Programme Title: MSci Astrophysics

Programme Specification (UG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	MSci Astrophysics
Name of interim award(s):	CertHE; DipHE; BSc
Duration of study / period of registration:	Four Years
QMUL programme code / UCAS code(s):	F523
QAA Benchmark Group:	Physics
FHEQ Level of Award :	Level 7
Programme accredited by:	Institute of Physics
Date Programme Specification approved:	
Responsible School / Institute:	School of Physical and Chemical Sciences

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

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

University College London, King's College London, Royal Holloway University of London.
Disclaimer: The availability of modules offered by KCL, UCL and RHUL are outside of QMUL's control and we cannot guarantee that all modules will be running each year.

Programme outline

This programme is an Institute of Physics (IoP) accredited integrated masters (MSci) in Astrophysics comprising of four years full time study. The programme covers the whole of the "core of Physics" as specified by the IoP in the compulsory modules and is structured to allow for increasing module choice in the second, third and fourth years of study. The fourth year is part of the intercollegiate Physics MSci jointly run by University College London, King's College London, Royal Holloway University of London and QMUL. An MSci graduate should be able to enter further training at PhD level and to become a professional astrophysicist. In addition, they should be able to enter any of a number of other careers which use the transferable skills gained in the four year programme of study. Specifically, in this degree programme students will learn fundamental principles of physics and mathematics and apply them to the study of planetary systems, stars, galaxies and the universe as a whole.

Aims of the programme

We aim to:
i. teach physics of high quality within an excellent research environment;
ii. recruit students able to benefit from a university education;

iii. provide a programme that enables students with a variety of educational backgrounds to pursue physics as a subject;
iv. provide access to such variety of modules, including those from other disciplines, as to enable students to tailor their studies to their own needs and interests;
v. instill in our students an understanding of the working of the physical world;
vi. encourage students to develop transferable skills that are applicable to a variety of careers;
vii. provide a programme that prepares students, where appropriate, for a range of professional careers in physics.
viii. provide opportunities for students to appreciate the beauty of physics and to develop a desire for learning.

What will you be expected to achieve?

Students successfully completing this programme will:

Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

Academic Content:	
A 1	Have acquired a core knowledge of physics.
A 2	Be able to communicate this knowledge.
A 3	Have acquired essential skills in the use of computers for word-processing, spreadsheet computing and the acquisition and manipulation of data.
A 4	Have acquired essential skills in measurement and the analysis of uncertainties of observation.

Disciplinary Skills - able to:

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B 1	Have acquired essential skills in the art of scientific report-writing and in the oral presentation of technical material.
B 2	Be able to apply scientific methods to the analysis of problems.
B 3	Have seen and understood the application of core physics to one or two specialised areas of study.
B 4	Have acquired an understanding of the workings of the physical world.
B 5	Be able to appreciate the role of science in general, and of physics in particular, within a broader range of human cultural activity.
B 6	Be fluent in the language and methods of physics.
B 7	Be able to apply core physics to the understanding of phenomena in specialised areas of study.
B 8	Be able to plan and execute a small research project.
B 9	Be able to apply acquired knowledge and skills to the modelling of new problems in physics.
B 10	Be equipped for a professional career based on physics.

Attributes:	
C 1	To acquire and apply knowledge in a rigorous way.
C 2	To connect information and ideas within their field of study.
C 3	To adapt their understanding to new and unfamiliar settings.
C 4	To develop the ability to reflect upon and asses their own progress.
C 5	To use quantitative data confidently and competently.
C 6	To obtain transferable key skills to help them with their career goals and their continuing education.
C 7	To develop effective spoken and written English.
C 8	To explain and argue clearly and concisely.
C 9	To apply their analytical skills to investigate unfamiliar problems.
C 10	To use information for evidence-based decision-making and creative thinking.

How will you learn?

Our programme is constructed within a modular course structure in which each student takes seven, eight or nine modules per year. Our overall strategy is to achieve a balance, appropriate to the aims of each course unit, between teaching (lectures; practical laboratory work; small-group tutorials) and learning by students (peer discussion; exercise classes; coursework and essay assignments; independent work in laboratories and computer studies; teach-yourself computer packages and the Internet; videos; textbooks and supplementary reading).

Exercise classes or laboratories are provided for all compulsory modules which are used to develop the specific skills needed. Two general physics laboratories are used to develop experimental skills, including the acquisition of data and the analysis of uncertainties of observation. In addition students learn to write a scientific account of their experimental observation. Finally, compulsory projects are undertaken in years three and four in order to develop students' investigative and communication skills.

How will you be assessed?

Assessment is by a mixture of continuous assessment and formal written examinations at the end of each year. We use a variety of in-course assessments to enable students to get quick feedback as to their performance. These include weekly coursework (marked and returned on a weekly basis), essay assignments, mid-term tests carried out in a lecture slot, performance in exercise classes and tutorials, laboratory and project reports. These in-course assessments are combined with formal final written examination results and oral examinations (on project modules) to produce the final mark for each course unit. The precise mixture of in-course and final exam marks to give the overall mark varies between different course units and is specified in the detailed course unit description given in the Student Handbook and on the relevant QMPlus module web page.

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 consists of compulsory and elective modules. All undergraduate students at Queen Mary take 120 credits a year. An MSci degree consists of 480 credits. Most modules are worth 15 credits which means that students normally take 8 modules a year. In your third year students study for a project worth 15 credits, whereas in the fourth year they undertake either a 30 or 45 credit project . Students are required to take all modules marked as 'compulsory'. Where modules are indicated as "elective" or "suggested" or "optional" students may choose whether or not to take the module. Where there is space in the curriculum students make take up to 15 credits per academic year from another School at Queen Mary. Students who chose this option are responsible for finding their own modules and complying with all registration requirements. The programme includes one compulsory non credit bearing (study only) module in the first and second years: SPA3000 Basic Mathematical Techniques and SPA5000 Communication Skills for Physicists.
The MSci Degree programme has an intercollegiate fourth year of study. The course units available in the fourth year are planned and delivered jointly by the Physics Departments at Queen Mary, University College, King's College and Royal Holloway. Thus the fourth year has a rich choice of courses which cover not only physics, but theoretical physics, astrophysics and applied physics.

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Professional Skills for Scientists	SPA4601	15	4	Compulsory	1	Semester 2
Mathematical Techniques 1	SPA4121	15	4	Compulsory	1	Semester 1
Classical Physics	SPA4401	15	4	Compulsory	1	Semester 1
Scientific Measurement	SPA4103	15	4	Compulsory	1	Semester 1
Modern Physics	SPA4402	15	4	Compulsory	1	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Electric and Magnetic Fields	SPA4210	15	4	Compulsory	1	Semester 2
Mathematical Techniques 2	SPA4122	15	4	Compulsory	1	Semester 2
Basic Mathematical Techniques	SPA3000	0	4	Study only	1	Semesters 1 & 2
Our Universe	SPA4101	15	4	Compulsory	1	Semester 2

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Thermodynamics	SPA5219	15	5	Compulsory	2	Semester 1
Quantum Mechanics A	SPA5319	15	5	Compulsory	2	Semester 1
Nuclear Physics and Astrophysics	SPA5302	15	5	Elective	2	Semester 1
Condensed Matter A	SPA5228	15	5	Compulsory	2	Semester 2
Electromagnetic Waves and Optics	SPA5222	15	5	Compulsory	2	Semester 2
Mathematical Techniques 3	SPA5218	15	5	Elective	2	Semester 1
Planetary Systems	SPA5241	15	5	Compulsory	2	Semester 2
Stars	SPA5307	15	5	Compulsory	2	Semester 2
Communication Skills for Scientists	SPA5000	0	5	Study only	2	Semester 1
Introduction to Scientific Computing	SPA5666	15	5	Compulsory	2	Semester 1

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Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Statistical Physics	SPA6403	15	6	Compulsory	3	Semester 2
Physics Review Project	SPA6913	15	6	Compulsory	3	Semester 1 or 2
The Physics of Galaxies	SPA6305	15	6	Compulsory	3	Semester 2
Spacetime and Gravity	SPA6308	15	6	Compulsory	3	Semester 1
Statistical Data Analysis	SPA6328	15	6	Elective	3	Semester 1
Quantum Mechanics B	SPA6413	15	6	Elective	3	Semester 1
Elementary Particle Physics	SPA6306	15	6	Elective	3	Semester 2
Physical Cosmology	SPA6311	15	6	Compulsory	3	Semester 1
Group Project for Physicists	SPA6543	15	6	Elective	3	Semester 2
Condensed Matter B	SPA6312	15	6	Elective	3	Semester 2
Quantum Mechanics and Symmetry	SPA6325	15	6	Elective	3	Semester 2
Computational Condensed Matter Physics	SPA6315	15	6	Elective	3	Semester 1
Mathematical Techniques 3	SPA5218	15	5	Elective	3	Semester 1

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Physics Investigative Project	SPA7015U	30	7	Core	4	Semesters 1 & 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Physics Research Project	SPA7016U	45	7	Core	4	Semesters 1 & 2
Relativistic Waves & Quantum Fields	SPA7018U	15	7	Elective	4	Semester 1
Stellar Structure and Evolution	SPA7023U	15	7	Elective	4	Semester 1
Relativity and Gravitation	SPA7019U	15	7	Elective	4	Semester 1
Solar System	SPA7022U	15	7	Elective	4	Semester 1
Advanced Quantum Field Theory	SPA7001U	15	7	Elective	4	Semester 2
Extrasolar Planets and Astrophysical Discs	SPA7009U	15	7	Elective	4	Semester 2
The Galaxy	SPA7010U	15	7	Elective	4	Semester 2
Astrophysical Plasmas	SPA7004U	15	7	Elective	4	Semester 2
Electromagnetic Radiation in Astrophysics	SPA7006U	15	7	Elective	4	Semester 2
Electronic Structure Methods	SPA7008U	15	7	Elective	4	Semester 2
Functional Methods in Quantum Field Theory	SPA7024U	15	7	Elective	4	Semester 1
Advanced Cosmology	SPA7028U	15	7	Elective	4	Semester 2
Collider Physics	SPA7029U	15	7	Elective	4	Semester 2
Supersymmetric Methods in Theoretical Physics	SPA7031U	15	7	Elective	4	Semester 2
Differential Geometry in Theoretical Physics	SPA7027U	15	7	Elective	4	Semester 1
Introduction to Strings and Branes	SPA7032U	15	7	Elective	4	Semester 2
Astrophysical Computing	SPA7034U	15	7	Elective	4	Semesters 1 & 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Practical Machine Learning	SPA7033U	15	7	Elective	4	Semester 2
Mathematical Methods for Theoretical Physics	INK7022U	15	7	Elective	4	Semester 1
Lie Groups and Lie Algebras	INK7020U	15	7	Elective	4	Semester 1
Statistical Mechanics	INR7007U	15	7	Elective	4	Semester 2
Advanced Quantum Theory	INU7001U	15	7	Elective	4	Semester 1
Advanced Topics in Statistical Mechanics	INU7067U	15	7	Elective	4	Semester 2
Galaxy Dynamics, Formation and Evolution	INU7071U	15	7	Elective	4	Semester 1
Advanced Physical Cosmology	INU7056U	15	7	Elective	4	Semester 2
Atom and Photon Physics	INU7003U	15	7	Elective	4	Semester 1
Photonics and Metamaterials (Advanced Photonics)	INK7048U	15	7	Elective	4	Semester 2
Quantum Computation and Communication	INU7022U	15	7	Elective	4	Semester 2
Molecular Physics	INU7014U	15	7	Elective	4	Semester 2
Particle Physics	INU7017U	15	7	Elective	4	Semester 1
Particle Accelerator Physics	INR7003U	15	7	Elective	4	Semester 1
Modelling Quantum Many-Body Systems	INK7066U	15	7	Elective	4	Semester 1
Order and Excitations in Condensed Matter	INU7016U	15	7	Elective	4	Semester 2
Theoretical Treatments of Nano-systems	INK7037U	15	7	Elective	4	Semester 2
Physics at the Nanoscale	INR7012U	15	7	Elective	4	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Superfluids, Condensates and Superconductors	INR7008U	15	7	Elective	4	Semester 1
Advanced Condensed Matter	INK7067U	15	7	Elective	4	Semester 1
Standard Model Physics and Beyond	INK7032U	15	7	Elective	4	Semester 2
Statistical Data Analysis	INR7014U	15	7	Elective	4	Semester 1
String Theory and Branes	INK7034U	15	7	Elective	4	Semester 2
Supersymmetry	INK7054U	15	7	Elective	4	Semester 2
Dark Matter and Dark Energy	INK7069U	15	7	Elective	4	Semester 1
Planetary Atmospheres	INU7045U	15	7	Elective	4	Semester 2
Space Plasma and Magnetospheric Physics	INU7026U	15	7	Elective	4	Semester 2
Molecular Biophysics	INU7031U	15	7	Elective	4	Semester 1
Physical Models of Life	INU7089U	15	7	Elective	4	Semester 2
Theory of Complex Networks	INK7001U	15	7	Elective	4	Semester 1
Equilibrium Analysis of Complex Systems	INK7002U	15	7	Elective	4	Semester 2
Dynamical Analysis of Complex Systems	INK7004U	15	7	Elective	4	Semester 2
Mathematical Biology	INK7005U	15	7	Elective	4	Semester 2
Elements of Statistical Learning	INK7003U	15	7	Elective	4	Semester 1

What are the entry requirements?

Overall tariff score required: 340 points A-level: grade A in physics and mathematics and a B in any other subject except General Studies
International Baccalaureate: 34 points overall with 6 in both HL(Higher Level) Physics and HL Mathematics.
European Baccalaureate: 80 % overall and 7 in both maths and physics.

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Access courses to HE (Higher Education) with speciality in Maths, Physics or Science: 60 credits overall, to include 45 credits at level 3, with at least 33 at Distinction and 12 at Merit, which must include both Maths and Physics.

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/institutes 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/institute operates a Learning and Teaching Committee, or equivalent, which advises the School/Institute Director of Taught Programmes 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 the committee's work in a number of ways, such as through student membership, or consideration of student surveys.

All schools/institutes operate an Annual Programme Review of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Taught Programmes Action Plan (TPAP) which is the summary of the school/ institute's work throughout the year to monitor academic standards and to improve the student experience. Students' views are considered in this process through analysis of the NSS and module evaluations.

What academic support is available?

The School of Physical and Chemical Sciences provides each student with an academic advisor, normally the same member of staff for the duration of a student's studies, who can provide academic and pastoral guidance. Additionally the School has a dedicated Student Support Officer who is available to discuss any student related problem. The School runs an open door policy which encourages the students to come and talk to their advisor, other academics or the dedicated Student Support Officer. The School also actively participates in the QMUL Peer Assisted Study Scheme (PASS).
The Senior Tutor has overall responsibility for academic support and pastoral care within the School. The Senior Tutor also has a key role in overseeing the School's attendance policy. The Senior Tutor will address any problems that cannot be resolved by a student's academic adviser or the Student Support Officer.

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.

Programme-specific rules and facts

This programme follows the standard QM progression criteria. Students must maintain an average mark of 60 or above to remain on the MSci degree. Failing to achieve this average will result in students being transferred to the BSc equivalent of the programme, and entering the corresponding year/graduating, if applicable. The final degree classification is determined by the college mark which is a weighted average of the first, second third and fourth year averages in the ratio 1:3:6:6 respectively.

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Links with employers, placement opportunities and transferable skills

The School actively participates in the South East Physics Network (SEPNet) summer internship programme as well as funding a small number of internal, paid summer internships. The School works closely with the Careers Service to provide a series of bespoke events for physics students and has also recently prepared a careers booklet, in conjunction with the Institute of Physics, detailing careers opportunities for students of physics and explaining the necessary skill sets required for each area of work. The programme also includes the third year optional module SPA6543 Group Project for Physicists which directly involves external industrial partners in setting the projects.

Programme Specification Approval

Person completing Programme Specification:	Gary Welch
Person responsible for management of programme:	Craig Agnor
Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:	11 Mar 2021
Date Programme Specification approved by Taught Programmes Board:	

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