<table>
<thead>
<tr>
<th>Awarding body/institution:</th>
<th>Queen Mary University of London</th>
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<tbody>
<tr>
<td>Teaching institution (if different from above):</td>
<td>Queen Mary University of London</td>
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| Name of the final award and Programme title: | BSc Physics with Particle Physics  
MSci Physics with Particle Physics |
| Duration of Study/Period of Registration | BSc 3 years  
MSci 4 years |
| UCAS code: | PHY 392 (BSc)  
PHY 393 (MSci) |
| QAA Benchmark Group | QAA 235 02/08 |
| Academic Department/s involved in programme delivery | Physics Department |

If accredited by a professional/statutory body, please give the name, date of last accreditation visit, approximate date of next visit and details of exemptions that will be given to QMUL graduates.

We are going to ask for the accreditation by the Institute of Physics. This programme has the same Compulsory modules as other accredited programmes.

Criteria for admission to the programme

The same criteria for the entry requirements for BSc and MSci programmes in Physics are adopted.
Current recruitment cycle (2010):
BSc: 280 UCAS points. E.g. for A-level students: B in Mathematics and Physics and C in another A-level.

MSci: 320 UCAS points. E.g. for A-level students: A and B in Mathematics and Physics (either way around), B in another A-level.

Next year recruitment cycle (2011):
BSc: 300 UCAS points. E.g. for A-level students: B in Mathematics and Physics and B in another A-level.

MSci: 340 UCAS points. E.g. for A-level students: A in Mathematics and Physics, B in another A-level.

Starting from 2012:
BSc: 320 UCAS points. E.g. for A-level students: A and B in Mathematics and Physics (either way around), B in another A-level.

MSci: 340 UCAS points. E.g. for A-level students: A in Mathematics and Physics, B in another A-level.

Aims of the programme

- teach physics with particle physics to a high standard within an excellent research environment;
- recruit students able to benefit from a university education;
- enable students with a variety of educational backgrounds to pursue physics in particle physics;
- enable students to tailor their studies to their own needs and interests;
- instill in students an understanding of the working of the physical world, in particular particle physics;
- encourage students to develop transferable skills that are applicable to a variety of careers;
- provide a programme that prepares students for a range of professional careers in physics.
- provide opportunities for students to appreciate the beauty of physics with particle physics and to develop a desire for learning.
Learning outcomes for the programme

- have acquired a core knowledge of physics with particle physics;
- be able to communicate this knowledge;
- have acquired essential skills in the use of computers for mathematics, word-processing, spreadsheet computing and the acquisition and manipulation of data, in measurement and the analysis of uncertainties of observation, in the use of high-level computer languages, in the art of scientific report-writing and in the oral presentation of technical material;
- be able to apply scientific methods to the analysis of problems;
- have seen and understood the application of core physics to particle physics;
- have acquired an understanding of the workings of the physical world, in particular particle physics;
- be able to appreciate the role of physics in general, and of particle physics in particular, within a broader range of human cultural activity.

A good BSc graduate should be able to employ the skills (s)he has learned in a variety of occupations, especially those calling for an analytical approach to the solving of problems.

A student graduating with an MSci should:

- have acquired a core knowledge of physics with particle physics;
- be able to communicate this knowledge;
- have acquired essential skills in the use of computers for mathematics, word-processing, spreadsheet computing and the acquisition and manipulation of data, in measurement and the analysis of uncertainties of observation, in the use of high-level computer languages, in the art of scientific report-writing and in the oral presentation of technical material;
- be able to apply scientific methods to the analysis of problems;
- have seen and understood the application of core physics to particle physics;
- have acquired an understanding of the workings of the physical world, in particular particle physics;
- be able to appreciate the role of physics in general, and of particle physics in particular, within a broader range of human cultural activity.
- be fluent in the language and methods of particle physics;
- be able to apply core physics to the understanding of phenomena in particle physics;
- be able to plan and execute a small research project;
- be able to apply acquired knowledge and skills to the modelling of new problems in physics;
be equipped for a professional career based on physics.

An MSci graduate should be able to enter further training at PhD level and to become a professional physicist. S(he) should in addition be able to enter any of a number of other careers which use the transferable skills gained in the four year programme of study.

Teaching, learning and assessment strategies

These programmes do not involve the creation of new modules. Teaching, learning and assessment strategies are already in place for each module of the programmes.

Our programmes are constructed within a modular course structure in which each student takes eight course units (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).

Compulsory tutorials, exercise classes or laboratories, are provided for all core courses: tutorials are used to reinforce students' knowledge and understanding in conceptually challenging courses, such as those on quantum and statistical physics, whilst exercise classes are used to develop the specific skills needed in courses such as Electric and Magnetic Fields. 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.

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.

Programme structure(s) and requirements, levels and modules

Each programme we offer is made up of a mixture of Compulsory units for a specific programme (C), and suggested (S) units which offer a range of choice to the student depending upon his/her interests and aptitudes.
The programmes will be run in accordance with the College's academic Regulations.

We have a detailed three-year plan for each programme and for the BSc this is:

**Year 1 for BSc:** Scientific Measurement, Condensed Matter, From Newton to Einstein, Mathematical Techniques 1, Mathematical Techniques 2, Electric and Magnetic Fields, Quantum Physics, **plus one option. Suggested Module:** Our Universe

**Year 2 for BSc:** Thermal and Kinetic Physics, Vibrations and Waves, Nuclear Physics and Astrophysics, Modern Computation in Physical Science, Electromagnetic Waves & Optics, Quantum Mechanics A, Physics Laboratory, **plus one option. Suggested modules:** Physical Dynamics, Stars, Condensed Matter 2, Physics of Energy and the Environment.

**Year 3 for BSc:** Extended Independent Project, Synoptic Physics, Quantum Mechanics B, Statistical Data Analysis, Statistical Physics, Elementary Particle Physics, **plus two options. Suggested modules:** Quantum Mechanics and Symmetry, Mathematical Techniques 3, Space Time and Gravity, Physics of Galaxies, Solid State, Continuous Time Methods in Finance, Mathematical Aspects of Cosmology.

If the module “Radiation detectors”, submitted by Dr Lucio Cerrito, is approved, it will be added as a compulsory module in Year 3, and the number of options will then decrease to 1.

The four-year plan for the MSci is:

**Year 1 for MSci:** Scientific Measurement, Condensed Matter, From Newton to Einstein, Mathematical Techniques 1, Mathematical Techniques 2, Electric and Magnetic Fields, Quantum Physics, **plus one option. Suggested module:** Our Universe.

**Year 2 for MSci:** Thermal and Kinetic Physics, Vibrations and Waves, Nuclear Physics and Astrophysics, Modern Computation in Physical Science, Electromagnetic Waves & Optics, Quantum Mechanics A, Physics Laboratory, **plus one option. Suggested modules:** Physical Dynamics, Stars, Condensed Matter 2, Physics of Energy and the Environment.

**Year 3 for MSci:** Physics Review Project, Synoptic Physics, Quantum Mechanics B, Statistical Data Analysis, Statistical Physics, Elementary Particle Physics, Quantum Mechanics and Symmetry, **plus two options. Suggested modules:** Mathematical Techniques 3, Space Time and Gravity, Physics of Galaxies, Solid State, Continuous Time Methods in Finance, Mathematical Aspects of Cosmology.

If the module “Radiation detectors”, submitted by Dr Lucio Cerrito, is approved, it will be added as compulsory module in Year 3, and the number of options will then decrease to 1.

**Year 4 MSci:** Physics Research Project, Particle Physics, Particle Accelerator Physics, **plus three options. Suggested modules:** Relativistic Waves and Quantum Fields, Advanced Quantum Theory, Atom and Photon Physics, Electromagnetic Theory, Computing and Statistical Data Analysis, Statistical Mechanics, Relativity and Gravitation.
In addition for each module there is a detailed description including the syllabus, the recommended textbook and the forms of assessment. This may be accessed via the undergraduate student handbook at

http://www.ph.qmul.ac.uk/~intranet/coursesindex.php

and

http://www.ph.qmul.ac.uk/~intranet/msciindex.php

Quality assurance mechanism (please include details of: SSLC meetings, student feedback mechanisms, personal tutor arrangements, programme induction, programme review and monitoring.)

Each student enters the Department via the College Induction Process plus a Physics Department Induction. Each student is assigned to a personal tutor who, throughout the student’s Degree studies, helps with the choice of modules and with any problems that may affect a student’s studies. Teaching and Learning policy is decided by a Departmental Teaching Committee. To assess how well our policy is implemented we have a variety of feedback mechanisms. There is a Student Staff Liaison Committee (SSLC) which meets once per term to consider student concerns and to monitor the results of student questionnaires circulated in each course unit. The Staff Convenor of the SSLC sits on the Teaching Committee and reports back student views and suggestions. Each module organiser submits a report on his/her module after the final examination which is considered by the Teaching Committee. Programmes of study are subject to review on an annual basis.

The programme organizer is closely related to the physics specialized area investigated by the programme, in this case a member of the Particle Physics Research Centre.

Employers Links
Please provide details of any links with employers e.g.
• Details of advisory panels that include current or potential employers;
• Organisations that regularly employ graduates from this programme and the roles that graduates undertake.
• Student prizes donated by organisations that may offer employment to graduates from this programme.

If there are no links with employers consider the learning outcomes and transferable skills and explain how these might be used to inform employers about the qualities and skills a graduate from this programme might be expected to have.

Transferable skills and employment possibilities:

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.

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<thead>
<tr>
<th>Person Completing Programme Specification</th>
<th>Dr Francesca Di Lodovico</th>
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<tbody>
<tr>
<td>Person responsible for management of programme</td>
<td>Dr Francesca Di Lodovico</td>
</tr>
<tr>
<td>Date programme specification agreed by Department or teaching and learning committee</td>
<td>2009, August</td>
</tr>
<tr>
<td>Date of approval by Faculty Board/SMD Education Board</td>
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<td>Date of update/amendment</td>
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