding of statistical concepts, your ability to apply statistical methodologies, your critical thinking skills, and your communication abilities. The combination of assignments, exams, projects, and the MSc dissertation ensures a comprehensive evaluation of your knowledge and practical skills in applied statistics and data science.

The assessment dates will be coordinated by the Director of Education, Programme Director and Module Organisers to ensure no undue pressure is placed on students.

Throughout the programme, you will receive feedback and guidance from faculty members, allowing you to identify areas of improvement and enhance your learning experience. The assessments are designed to not only evaluate your progress but also to promote active engagement with the subject matter and to prepare you for future challenges in the field of applied statistics and data science.

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

The programme is offered in a full time one year format with module diet itemized below.

The programme consists of four compulsory taught modules, three in Semester A and one in Semester B, as well as a summer dissertation project. Full-time students are expected to complete eight taught modules and the project dissertation in one academic year. Students choose their elective modules according to their academic background and interests, in consultation with the Programme Director and other staff as needed.

Academic Year of Study

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
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Programme Title: Applied Statistics and Data Science MSc

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Probability and Statistics for Data Analytics	MTH794P	15	7	Compulsory	1	Semester 1
Applied Statistical Modelling	MTH7021P	15	7	Compulsory	1	Semester 1
Bayesian Statistics	MTH776P	15	7	Compulsory	1	Semester 2
Machine learning with Python	MTH786P	15	7	Compulsory	1	Semester 1
Storing, Manipulating and Visualising Data	MTH765P	15	7	Compulsory	1	Semester 1
Computational Statistics with R	MTH791P	15	7	Compulsory	1	Semester 2
Time Series	MTH6139P	15	6	Elective	1	Semester 2
Time Series Analysis for Business	MTH783P	15	7	Elective	1	Semester 2
Advanced Machine Learning	MTH793P	15	7	Elective	1	Semester 2
Survey Sampling	MTH7019P	15	7	Elective	1	Semester 2
Biostatistics and Medical Statistics	MTH7020P	15	7	Elective	1	Semester 2
Applied Statistics and Data Science Dissertation	MTH7022P	60	7	Core	1	Semester 3

What are the entry requirements?

A 2:1 or above at undergraduate level in a Science, Technology, Engineering or Mathematics (STEM) subject. Applicants with a 2:1 in any other subject can also be considered provided the degree contains satisfactory study in mathematics or statistics. For international students we require English language qualifications IELTS 6.5.

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The Staff-Student Liaison Committee provides a formal means of communication and discussion between Schools and its students. The committee consists of student representatives from each year in the school/institute together with appropriate representation from staff within the school/institute. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

Each school operates a School Education Committee, or equivalent, which advises the School/Institute Director of Education on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM

policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, such as through student membership, or consideration of student surveys.

All schools operate an Annual Programme Review of their taught undergraduate and postgraduate provision. The process is normally organised at a School-level basis with the Head of School, or equivalent, responsible for the completion of the school's Annual Programme Reviews. Schools/institutes are required to produce a separate Annual Programme Review for undergraduate programmes and for postgraduate taught programmes using the relevant Undergraduate or Postgraduate Annual Programme Review pro-forma. Students' views are considered in this process through analysis of the PTES and module evaluations.

What academic support is available?

All students will be assigned an Academic Advisor with whom they will have regular meetings. In addition the students will have all the standard induction, advice and supervisory arrangements normally offered to students within SMS.

The school handbook will be provided (and made accessible at all times) to students, where all the channels of support will be outlined. These include the support channels within the school and also those available at College level.

Programme-specific rules and facts

N/A

How inclusive is the programme for all students, including those with disabilities?

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:

- Finding out if you have a specific learning difficulty like dyslexia
- Applying for funding through the Disabled Students' Allowance (DSA)
- Arranging DSA assessments of need
- Special arrangements in examinations
- Accessing loaned equipment (e.g. digital recorders)
- Specialist one-to-one "study skills" tuition
- Ensuring access to course materials in alternative formats (e.g. Braille)
- Providing educational support workers (e.g. note-takers, readers, library assistants)
- Mentoring support for students with mental health issues and conditions on the autistic spectrum.

Links with employers, placement opportunities and transferable skills

The staff involved in the Applied Statistics and Data Science have strong links and research collaboration with a range of international academic institutions and industry. Several of these companies will be involved in the teaching activities, providing guest lectures, as well as business use cases for applying relevant techniques.

Additionally, several of the MSc projects offered to the students may be performed in collaboration with an industry partner, including summer placement opportunities.

Programme Specification Approval

Person completing Programme Specification:

Dr Sebastian del Bano Rollin

Person responsible for management of programme:

Dr Silvia Liverani

**Date Programme Specification produced / amended by
School / Institute Education Committee:**

08/06/2023; reviewed 26 Sep 23 by S. Beheshti, DoE

**Date Programme Specification approved by Taught
Programmes Board:**