Programme Title: F303, F301, F307 MSci Physics + extramural years

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 Physics, MSci Physics with Year Abroad, Master in Science (MSci) Physics with Professional Experience
Name of interim award(s):	CertHE; DipHE; BSc
Duration of study / period of registration:	Four Years (five years with year in industry/abroad)
QMUL programme code / UCAS code(s):	F303, F301, F307
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:

Programme outline

This programme is an Institute of Physics (IoP) accredited integrated masters (MSci) in Physics comprising of four years full time study (extended to five years for the year abroad/professional experience programmes). 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. An MSci graduate should be able to enter further training at PhD level and to become a professional physicist. 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.

The Year Abroad/Professional Experience programme follows the MSci Physics programme with the addition of a non-weighted Study Abroad/Professional Experience Year that does not count towards the final degree award. If you are a MSci student and choose to do a study abroad or Professional Experience year, this will take place in Year 4, and the Year 4 modules will instead be studied in Year 5.

This professional experience year will be competitively applied for with external organizations. If a student fails to secure an external position, then it may be possible for them to apply for an unpaid internship within the School for a duration of less than

12 months.

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.
ix. provide opportunities for students to prepare for the workplace and apply for a professional experience year that may give a vocational education aspect to complement academic studies.

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, including comprehending basic physical laws and principles
A 2	Be able to communicate complex scientific ideas, the conclusions of an experiment, investigation or project concisely, accurately and informatively
A 3	Have acquired essential ICT skills for analysing data, simulating physical systems, retrieving information and communicating scientific results

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A4	Be able to undertake numerical manipulation and present or interpret information graphically
A5	Be able to execute and analyse the results of an experiment or investigation, including evaluating uncertainties and comparing results with expected outcomes
A6	Demonstrate a working knowledge of a variety of experimental, mathematical and / or computational techniques applicable to current research or applications in physics
A7	Have undertaken an extended investigation and exhibited appropriate competencies, including demonstrating some originality
A8	Have encountered research-level material

Disciplinary Skills - able to:	
B1	Have acquired essential skills in the art of scientific report-writing and in the oral presentation of technical material.
B2	Solve advanced research-informed problems in physics
B3	Be able to apply physical principles to diverse areas of physics, some of which are at (or informed by) the forefront of the discipline
B4	Solve physical problems by selecting and using appropriate mathematical and physical techniques
B5	Be able to appreciate the role of science in general, and of physics in particular, within a broader range of human cultural activity
B6	Understand concepts of equality, diversity and inclusion, and how they affect both the practice and progress of science
B7	Identify ethical issues in scientific work, and recognise unprofessional or unethical behaviour
B8	Understand what constitutes a safe working environment
B9	Interpret and contextualise mathematical descriptions of physical phenomena
B10	Show competent use of specialised equipment, research grade software or methods
B11	Master new techniques in a theoretical, computational or experimental context
B12	Demonstrate an understanding of scientific research and propose realistic suggestions as to how it may progress further

Attributes:	
C1	To acquire and apply knowledge in a rigorous way.
C2	To connect information and ideas within their field of study.
C3	To adapt their understanding to new and unfamiliar settings.

C 4	To manage and reflect upon own learning, making use of appropriate texts and learning materials
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 explain and argue clearly and concisely.
C 8	To apply their analytical skills to investigate unfamiliar problems.
C 9	To use information for evidence-based decision-making and creative thinking.
C 10	To work independently by using own initiative, be organised and meet deadlines
C 11	To work in a group, interacting constructively as part of a team
C 12	To plan and execute an open-ended extended research project

How will you learn?

Our programme is constructed within a modular course structure in which each student takes 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 essay and / or presentation 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.

Assessment for the study-abroad year will be conducted as per the module regulations of the relevant partner institution but will not contribute to the final degree award from QMUL. Students must pass all elements of assessment to progress.

Assessment for the professional experience year will be conducted in conjunction with the external employer but will not contribute to the final degree award from QMUL. Students must pass all elements of assessment to progress.

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 core, 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

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a year. In your third year students study for a project worth 15 credits, whereas in the fourth year they undertake a 30 credit project . Students are required to take all modules marked as 'core' or 'compulsory'. Students must pass any core modules to be eligible to progress to the next academic year. 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 at level 5, 6 and 7 may 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 fourth year of the programme can be conducted with a partner institution in another country (year abroad) or in industry (professional experience). The professional experience year needs to be competitively applied for during their second year of study.

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
Electric and Magnetic Fields	SPA4210	15	4	Compulsory	1	Semester 2
Mathematical Techniques 2	SPA4122	15	4	Compulsory	1	Semester 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

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Physics Laboratory	SPA5201	15	5	Compulsory	2	Semester 2
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	Compulsory	2	Semester 1
Planetary Systems	SPA5241	15	5	Elective	2	Semester 2
Stars	SPA5307	15	5	Elective	2	Semester 2
Physical Dynamics	SPA5304	15	5	Elective	2	Semester 2
Introduction to Scientific Computing	SPA5666	15	5	Compulsory	2	Semester 1
Practical Techniques for Data Science	SPA5131	15	5	Elective	2	Semester 2
Professional Skills for Scientists II	SPA5601	0	5	Compulsory	2	Semesters 1 & 2

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	Core	3	Semester 1 or 2
The Physics of Galaxies	SPA6305	15	6	Elective	3	Semester 2
Spacetime and Gravity	SPA6308	15	6	Elective	3	Semester 1
Statistical Data Analysis	SPA6328	15	6	Elective	3	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Quantum Mechanics B	SPA6413	15	6	Compulsory	3	Semester 1
Particle and Nuclear Physics	SPA6307	15	6	Elective	3	Semester 2
Physical Cosmology	SPA6311	15	6	Elective	3	Semester 1
Quantum Mechanics and Symmetry	SPA6325	15	6	Compulsory	3	Semester 2
Machine Learning and Artificial Intelligence	SPA6330	15	6	Elective	3	Semester 2

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
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
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
Advanced Cosmology	SPA7028U	15	7	Elective	4	Semester 2
Supersymmetric Methods in Theoretical Physics	SPA7031U	15	7	Elective	4	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Differential Geometry in Theoretical Physics	SPA7027U	15	7	Elective	4	Semester 1
Introduction to Strings and Branes	SPA7032U	15	7	Elective	4	Semester 2
Deep Learning	SPA7037U	15	7	Elective	4	Semester 2
Radiative Transfer and Astrochemistry	SPA7036U	15	7	Elective	4	Semester 2
Practical Astrophysics	SPA7038U	15	7	Elective	4	Semester 2

Academic Year of Study

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
One of the following modules must be taken to qualify for one of the extramural year degrees:						
SPCS Study Abroad Year	SPC5555	120	5	Core	4	Semesters 1-3
SPCS Industrial/Professional Experience Placement Module	SPC5550	120	5	Core	4	Semesters 1-3

What are the entry requirements?

Grades AAB at A-Level. This must include grade A or above in both A-Level Mathematics and Physics. Excludes General Studies.
International Baccalaureate Diploma with a minimum of 34 points overall, including 6,6,5 from three Higher Level subjects. This must include a minimum of 6 in both Higher Level Mathematics, and Higher Level Physics.
BTEC qualifications are not considered for entry to this programme.
Access HE Access qualifications are not considered for entry to this programme.
GCSE Minimum five GCSE passes including English and Maths at grade C or 4.

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 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 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 Student Experience Action Plan (SEAP) 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 Department of Physics and Astronomy 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 Department. 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.

For students registered on the Year Abroad degree, progression differs from the standard QM progression in the following ways: progression from year 3 to year 4 (year abroad) is as per standard regulations with the additional requirement that the average mark from years 1, 2 and 3 >= 60%. During year 2 students must pass 90 credits equivalent to progress to year 3. Students failing to meet either the progression from year 2 to year 3 or year 3 to year 4 (year abroad) will be moved to the equivalent non-year-abroad programme and the progression requirements of that programme will apply. The final degree classification is determined by the college mark which is a weighted average of the first, second, third and fifth year averages in the ratio 1:3:6:6 respectively. The year abroad (year four) does not contribute to the final college mark nor the final degree classification.

The year abroad module is core. If resits are offered by the host institution for failed modules during the year abroad then students will be entitled to resits. If the host institution does not offer resits then the students will not be entitled to resits.

For students registered in the Professional Experience year, progression from year 4 to year 5 requires that the professional

experience year module is passed. Students failing either of the progression hurdles will be transfered to the equivalent non-professional-experience MSci Physics programme, entering into the corresponding year of that programme with the appropriate progression hurdles from that programme to be applied.

The professional experience year does not contribute to the final college mark nor the final degree classification.

The Physics Professional Experience Year module is core and there is no opportunity for this module to be re-taken given the nature of that year. Synoptic reassessment of that module is permitted.

Links with employers, placement opportunities and transferable skills

The Department 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.

Students will be expected to apply for a professional experience year to take place in year 4 of study. They will be coached in year 1 and/or 2 on CV practice and introduced to the careers service, as well as being briefed on current employers that are known to consider professional experience year applications in order to allow the students to focus on building an appropriate portfolio of expertise in order to apply for a position in year 3. This will include the fact that many employers require an appropriate academic performance for professional experience year students who they employ. This is typically a minimum of the equivalent of a 2.1 performance in study done thus far, however it will vary from employer to employer. In year 3 we will support the students on application for professional experience positions. Those students who are successful in finding a position will then undertake a 6-15 month posting during year 4. Year 5 will see the students return to QMUL to complete their MSci studies. Students failing to win a professional experience position and passing the progression threshold may be offered the option of an unpaid research or outreach internship within the SPA, of length less than 12 months, otherwise they will be transferred onto the standard BSc Physics programme. Unpaid internships in the SPA are subject to availability and academic or other requirements (for example DBS check or H&S aptitude). Students failing to win a professional experience position and failing to pass the progression threshold will be transferred onto the standard MSci Physics programme.

Programme Specification Approval

Person completing Programme Specification:	Lesley Howell
Person responsible for management of programme:	Christopher White as DTL for DPA
Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:	8 Dec 2023
Date Programme Specification approved by Taught Programmes Board:	