Programme Title: BSc Theoretical Physics

Programme Specification

Awarding Body/Institution	Queen Mary University of London
Teaching Institution	Queen Mary University of London
Name of Final Award and Programme Title	BSc Theoretical Physics
Name of Interim Award(s)	
Duration of Study / Period of Registration	Three Years
QM Programme Code / UCAS Code(s)	F340
QAA Benchmark Group	Physics
FHEQ Level of Award	Level 6
Programme Accredited by	Institute of Physics
Date Programme Specification Approved	11 Jan 2017
Responsible School / Institute	School of Physics and Astronomy

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

Institution(s) other than Queen Mary that will provide some teaching for the programme

Programme Outline

This programme is an Institute of Physics (IoP) accredited BSc in Theoretical Physics comprising of three 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 and third years of study. A BSc graduate should be able to enter further training at MSc level or enter any of a number of other careers which use the transferable skills gained during their studies.

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;

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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:

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 teh acquisition and manipulation of data.
A 4	Have acquired essential skills in measurement and the analysis of uncertainties of observation.

Disciplinary Skills - able to:	
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.

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.

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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.

QMUL Model Learning Outcomes - Level 4:	
D 1	Identify and discuss their own career aspirations or enterprise skills and knowledge and how they impact on others
D 2	
D 3	

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, a compulsory independent project is used to develop students' investigative and communication skills. Students studying Theoretical Physics normally undertake their project under the supervision of a member of the Centre for Research in String Theory.

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.

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How is the Programme Structured?

Please specify the full time and part time programme diets (if appropriate).

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 third 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 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. Finally, the programme includes one compulsory non credit bearing (study only) module in the second and third years: SPA5000 Communication Skills for Physicists (N.B. from September 2015) and SPA6300 Synoptic Physics.

QMUL Model

Students are required to undertake the equivalent of one module (15 credits in 2017/18) per year of study which has been identified as meeting the requirements of the QMUL Model. Each of these modules has been designed to combine the best of QMUL's academic excellence with your ability to identify and develop your skills, networks and experience. This will help to ensure you become a graduate who can undertake further study or secure graduate employment in areas that interest you, and will support your ability to position yourself to find the right job or opportunity for you. The relevant module for your first year of study in 2017/18 is indicated below.

Where more than one module is specified, this is because pertinent elements from these modules have been identified as being appropriate to the QMUL Model and when studied together, deliver the equivalent content of one 15-credit QMUL Model module.

The QMUL Model modules for future years and associated Learning Outcomes will be identified as your studies continue.

Should Professional, Statutory and Regulatory Body requirements apply to your programme of study, these will be taken into account in the specification of QMUL Model requirements.

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Professional Skills for Scientists	SPA4601	15	4	Compulsory	1	Semester 1	Yes
Mathematical Techniques 1	SPA4121	15	4	Core	1	Semester 1	No
Classical Physics	SPA4401	15	4	Compulsory	1	Semester 1	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Scientific Measurement	SPA4103	15	4	Compulsory	1	Semester 1	No
Modern Physics	SPA4402	15	4	Core	1	Semester 2	No
Electric and Magnetic Fields	SPA4210	15	4	Compulsory	1	Semester 2	No
Mathematical Techniques 2	SPA4122	15	4	Core	1	Semester 2	No
Our Universe	SPA4101	15	4	Elective	1	Semester 2	No
Introduction to Energy and Environmental Physics	SPA4250	15	4	Elective	1	Semester 2	No

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Thermodynamics	SPA5219	15	5	Compulsory	2	Semester 1	No
Quantum Mechanics A	SPA5319	15	5	Core	2	Semester 1	No
Nuclear Physics and Astrophysics	SPA5302	15	5	Compulsory	2	Semester 1	No
Physics Laboratory	SPA5201	15	5	Elective	2	Semester 2	No
Condensed Matter A	SPA5228	15	5	Compulsory	2	Semester 2	No
Electromagnetic Waves and Optics	SPA5222	15	5	Compulsory	2	Semester 2	No
Mathematical Techniques 3	SPA5218	15	5	Compulsory	2	Semester 1	No
Planetary Systems	SPA5241	15	5	Elective	2	Semester 1	No
Stars	SPA5307	15	5	Elective	2	Semester 2	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Physical Dynamics	SPA5304	15	5	Core	2	Semester 2	No
Physics of Energy and the Environment	SPA5250	15	5	Elective	2	Semester 2	No
Communication Skills for Scientists	SPA5000	0	5	Compulsory	2	Semester 1	No
Introduction to C++ Programming	SPA4321	15	4	Elective	2	Semester 2	No
Complex Variables	MTH5103	15	5	Elective	2	Semester 2	No

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Synoptic Physics	SPA6300	0	6	Compulsory	3	Semester 1	No
Statistical Physics	SPA6403	15	6	Compulsory	3	Semester 2	No
Extended Independent Project	SPA6776	30	6	Compulsory	3	Semesters 1 & 2	No
The Physics of Galaxies	SPA6305	15	6	Elective	3	Semester 1	No
Spacetime and Gravity	SPA6308	15	6	Compulsory	3	Semester 1	No
Fluid Dynamics	SPA6310	15	6	Elective	3	Semester 1	No
Statistical Data Analysis	SPA6328	15	6	Elective	3	Semester 1	No
Radiation Detectors	SPA6309	15	6	Elective	3	Semester 2	No
Mathematical Techniques 4	SPA6324	15	6	Elective	3	Semester 1	No
Quantum Mechanics B	SPA6413	15	6	Compulsory	3	Semester 1	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Elementary Particle Physics	SPA6306	15	6	Elective	3	Semester 1	No
Physical Cosmology	SPA6311	15	6	Elective	3	Semester 2	No
Group Project for Physicists	SPA6543	15	6	Elective	3	Semester 2	No
Condensed Matter B	SPA6312	15	6	Elective	3	Semester 2	No
Quantum Mechanics and Symmetry	SPA6325	15	6	Compulsory	3	Semester 2	No
Computational Condensed Matter Physics	SPA6315	15	6	Elective	3	Semester 1	No

What Are the Entry Requirements?

Overall tariff score required: 320 points. A-level: grade A or B in physics and mathematics or vice versa and a B in any other subject except 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 al least 30 at Distinction and 15 at Merit, which must include both Maths and Physics.

How Do We Listen 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.

Academic Support

The School 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 Administrator 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

Administrator. 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.

Programme-specific Rules and Facts

This programme follows the standard QM progression criteria and degree classification algorithm. The final degree classification is determined by the college mark which is a weighted average of the first, second and third year averages in the ratio 1:3:6 respectively.

Specific Support for Disabled Students

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 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	Dr. Craig Agnor

Queen Mary University of London

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Person responsible for management of programme	Dr. Rodofo Russo
Date Programme Specification produced/amended by School Learning and Teaching Committee	11 Jan 2017
Date Programme Specification approved by Taught Programmes Board	11 Jan 2017

Queen Mary University of London