Programme Title: BSc Physics with Particle Physics with a Year Abroad

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:	BSc Physics with Particle Physics with Year Abroad
Name of interim award(s):	CertHE; DipHE
Duration of study / period of registration:	Four Years
QMUL programme code / UCAS code(s):	F39Y
QAA Benchmark Group:	Physics
FHEQ Level of Award :	Level 6
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

The Physics with Particle Physics with a Year Abroad Programme closely follows the core physics programme but with an emphasis on experimental particle physics. In particular, some modules that are options in F300 are required in this programme: Statistical Data Analysis, Quantum Mechanics B, and Radiation Detectors. The extended physics project will normally be under the supervision of an academic member of staff from the Particle Physics Research Centre. The programme follows the BSc Physics with Particle Physics programme with the addition of a non-credit Study Abroad Year that does not count towards the final degree award.

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?

All programmes share a set of common learning outcomes.
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 with particle physics.
A 2	Have seen and understood the application of core physics to particle physics
A 3	Have acquired an understanding of the workings of the physical world, in particular particle physics
A 4	Have acquired an understanding of scientific measurement and associated uncertainties

Disciplinary Skills - able to:	
B 1	effectively communicate core knowledge of physics and particle physics in written reports and oral presentation

B 2	effectively use computers for: document preparation, spreadsheet computing, data acquisition, manipulation and analysis
B 3	use high-level programming languages
B 4	apply scientific methods to the analysis of problems

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 assess their own progress.
C 5	To engage with the professional world.
C 6	To acquire new learning in a range of ways, both individually and collaboratively.
C 7	To possess the skills to influence, negotiate and lead.
C 8	To use quantitative data confidently and competently.
C 9	To show respect the opinions of others an a readiness to act inclusively.
C 10	To obtain transferable key skills to help them with their career goals and their continuing education.
C 11	To develop effective spoken and written English.
C 12	To explain and argue clearly and concisely.
C 13	To use communication technologies competently.
C 14	To apply their analytical skills to investigate unfamiliar problems.
C 15	To work individually and in collaboration with others.
C 16	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 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
- 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, review and experimental projects are used to develop students' investigative skills. Students studying Physics with Particle Physics normally undertake their project under the supervision of a member of the Particle Physics Research Centre.

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 reports) 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.

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.

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. A BSc degree consists of 360 credits. Most modules are worth 15 credits which means that students normally take 8 modules a year. In your fourth year students normally study for a project worth 30 credits. 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 at level 5 and 6 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. Students at level 4 should choose from one of the SPCS level 4 modules available. Finally, the programme includes one compulsory non credit bearing (study only) module in the first and second: SPA3000 Basic Mathematical Techniques and SPA5000 Communication Skills for Physicists.

The third year of the programme will be conducted with a partner institution in another country.

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

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
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
Basic Mathematical Techniques	SPA3000	0	4	Study only	1	Semesters 1 & 2
Our Universe	SPA4101	15	4	Elective	1	Semester 2
Introduction to Energy and Environmental Physics	SPA4250	15	4	Elective	1	Semester 2
Introduction to Data Science	SPA4131	15	4	Elective	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
Physics Laboratory	SPA5201	15	5	Compulsory	2	Semester 2
Condensed Matter A	SPA5228	15	5	Compulsory	2	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
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	Elective	2	Semester 2
Stars	SPA5307	15	5	Elective	2	Semester 1
Physical Dynamics	SPA5304	15	5	Elective	2	Semester 2
Communication Skills for Scientists	SPA5000	0	5	Study only	2	Semester 1
Introduction to Scientific Computing	SPA5666	15	5	Elective	2	Semester 1
Introduction to Scientific Computing	SPA5666	15	5	Elective	2	Semester 2
Introduction to Energy and Environmental Physics	SPA4250	15	4	Elective	2	Semester 2
Our Universe	SPA4101	15	4	Elective	2	Semester 2

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Study Abroad Year	SPA5555	120	5	Core	3	Semesters 1 & 2

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Statistical Physics	SPA6403	15	6	Compulsory	4	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Extended Independent Project	SPA6776	15	6	Compulsory	4	Semesters 1 & 2
Statistical Data Analysis	SPA6328	15	6	Compulsory	4	Semester 1
Quantum Mechanics B	SPA6413	15	6	Elective	4	Semester 1
Elementary Particle Physics	SPA6306	15	6	Compulsory	4	Semester 1
Physical Cosmology	SPA6311	15	6	Elective	4	Semester 1
Group Project for Physicists	SPA6543	15	6	Elective	4	Semester 2
Quantum Mechanics and Symmetry	SPA6325	15	6	Elective	4	Semester 2
Computational Condensed Matter Physics	SPA6315	15	6	Elective	4	Semester 1
The Physics of Galaxies	SPA6305	15	6	Elective	4	Semester 2
Spacetime and Gravity	SPA6308	15	6	Elective	4	Semester 1

What are the entry requirements?

Entry requirements are in common with the F300 Physics programme.

Overall tariff score required: 320 points.

A-level: grade A or B in physics and mathematics or viceversa and a B in any other subject expect General Studies.

International Baccalaureate: 32 points overall with 6 in both HL(Higher Level) Physics and HL Mathematics.

European Baccalaureate: 75 % overall 7/6 in maths/physics in any order.

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 30 at Distict and 15 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

Progression differs from the standard QMUL regulations in the following respects: Progression from year two to year three (year abroad) is as per the standard regulations with the additional requirement of an average grade above 70%. Progression from year 3 to year 4 requires a minimum of a 90 credits passed during year 3 abroad. Students failing either the progression hurdles from year 2 to year 3 (study abroad) or year 3 to year 4 will be transfered to the equivalent non-study-abroad BSc Physics programme, entering into year 3 of that programme with the appropriate progression hurdles from that programme to be applied. In order to graduate students must obtain at least 315 credits from years 1 2 and 4. The final degree classification is determined by the college mark which is a weighted average of the first, second and fourth year averages in the ratio 1:3:6 respectively. The year abroad 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.

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 fourth year optional module SPA6543 Group Project for Physicists which directly involves external

industrial partners in setting the projects.

Many of our BSc graduates go on to further specialist study of Physics at MSc or PhD level but significant numbers aim at careers that indirectly use their physics training. Differently, almost all MSci graduates go on to further specialist study of Physics at PhD level however they may easily enter a range of other career paths that use the transferable skills gained in the MSci programme of study.

These employment areas include teaching at secondary or tertiary level, management, finance, IT and journalism. All physics graduates with reasonable degrees are highly employable because of the skills they gain in their studies. The most important of these skills are: numeracy, familiarity with computers and IT, problem-solving skills, ability to carry out measurement and observation and to analyse the results thereof, the ability to write technical reports and the ability to give oral presentations of scientific arguments.

Recent experience from students taking a project in particle physics or a Summer internship shows that they became very enthusiastic about the subject studied and continued their studies in particle physics either with a PhD or a Master. In other instances, students moved easily to the financial sector.

Programme Specification Approval

Person completing Programme Specification:	Isabella Clottey
Person responsible for management of programme:	Matthew Buican
Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:	20 May 2021
Date Programme Specification approved by Taught Programmes Board:	