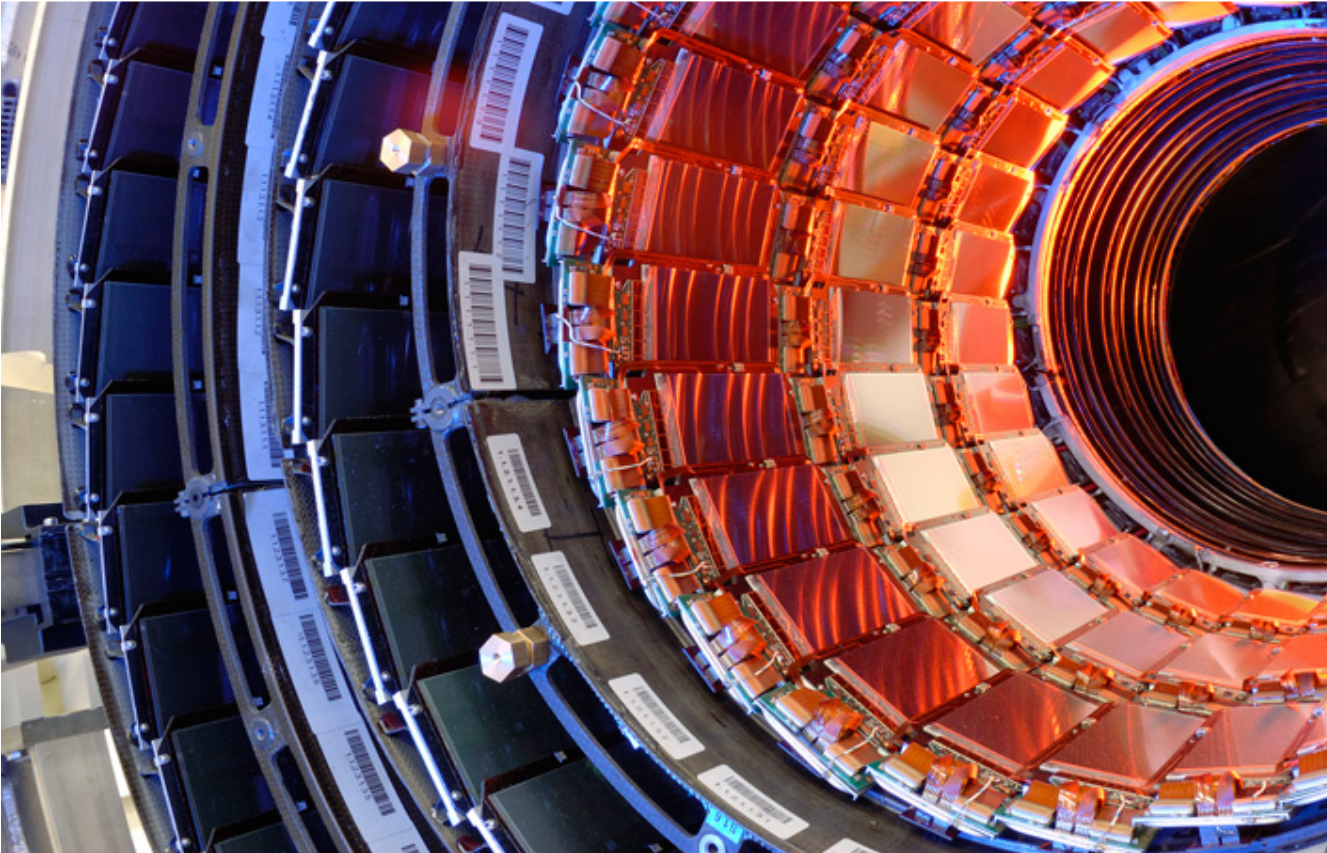




2017-2018

The Undergraduate Handbook [FULL LENGTH VERSION]



**The School of Physics and
Astronomy**

<http://www.physics.manchester.ac.uk/study/undergraduate/undergraduatehandbook/>

physics@manchester.ac.uk

University of Manchester

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Disclaimer: Please note that this handbook was correct at the time of printing. Changes and amendments may occur throughout the academic year and these will be reflected in the online version.

A PDF version and further school information can be found at:

<http://www.physics.manchester.ac.uk/study/undergraduate/undergraduatehandbook/>

APPENDIX 1 Course Unit Syllabus

APPENDIX 2 Academic Malpractice including Plagiarism

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For general school enquiries including; room bookings, unofficial transcript processing, programme changes and course unit selection
physics@manchester.ac.uk

Email for Mitigating Circumstances supporting evidence and queries
physics.support@manchester.ac.uk

The School Teaching and Learning Office is located in Room 1.61, Braddick Library, First Floor, Schuster Building and is open from 9.00 a.m. to 4.00 p.m. Monday – Friday. Here you will be able to access information and advice on all undergraduate teaching/support issues.

1. Introduction

This handbook provides information on the degree programmes taken by undergraduates in the School of Physics and Astronomy at the University of Manchester. All of the programmes organised by the School of Physics and Astronomy are subject to the Regulations, Ordinances and policies of the University of Manchester. Nothing stated in this handbook is meant to supersede or modify any of these except where specific exemptions have been granted by the Faculty of Science and Engineering.

1.1 The School Buildings

The School of Physics and Astronomy is housed across two buildings on south Campus, the Schuster building and the Alan Turing building; and the Jodrell Bank Observatory in North Cheshire, about 30 km (20 miles) south of campus. As of October 2017, the new Schuster Annexe will open to staff and students. The majority of members of staff have offices in the Schuster building which is also where most of teaching of physics students takes place. Access to Schuster building is via the main entrance which is located on Brunswick Street. The Alan Turing building is comprised of three connected blocks. Staff in the Jodrell Bank Centre for Astrophysics (JBCA) have offices on the 3rd floor of the central and northern blocks of the Alan Turing building. Members of the Photon Science Institute (PSI) have offices in the PSI which is housed within the block of the Alan Turing building - closest to Schuster building.

The Teaching and Learning Office is located in Room 1.61, Braddick Library, First Floor in the Schuster building. The ground floor of the Schuster building houses the Rutherford, Bragg, Blackett and Moseley lecture theatres. The teaching laboratories are located on floors 1 to 5 of North-South limb of Schuster building, whilst research laboratories are housed within the East-West limb. A large, purpose built mechanical workshop is housed within G26, which is located on the western elevation of Schuster building, adjacent to stores and the main goods bay.

1.2 Master's and Bachelor's Degrees

Undergraduate students may graduate with a Bachelor of Science degree (BSc) after three years of study or with a Master of Physics degree (MPhys) after four years of study. The relation between the BSc and MPhys degree programmes is as follows:

- Both degree programmes prepare students for careers as professional physicists. Our high academic standards enable our BSc and MPhys graduates to compete effectively for postgraduate studentships.
- Both degree programmes prepare students for employment as scientifically aware graduates in industry and in commerce. In particular, both degree programmes develop the ability to communicate clearly and confidently, to analyse complex problems, to describe events using precise terms, to use modern technology confidently and to have an understanding of the principles underlying technology.
- The BSc is ideal for students wishing to obtain an excellent and highly valued undergraduate degree leading to a wide range of career paths. It also provides entry to specialised postgraduate masters degrees suitable for particular careers and progression to higher degrees.
- The fourth year of the MPhys provides additional opportunities for students to show initiative, to learn independently, to research and to gather information. It requires students to undertake projects which provide insight into the nature of research in experimental or theoretical physics and to study topics in advanced physics in depth. To continue on the four-year programme a student requires a mark of 55% in the second year assessment and a third year mark above 50%.

Because the first two years of study of the three-year and the four-year degree programmes are identical, all students are recommended to register initially for a four-year Master's degree.

Decisions on whether to graduate after three years with a Bachelor's Degree or after four years with a Master's degree are normally taken at the end of the second year of study. In special circumstances, students who opt for a Master's degree may request to be considered for a Bachelor of Science degree at the end of the third year, but before registration at the beginning of the fourth year, provided they have successfully completed the examinations in the first three years at The University of Manchester.

1.3 Degree Programmes Available

Physics	BSc (Hons) or MPhys (Hons)
Physics with Astrophysics	BSc (Hons) or MPhys (Hons)
Physics with Philosophy	BSc (Hons) or MPhys (Hons)
Physics with Study in Europe	MPhys (Hons) only
Physics with Theoretical Physics	BSc (Hons) or MPhys (Hons)
Mathematics and Physics	BSc (Hons) or MMath&Phys (Hons)

1.4 Academic Year

The academic year is divided into two semesters each consisting of 10-11 weeks of teaching followed by a revision and examination period.

Important Dates for the Academic year 2017/2018

[Academic Year by Teaching Weeks 2017-18 \[PDF\]](#)

SEMESTER	EVENT	START DATE	END DATE
ONE	Welcome Week 2017-2018 [Registration]	18 th September 2017	22 nd September 2017
ONE	Teaching commences (SEM1)	25 th September 2017	15 th December 2017
ONE	Deadline for registering options	17 th July 2017	6 th October 2017
ONE	Independent Study Week (YRs 1-3)	30 th October 2017	3 rd November 2017
ONE	Vacation	18 th December 2017	14 th January 2018
ONE	Exam Period	15 th January 2018	26 th January 2018
TWO	Teaching Commences (SEM2)	29 th January 2018	23 rd March 2018
TWO	Deadline for registering options	17 th July 2017	9 th February 2018
TWO	Vacation	26 th March 2018	15 th April 2018
TWO	Teaching recommences (SEM2)	16 th April 2018	11 th May 2018
TWO	Exam period	16 th May 2018	6 th June 2018
THREE	RE-Examination period	20 th August 2018	31 st August 2018
ONE 2018-2019	Welcome Week 2018-2019 [Registration]	17 th September 2018	21 st September 2018

YOUR ATTENDANCE IS IMPORTANT:

- All students are expected to attend the Professional Development module during Week 1.
- Only year 1 to 3 have Independent Study Week.
- Please note your presence in Manchester is required. There are sessions during Independent Study Week at which attendance is compulsory, and assessments take place.
- Third and fourth year borderline graduating or progressing students may have interviews with the External Examiner shortly after the end of the 2nd Semester. Attendance and successful completion at this interview could potentially result in a higher degree classification.
- The dates for the interviews will be in June and will be published on Blackboard when available.

1.5 Communication with students

Communication with students is usually by email. All official emails will be sent to your university email address. Most important communications from the University, e.g. exam registration, are sent by email. If you wish you can set up your account to forward mail to your “personal” email account.

Please ensure that you check your emails on a regular basis.

1.6 Student Services Centre

For advice on fees and loans etc. students should contact the Students Services Centre on Burlington Street. (Campus map 57)

Tel: 0161-275-5000

Email: ssc@manchester.ac.uk

1.7 Health and Safety Induction

All new students will be required to complete satisfactorily four brief safety induction modules on Blackboard, before the first laboratory session.

“Life in Orbit is spectacular”

Tim Peake

2a. Competencies required for undergraduates completing a degree programme in the School of Physics and Astronomy

This section describes how competencies are defined and assessed in the School.

“The Purposes of a Manchester Undergraduate Education (The Manchester Matrix)” sets out eight areas which students undertaking undergraduate education at the University of Manchester are expected to achieve by the end of their study. This document can be found at <http://documents.manchester.ac.uk/display.aspx?DocID=9804>

The graduate attributes are a set of core competencies which students are expected to achieve through completion of any University of Manchester programme.

Item 2 in the Manchester Matrix is expanded with specific attributes for degree programmes in the School of Physics and Astronomy. These attributes (incorporating the general outcomes for the degree programmes, the lectures, tutorials, laboratory work and workshops, and the intended learning outcomes for individual course units) are described in this Undergraduate Handbook, which can be found online at <http://www.physics.manchester.ac.uk/study/undergraduate/undergraduatehandbook/>

These attributes are reviewed by the Institute of Physics every five years. All programmes are accredited by the Institute of Physics. The skills and achievements of graduates of accredited degrees are set out in The Physics Degree –

http://www.iop.org/education/higher_education/accreditation/file_64166.pdf - which includes the *Core of Physics*, the key concepts which must be covered in all accredited programmes.

Moreover, the programmes comply with the Quality Assurance Agency for Higher Education (QAA) subject benchmark for Physics, Astronomy and Astrophysics

<http://www.qaa.ac.uk/en/Publications/Documents/SBS-Physics-Astronomy-and-Astrophysics-17.pdf>

When assessing whether a student has achieved a competency, various methods are used. The method chosen for each course unit is described in the Undergraduate Handbook and has been deemed appropriate to assess the learning outcomes by the School Teaching & Learning Committee.

Lecture based courses are normally assessed in unseen and time-constrained examinations. The unseen element ensures that the material required for all the learning outcomes has been absorbed and understood by an individual student. The time-constrained element tests the student’s capacity to organise work, as well as to think and communicate under pressure.

The School recognises that undue pressure can lead to stress. To quote the Health and Safety Executive, <http://www.hse.gov.uk/stress/furtheradvice/whatisstress.htm> : “There is a difference between pressure and stress. Pressure can be positive and a motivating factor, and is often essential in a job. It can help us achieve our goals and perform better. Stress occurs when this pressure becomes excessive. Stress is a natural reaction to too much pressure.”

Consequently, examinations are carefully written and checked internally and externally, to ensure that the relevant learning outcomes of a course unit can be tested in the appropriate time period. The knowledge and understanding of basic physics formulae appropriate to each of our course units is also a competency. Understanding of physics at university level and beyond is inextricably intertwined with mathematics—a phrase that is commonly used is that mathematics is the language of physics. The understanding, derivation and application of these formulae in an examination, demonstrates a student’s underpinning knowledge of physics.

The advice of the University's Disability and Advisory Support Service (DASS) is followed if the time period or any other examination conditions need to be adjusted for particular students.

2b. Aims and Objectives for Teaching and Learning

All undergraduate programmes in physics aim to

1. Offer an opportunity to study Physics within an internationally-leading research environment.
2. Provide students with a sound base of knowledge and understanding of basic physics principles, to expose them to the applications of these principles in a broad range of areas, and to allow them to study some of these in depth.
3. Provide the opportunity for students to study a specialised area of physics such as astrophysics or theoretical physics to an advanced level, and to obtain a degree whose title reflects this.
4. Give students the possibility of combining the acquisition of a sound base of physics with the study of a foreign language, and offer the opportunity to pursue a part of their studies in another European country or in North America or Singapore.
5. Provide students with a training in the mathematical techniques which underpin physics, and to offer them the opportunity to develop related skills and knowledge to a high level.
6. Provide students with comprehensive training in laboratory techniques, the skills of investigation planning, and handling of experimental apparatus, data analysis and interpretation, and the communication of results.
7. Foster students' development of transferable and personal skills, including those of problem-solving, analysis, independent learning, team-working, IT and communication, which will be essential to their future careers.
8. Provide a flexible structure within which students' changing interests and aspirations can be accommodated.
9. Provide students with a friendly and supportive environment in which to develop intellectually and personally.
10. Equip students for employment in a broad range of disciplines, particularly those which value numerate graduates who can apply their knowledge and problem-solving skills to real-world situations.
11. The Masters level programmes aim to provide students with knowledge and skills which will equip them to start a doctorate, and to expose them to a sufficient range of topics that they can make a well-informed choice of subject area.
12. The Masters level programmes also aim to further equip students for professional employment, in particular by developing their analytical skills within and beyond the boundaries of Physics and by equipping them to make sound decisions in the absence of complete information.

2.1 Outcomes for all undergraduate programmes in physics

Knowledge and Understanding – Graduates should be able to:

1. Demonstrate a knowledge and understanding of fundamental physical laws and principles, in particular in the areas of classical and quantum mechanics, electromagnetism, statistical physics, wave phenomena, thermodynamics and properties of matter.
2. Apply these principles to diverse areas of physics, including a number of the following: astrophysics, atomic physics, laser physics, particle and nuclear physics, condensed matter physics and materials, plasmas and fluids and biomedical physics. The range of applications encountered will be programme dependent, but all students will encounter several.

In addition students completing a Masters programme should be able to:

3. Demonstrate achievement of the learning outcomes of the corresponding bachelors' programme at a higher level than in their third year deriving from the study of advanced topics, many at the forefront of the discipline.

Intellectual skills – Graduates should be able to:

1. Formulate and solve problems in physics, identifying the relevant physical principles and making approximations necessary to obtain solutions; use special cases and order-of-magnitude estimations to guide their thinking and make assumptions clear in the presentation of their solution.
2. Use mathematics to describe the physical world and show an understanding of mathematical modelling of physical phenomena; use appropriate mathematical tools in physics problems.
3. Carry out a substantial open-ended investigation; analyse critically the results of an investigation, with particular reference to the significance of the results and how they compare with theoretical prediction.

In addition students completing a Masters programme should be able to:

4. Apply fundamental physical laws and principles to diverse areas of physics including some at the forefront of the discipline.
5. Apply their theoretical and practical skills to the understanding and/or investigation of subjects at the forefront of knowledge.
6. Use a wide variety of source material including primary sources.

Practical skills – Graduates should be able to:

1. Work safely in a laboratory, identifying hazards and operating apparatus to avoid risk to themselves and others.
2. Demonstrate technical competence in adjustment, calibration and use of experimental apparatus.
3. Communicate the results of an experiment in formal presentations, both oral and written.

In addition, students completing a Masters programme should be able to:

4. Plan and carry out an investigation under supervision; analyse the results critically making appropriate reference to prior relevant original research.

Transferable skills enhanced by the degree programmes include the ability to:

1. Present data graphically and use appropriate IT and programming tools to analyse data at a level appropriate to their degree.
2. Communicate scientific information orally and in writing, at a level appropriate to their degree demonstrating the awareness of the requirements of different types of published output.
3. Organise their own learning and use appropriate learning resources; work both independently and as part of a team.

In addition, students completing a Masters programme should be able to:

4. Demonstrate enhanced personal skills from studying in another country.

In addition, students studying Physics with Study in Europe should be able to:

5. Demonstrate the high level of personal organisation and motivation needed to study in Europe.

In addition, students completing a Masters programme should be able to:

6. Work independently in both lecture-based courses and project work.

2.2 Aims and Learning Outcomes distinctive to particular degree programmes

1. Graduates in *Physics* will have demonstrated:

- Knowledge and skills which are additional to those met in core physics. By selecting options, they may have studied particular topics in theoretical and experimental physics in more depth, taken courses in astrophysics, acquired extra skills in computing, and/or broadened their knowledge in applied science, mathematics, biological physics, genetics, economics, modern languages, the history and philosophy of science, business and management or other subjects.

Graduates in *Physics with Astrophysics* will have:

- Demonstrated detailed knowledge of astronomical phenomena and be able to explain the physical principles underlying these phenomena.
- Appreciated principal issues in observational astronomy and carry out observations and analysis of astronomical data.

Graduates in *Physics with Theoretical Physics* will have:

- Demonstrated understanding of the role of mathematics in physics, both as a tool and at a deeper level as in, for instance, symmetry principles.
- Used quantum mechanics in a variety of applications.
- Used mathematical models and techniques at a higher level than is expected of physics students; using numerical as well as analytical techniques.

Graduates in *Physics with Study in Europe* will have:

- Demonstrated an appreciation of cultural differences in the approach to physics as a mathematical and practical subject.
- Shown that they can communicate fluently in a foreign language, in particular on scientific topics.

2. The *Physics with Philosophy* programme aims to:

- Develop the ability to assimilate complex philosophical issues and present a clear, reasoned argument.
- Develop an understanding of the mechanisms of acquiring and using knowledge and logic.

- Prepare students for further study and research in physics and philosophy and for a wide range of career opportunities in industry, commerce and education.
3. The *Mathematics and Physics* programme aims to:
- Offer an opportunity to study Mathematics and Physics within an internationally leading research environment.
 - Give students a grounding in the core ideas of mathematics, including the concept of rigorous argument and formal proof, and an appreciation of the power and generality of abstract formulation and the analytic method.
 - Provide an awareness of the broad range of applications that can be modelled mathematically and knowledge of the analytic and numerical techniques that can be used to solve the attendant problems.
 - Give students experience of advanced mathematical methods, ideas and thinking.
 - The Masters level programme also aims to further equip students for professional employment, in particular by developing their analytic skills within and beyond the boundaries of Mathematics and Physics.

2.3 Aims and Learning Outcomes of Lectures, Tutorials, Laboratory Work and Workshops

All the degree programmes have three main teaching and learning elements: lectures, tutorials and laboratory work. These are supplemented by self-motivated study, essay writing, computer-aided learning, project work, workshops and example classes.

The aims and objectives of lectures, tutorials, workshops and laboratory overlap, support and complement each other and contribute to achieving the aims and objectives of the degree programmes.

Lectures

The aims of lectures are:

- To develop understanding of a coherent body of knowledge of physics and mathematics.
- To develop the capability for logical analysis of complex phenomena.
- To develop the capability for independent learning from books and other sources of knowledge.

The following objectives are specific student learning experiences and achievements which go towards meeting the aims listed above:

1. To identify key physical concepts and to appreciate how they account for phenomena
2. To follow the essential steps in mathematical descriptions of physical phenomena
3. To evaluate, record and summarise material presented in lectures for use as a basis for further study
4. To seek understanding of material presented in lectures by:
 - a. Asking questions of oneself, lecturers, tutors and other students
 - b. Consulting books and other sources
 - c. Solving qualitative and quantitative problems
 - d. Doing laboratory experiments

Tutorials

The aims of tutorials are:

- To promote effective learning by providing feedback and guidance
- To enhance understanding of physics and mathematics
- To develop problem solving skills
- To develop skills in communication

The following objectives are specific student learning experiences and achievements which go towards meeting the aims listed above:

1. To consolidate understanding of material presented in lectures by:
 - a. Asking questions
 - b. Explaining concepts to tutors and to other students
 - c. Solving problems and having them marked by tutors
 - d. Obtaining feedback on their current level of understanding
2. To extend and deepen knowledge of physics by:
 - a. Combining ideas and knowledge from different parts of the course
 - b. Solving general problems in physics
 - c. Discussing topics in advanced physics
3. To improve communication skills by:
 - a. Discussion
 - b. Asking and answering questions
 - c. Writing essays
 - d. Giving talks

Workshops

The aims of workshops are:

- To promote effective independent learning
- To provide an environment where students can work on problems and guidance can be sought if needed
- To develop the ability to express physics problems in mathematical language
- To develop problem solving skills
- To develop the ability to work in a group

The following objectives are specific student learning experiences and achievements which go towards meeting the aims listed above:

1. To analyse and apply material from lectures by:
 - (a) solving problems individually
 - (b) solving problems in groups
2. To meet new material which is best learned by solving problems
3. To consolidate understanding of material presented in lectures and workshops by:
 - (a) asking questions (of other students and demonstrators)
 - (b) explaining methods of solution to other students
 - (c) obtaining feedback on their understanding in discussion with demonstrators (and other students)

2.4 Learning outcomes for Laboratory

It is expected that successful students will be able to:

	Year 1	Year 2	Year 3	Year 4
Safety Awareness	Use apparatus safely.	Identify hazards associated with an experiment to minimise risks.	Identify hazards associated with apparatus developed by the student him/herself, and undertake a risk assessment.	Undertake a risk assessment.
Investigative/Problem Solving Skills				
(i) Conduct and Initiative (planning, preparation, initiative)	Follow guidance on how to conduct experiments as explained in laboratory scripts and by laboratory demonstrators.	Demonstrate a ability to think more widely than a given laboratory script, e.g., design an extension to an experiment in consultation with a demonstrator.	Develop and extend prescribed experimental procedures.	Develop and plan project in discussion with supervisor using original source material as a guide.
(ii) Technical Expertise	Use competently and safely a range of laboratory equipment.	Demonstrate technical competence in adjustment, calibration and use of experimental apparatus.	Be able to handle sophisticated apparatus with confidence.	Design and implement the steps necessary to undertake a project, i.e. acquisition and implementation of equipment, selection of appropriate theoretical tools and techniques, use of research level software and programming skills.
(iii) Recording and managing data	Keep detailed records of investigations in a laboratory notebook.	Keep full and careful records of all measurements and analysis in a laboratory notebook.	Keep professional quality records of laboratory work. Use computer aided data acquisition systems as appropriate.	Keep professional quality records of laboratory work. Use computer aided data acquisition systems and analysis methods as appropriate.
	Year 1	Year 2	Year 3	Year 4
Analytical skills				
(i) Techniques	Analyse the results of an experiment, describing the results numerically and graphically.	Critically evaluate the results of an experiment.	Critically evaluate the results of an experiment, assess the significance of the experimental results compared to expected outcomes and draw valid conclusions.	Critically evaluate the results and analysis of an experiment, choose experimental techniques which improve the outcome.
ii) Evaluation of errors	Identify the major sources of errors and estimate the effects on the overall results of an experiment.	Describe the sources of random and systematic error calculating their effects on the results.	Describe the sources of random and systematic error, calculate	Fully understand all sources of random and systematic error, minimise their

			their effects on the results and evaluate ways of reducing the dominant error.	effect and calculate the final errors on all results.
Physics knowledge	Link the experimental findings to underlying physics acquired in lecture courses and elsewhere.	Make connections between fundamental principles and laws from across courses to explain experimental findings.	Link the experimental findings to underlying physics in lecture courses, textbooks and scientific journals.	Describe experimental findings with reference to research papers and a thorough exposition of the fundamental laws and principles underlying the experiment.
Communication skills (i) Oral presentation	Describe experiments clearly and concisely in a short, informal interview.	Describe experiments clearly and concisely in informal verbal presentations, defending procedures and analysis.	Describe an experiment in a formal presentation using visual aids, defending procedures, results and interpretation.	Discuss a project in the light of research developments as part of a question and answer session following a presentation in a formal interview.
(ii) Written presentation	Describe experiments clearly and concisely in a formal written report using a 'template' that defines the Department's preferred style.	Describe experiments clearly and concisely in a formal written report using a 'template' that defines the Department's preferred style.	Describe experiments in the style of a scientific paper and/or in the form of a conference report.	Write a report to the standards of a scientific paper suitable for peer review including significant reference to primary sources.

2.5 General Papers

General Physics Papers are an important part of the Honours Examinations system. In broad terms, their aim is to ensure that at the time of graduation students normally have a good grasp of basic physics principles across the whole of core physics. The specific papers taken, and their aims, are as follows. Further information on credit weighting and progression regarding the General Paper can be found in section 7.1.1

Second Year Paper (PHYS20040/PHYS20240)

The second-year general paper contributes to the overall second year assessment and to the carry-forward mark. The aims of the paper are:

- to ensure that at the end of second year, students normally retain a good knowledge and understanding of the basic principles of core physics from previous semesters;
- to familiarize students, under examination conditions, with short general physics questions of the type they will be required to answer in the third year.

The paper is taken at the end of the academic year, and is a three hour paper comprising fifteen compulsory short questions based on material drawn from across the whole of core physics (semester 1– semester 3 inclusive). The best thirteen marks are used for assessment. Mathematics and Physics joint honours students, Physics with Philosophy students and students who have entered year 2 as direct entry students, take a two hour reduced paper on which the mark is based on the best marks on nine out of ten compulsory questions. The weighting is 3/5 of the full paper. Students who change from one of these programmes to the Physics programme prior to the end of second year will take the full length paper.

Third Year Paper (PHYS30010/PHYS30210)

The third-year general paper contributes to the Final Honours assessment for BSc candidates and, through the carry-forward, to the Final Honours assessment for MPhys candidates. The aims of the paper are to ensure that students normally:

- have a good knowledge and understanding of basic principles across the whole of core physics; and
- are able to use this knowledge to solve simple problems and to make estimates of physical quantities.

The paper is taken at the end of the academic year, and is a three hour paper comprising fifteen compulsory short questions based on material drawn from across the whole of core physics (semester 1– semester 5 inclusive). The best thirteen marks are used for assessment. Students on Mathematics and Physics, or Physics with Philosophy degree programmes and students who have entered year 2 or year 3 as direct entry students, take a two hour reduced paper on which the mark is based on the best marks on nine out of ten compulsory questions. The weighting is 3/5 of the full paper.

The general papers are among the more challenging examination papers in that they do not generally contain “bookwork”, and reward problem solving and the ability to synthesize knowledge from different areas of the curriculum. Students are strongly encouraged to prepare for them by practising past papers, and are supported in this by questions on the second year tutorial sheets and by dedicated third year examples classes. Students who change from one of these programmes to the Physics programme prior to the end of third year will take the full length paper.

2.6 Physics with Study in Europe students: Report on Year Abroad

Students are required to produce a report on their year abroad in three sections.

- Section 1 should list the courses attended, together with a report on their content. You should comment on how useful, or otherwise, you found the course.
- Section 2 should be a 3000-4000 word essay based on a major topic you have studied while abroad.
- Section 3 should contain a summary of all your examination results, together with class averages if they can be obtained.

**If I knew how awful marking exams was, I'd have enjoyed
sitting them more!**

P. Mitchell

3. Student Support Welfare and Guidance

Listed below are various sources of guidance for students. In the case of any personal problems, a student is encouraged in the first instance to contact the **Student Support and Welfare Officer in the Teaching and Learning Office**. If you would like to make an appointment, please email **Géraldine Garrabet** at physics.support@manchester.ac.uk.

If the problem is academic related and involves course choices, your **Personal Tutor** or **Programme Director** should be contacted see section B. Alternatively, if you have additional concerns about your studies you may also contact your Year Tutor see section B. who is the appropriate person to contact at any time if you wish to request a change of personal tutor or approve a change of options. If this is not possible, you may also contact the Deputy Director of Teaching & Learning.

The School Teaching and Learning Office will always be happy to advise on the most appropriate person to contact. Beyond the School, the University operates a Counselling Service.

3.1 Personal Tutors

Each student is assigned a Personal Tutor at the beginning of the degree programme. The Personal Tutor advises on choosing course unit options and monitors progress throughout the degree programme. Four official meetings are scheduled each academic year: a meeting in registration week at the beginning of the academic year, a meeting to consider progress at the end of the first semester, a mid-year progress meeting in week four of the second semester, and an end of year meeting following the June examination period. However, at all times during the year, students should feel free to approach their Personal Tutors on matters affecting study and on personal problems.

3.2 Disability Advisory and Support Service

The Disability Advisory and Support Service (DASS) – <http://www.dso.manchester.ac.uk> provides help and advice for students with specific learning difficulties, disabilities, sensory impairments, mental health difficulties and medical conditions. The DASS office is based on the Second Floor of University Place. Telephone: 0161-275-7512/8518; email - dass@manchester.ac.uk

The School's Disability Co-ordinator is Géraldine Garrabet, who can be contacted via the School Teaching and Learning Office (Telephone: 0161-275-4100 or email: physics.support@manchester.ac.uk). Géraldine is responsible for ensuring that special needs for any students are communicated to the University and staff in the School.

3.3 University Support Services

The University's counselling service offers confidential help with any personal issues affecting work, self-esteem, relationships, mental health and general well-being. The Counselling Service (<http://www.counsellingservice.manchester.ac.uk> - 0161-275-2864) is on the fifth floor of Crawford House.

The Students' Union (Steve Biko Building, 0161-275-2947) provides advice on academic and welfare problems (advice.su@manchester.ac.uk). There is also a *Nightline* service run by students (nightmail@nightline.manchester.ac.uk).

3.4 Tutors and Tutorials

Tutors are assigned at the beginning of the academic year. Each student has a physics tutor and a mathematics tutor in the first year, and a physics tutor in the second year. Your first year

physics tutor is normally also your personal tutor. Tutors help with mathematics and physics courses but they can also provide guidance on personal problems. Tutorials, normally as a group of five students, take place weekly. Work for tutorials is compulsory and is assessed. If a student misses a tutorial he or she should contact their tutor as soon as possible and explain the absence.

3.5 Contact with other Academic Staff (refer to Staff Lists in sections A. and B.)

Students are welcome to contact informally any member of staff about teaching and learning. If they have problems in this regard, they should request an appointment via email. Email addresses are listed at the beginning of this handbook and are also available from the staff and student directory on the University website (<http://directory.manchester.ac.uk>)

3.6 References

Personal Tutors will normally provide a reference for students who require one for a job or further study. They should always be contacted in advance; it is very helpful to provide the tutor with a CV and a brief statement about reasons for applying for the position. Other members of staff who have had significant contact with the student, for instance second year tutors and project supervisors, will usually also be happy to provide a reference, but again they should be asked in advance.

3.7 Peer Assisted Study Sessions (PASS)

The School operates a PASS (Peer Assisted Study Sessions) programme which is led by students in the School supported by a member of academic staff. During weekly timetabled sessions higher year students act as facilitators in order to help first year students manage their transition from A-level to undergraduate study. The sessions provide a safe environment where academic issues are discussed, and study skills and learning strategies are developed with the benefit of increasing academic confidence. Each first year student will be assigned to a particular session at the start of the year. Each session will have about ten first year students with two PASS leaders.

3.8 Careers Service

The Careers Service provides information and guidance on career planning to all students and postgraduates during their course and for up to three years following graduation. In addition to the Careers Resource Centre library, students can obtain individual careers advice at any stage of their university career, from work experience to company internships, from full-time employment to further study, both in the UK and overseas. The Careers Resource Centre is in The Atrium, 1st floor, University Place and is open weekdays from 9.00 am to 5.00 pm (0161-275-2829) or on the web at <http://www.careers.manchester.ac.uk>.

3.9 Student Work and Attendance

Students who cannot attend scheduled tutorials and laboratory classes should, as a matter of courtesy, inform the relevant member of staff at the earliest opportunity. In the event of an absence from the department, a Short Term Absence Form, https://online.manchester.ac.uk/bbcswebdav/pid-4018203-dt-content-rid-16754902_1/orgs/I3039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/Short%20Term%20Absence%20Form.pdf?target=blank which is obtainable from the UG Virtual Common Room on Blackboard, should be completed.

See also Section 8 [Assessment and Examinations] of the Undergraduate Handbook.

3.10 Student Ill-Health and Assessment

It is a requirement of your registration with the University of Manchester that you register with a local medical general practitioner (GP).

**A list of GP practices can be obtained from any University hall of residence, a local Pharmacy, or via NHS Direct
<http://www.nhs.uk/pages/home.aspx>**

- (a) **You should always consult your GP (or for emergencies the Accident and Emergency Department of a hospital) if you are severely ill, if an illness persists or if you are in any doubt about your health.** You should also consult your GP if illness keeps you absent from the University for more than 7 days including weekends. If you do consult a GP and they consider that you are not fit for attendance at the University, then you should obtain a note from the doctor to that effect or ask them to complete Part III of the University form 'Certification of Student Ill Health' copies of which are available at local GP surgeries. You should hand this certificate to the School Office at the earliest opportunity.
- (b) If your condition is not sufficiently serious to cause you to seek medical help, then the University will not require you to supply a doctor's medical certificate unless you are absent from the University due to illness for more than 7 days (in which case see (b) above). You **must** however contact the School Office as soon as possible and self-certify your illness (that is complete and sign the Short Term Absence Form to state you have been ill) as soon as you are able to attend the School. You should do this if your illness means you are absent from the University for any period up to 7 days (see (d)(i)) or if you are able to attend the University but your illness is affecting your studies (see (d) (ii) and (iii)).
- (c) The following sub-paragraphs explain what you should do if your illness affects your attendance at compulsory classes or examinations, or if you consider that your performance in assessments has been impaired. The School's Mitigating Circumstances Committee will consider such submissions if they may affect a student's progression or any examination result; see section 8.13 for more information.
- (d) If you are unwell and feel unable to attend the University to take a compulsory assessment or examination then you **must** seek advice by contacting the Teaching and Learning Office immediately, in person, through a friend or family member, by telephone or by email. **You must do this as soon as possible, and certainly no later than the day of your compulsory class, assessment or examination, so that all options can be considered.** If you do not do this then you will normally be considered to have been absent from the class without good reason, or to have taken the assessment or examination in which case you will be given a mark of zero. You **must** also complete and hand in a "Certification of Student Ill Health" form stamped and signed or a doctors note on your return.
- (e) You may be unwell but are able to proceed with an assessment or examination and yet you feel that your performance will have been impaired. If you wish this to be taken into account as a mitigating circumstance, you **must** inform the Teaching and Learning

Office about this on the day of the assessment or examination and hand in to your school a completed "Certification of Student Ill Health" form. If you leave this until later it will not normally be possible to take your illness into account when assessing your performance.

- (f) If, as a consequence of your illness, you wish to seek an extension to a deadline for submitting assessed coursework, you **must** complete a "Certification of Student Ill Health" form and discuss it with the appropriate course lecturer or tutor. The application for extension **must** be made BEFORE the deadline and not retrospectively.
- (g) You may be under occasional and ongoing medical attention which affects your studies. If so, you should obtain a letter from your GP which should be given to the Teaching and Learning Office before the end of January, May/June or August/September examination period, as appropriate, if you wish your condition to be taken into account as a mitigating circumstance. You can also email supporting documentation to physics.support@manchester.ac.uk

Notes:

- (i) If you are found to have been deceitful or dishonest in completing the Certification of Student Ill Health form you could be liable to disciplinary action under the University's Conduct and Discipline of Students Regulation XVII.
- (ii) The use of the "Certification of Student Ill Health" forms by GPs as described above has been agreed by the Manchester Local Medical Committee. A GP may make a charge for completing the form.

4. Course Review

A number of mechanisms are in place to monitor and to improve learning and teaching. Lectures and laboratory work are monitored by student questionnaires which provide valuable feedback to individual teachers and to the school as a whole. The Year Tutors for each year of the course hold regular meetings in which teaching is reviewed by tutors, lecturers and student representatives. Students have academic tutors and personal tutors who can help resolve problems and pass on suggestions for improvement in teaching. Finally, students and staff are encouraged to bring problems and to make suggestions for improvement to the following committees and members of staff with special responsibilities for teaching (see sections A. and B. for a list of staff currently in these roles).

4.1 The School Board

The School Board meets several times each year and provides a forum for the discussion of any matter relevant to the school. All teaching committees report to the School Board. All full-time members of the academic staff are members of the Board. Representatives of students, technical staff and administration staff attend meetings of the Board.

Chair: Dr. Andrew Markwick (andrew.markwick@manchester.ac.uk)

4.2 Physics Students Representatives Committee

The student body elects a committee of fellow students to represent student interests. Student representatives attend meetings of the School Board and of the main committees which deal with teaching matters. They play an active role in the regular teaching review meetings of tutors, lecturers and student representatives chaired by the Year Tutors. In addition, joint meetings of staff and student representatives are held to consider issues of broad concern.

4.3 The Teaching and Learning Committee

This committee meets regularly under the chairmanship of the Director of Teaching and Learning. Its membership consists of staff with special responsibilities for teaching, the Year Tutors and the Chair of Examiners for each year of study, the Chair of the Laboratory Committee and the Recruitment and Admissions Directors. In addition, there are four student representatives. This committee is responsible for the content, structure and organisation of the undergraduate degree programmes.

4.4 The Laboratory Committee

This committee organises and develops the laboratory work component of the teaching programme. Its membership consists of staff in charge of laboratory teaching in each year of the degree, staff with responsibility for particular laboratories and four student representatives.

4.5 Teaching Quality and Lecture Allocation Group

This committee has the responsibility for promoting good practice and high quality teaching in the School. The committee organises peer review of teaching with the aims of improving the quality of the course units, reviews the results of student feedback and develops the teaching skills of staff.

It also assigns, in consultation with the Director of Teaching and Learning, the major teaching duties in the school. Its remit is to ensure that course units are taught effectively by appropriate staff and to develop the teaching experiences of staff.

4.6 Year Tutors

Year Tutors are responsible for the quality of teaching and the organisation of teaching in each year of the degree programme. Responsibilities include: organising example sheets for tutorials and regular meetings at which teaching is reviewed by tutors, lecturers and student representatives.

4.7 Year Laboratory Tutors

Year Laboratory Tutors are responsible for the quality of laboratory teaching and assessment in each year of the degree programme. The Year Laboratory Tutors report to the Laboratory Committee.

4.8 National Student Survey (NSS)

Each year, graduating students are asked about their experiences on their degree course, via the National Student Survey (NSS). The University, the School of Physics and Astronomy, HEFCE (the universities' funding body) and the government all put great weight on the results of this survey, and they are also made available for future UCAS applicants.

All students are therefore urged to participate in the NSS if you are asked to do so. Views expressed there are used to improve the course. There are some notes available in the Undergraduate Virtual Common Room on Blackboard (see section 5.3) which may help you to understand the survey questions. Please read them before completing the survey.

https://online.manchester.ac.uk/bbcswebdav/pid-3890482-dt-content-rid-12264060_1/orgs/13039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/General%20Information/HTML/Notes%20on%20the%20National%20Student%20Survey.html

4.9 External Examiners' Reports

External Examiners' reports relating to this programme will be shared with student representatives at the Teaching and Learning Committee, where details of any actions carried out by the School in response to the External Examiners' comments will be discussed. Students should contact their student representatives if they require any further information about External Examiners' reports or the process for considering them.

5. Learning Resources

5.1 The University of Manchester Library

The University Library is the largest non-legal deposit academic library in the United Kingdom, and includes extensive collections in physics, astronomy and related subjects. Students, staff and researchers at The University of Manchester also enjoy access to an abundant virtual library of electronic resources, 24 hours a day, throughout the year.

The University Library consists of a large central facility on the main campus (the Main Library), together with several satellite libraries (including the Braddick Library). The **Main Library** is situated at the end of Burlington Street, some five minutes walk from the School of Physics and Astronomy, and houses the principal collections for science and other subjects. The **Braddick Library** primarily serves taught course students from the School of Physics and Astronomy, and is located within the School on the first floor of the Schuster Building. The Braddick Library supplements the Main Library's provision, and includes a Recommended Book Collection containing recommended reading for courses, a Teaching Collection of books and reference works, and a self-service photocopying facility.

Out of hours access to the study area of the Braddick Library is available for all third and fourth year students.

Study facilities also include the Learning Commons building on Oxford Road.

The University Library supports students with a comprehensive range of services. These include High Demand collections of the most heavily used materials, self-issue and self-return machines, online renewals and reservations through the library catalogue, online reading lists, self-service photocopying, document supply, and library and discipline-specific guides. A range of study facilities cater for a variety of study styles, including Group Study Rooms that can be booked in advance through the student portal. Several computer clusters offer access to over 240 networked computers, which are available during the Main Library's opening hours.

The University Library's website (<http://www.manchester.ac.uk/library>) provides detailed information about its services, enables access to the library catalogue, and delivers a wealth of electronic resources that can be used remotely. The relevant discipline-specific pages offer advice and access to resources for physicists and astronomers (<http://subjects.library.manchester.ac.uk/physics>). Resources include databases that support literature searching by identifying references to relevant publications, as well as electronic journals, electronic books and electronic reference materials (such as handbooks and data compilations, encyclopaedias and dictionaries) that enable access to full text publications.

The University Library is actively working to ensure that all students with special needs have full access to all library resources and services. The University Library has a designated Disability Support Co-ordinator, Gavin Park (gavin.park@manchester.ac.uk), who may be contacted directly by students.

5.2 Physics Help Service

Help with problems in most areas of Physics and Mathematics is available in the Braddick Library for two hours each week, and times are available on Blackboard (see section 5.3).

5.3 Blackboard (<https://online.manchester.ac.uk>)

Blackboard is the University-wide virtual learning environment. Each course module has a Blackboard site. Information about laboratory and project procedures are available from the relevant module sites within Blackboard. In addition the UG Virtual Common Room in

Blackboard contains links to past exam papers, lecture timetables and forms, as well as other useful links.

Examples sheets and their model answers for most courses are made available electronically on Blackboard.

5.4 Computing Facilities in the School

Public clusters.

There is a PC cluster on the Mezzanine floor of the Schuster Building. The next nearest clusters are on the ground floor of the Chemistry Building and in the George Kenyon Building. A full list of clusters and their realtime availability is accessible from the IT Services website (<http://www.itservices.manchester.ac.uk>).

Wireless access for laptops and mobile phones is available in most of the Schuster Building.

First floor teaching laboratories.

This floor is the home of the Don Butler PC cluster, which consists of 20 general purpose PCs.

Third floor teaching wing.

This floor houses the main teaching computing facilities.

PCLAB1 contains forty PCs used mainly for teaching and computing courses and for general purpose use. There are also a limited number of wired connection points for laptops.

PCLAB2 contains twenty two PCs used for teaching computing and analogue hardware control and for general purpose use.

PCLAB3 is the 4th year cluster. This contains ten computers of which some contain dedicated software for the 4th year projects; three computers run dedicated experiments under the Linux operating system.

Fourth floor teaching laboratory.

This laboratory mainly contains dedicated experiment control systems with some 26 machines. There are also four general purpose machines for word processing and data analysis.

Software in the teaching laboratories.

The two main operating systems used are Windows and Scientific Linux. Scientific Linux has been adopted as the defacto standard Linux distribution throughout the Faculty of Science and Engineering. Common applications to support document preparation, web browsing, etc. are installed as standard. Specialist applications like Matlab, Mathematica, LabView, visualisation packages, etc. are installed as required.

The University also has a large portfolio of applications software that can be used by students on campus or in the halls of residence.

Printing

All clusters provide some form of networked printing which is charged at School standard central charges. Each student is credited with an allowance at the beginning of term by the School to cover the costs of printing for course. Any further printer credits required can be obtained from the printer credit kiosks in the Kilburn building.

6. Structure of Degree Programmes by Year and Semester

The following pages outline the compulsory and option elements for each programme for each year of study for all the physics degree programmes for the current academic year. This structure may be modified in future academic years as a part of a process of curriculum review and development.

Continuing students should choose their options by early August, having consulted their personal tutor before leaving Manchester in June. First year students' options are chosen in consultation with their personal tutor at the start of the year. Changes must be agreed with the personal tutor no later than 2 weeks after the start of the appropriate semester. You are also required to enter your options on the student system, by the end of the second teaching week. Please ensure that these are the same as those you have agreed with your personal tutor. Variations involving the compulsory elements of a programme are only allowed in exceptional circumstances and must be agreed with your year tutor.

Please note that students must check with the host school if external options are running.

First Year – Semester 1

MPhys/BSc programmes (These are the same in Y1 and Y2).

Students take 60 credits per semester^[1] as specified below. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths.

Programme	PHYS10071	PHYS10101	PHYS10121	PHYS10191	Lab. 10180	Lab. 10280	Additional Core	Option
Physics	✓	✓	✓	✓	✓	✗	✗	See List
Physics with Astrophysics	✓	✓	✓	✓	✓	✗	✗	See List
Physics with Study in Europe	✓	✓	✓	✓	✓	✗	Language Course ^[2]	✗
Physics with Theoretical Physics	✓	✓	✓	✓	✗	✓ not 10180E	PHYS10471(M)	✗
Physics with Philosophy	✓	✓	✓	✗	✗	✓ not 10180E, incl 10181B & 10181L	PHIL10021 (20 credits)	✗
Mathematics and Physics	✗	✓	✓	✗	✗	✓ not 10180E, incl 10181B & 10181L	MATH10111 (15 credits) MATH10121 (20 credits)	✗

Physics Core Courses

PHYS10071	Mathematics 1
PHYS10101	Dynamics
PHYS10121	Quantum Physics and Relativity
PHYS10191	Introduction to Astrophysics and Cosmology
PHYS10180	First Year Laboratory (Double unit S1 & S2, 20 credits):
PHYS10280	First Year Laboratory (Single unit S1 only 10 credits)
	Including:
PHYS10181B	Computing and Data Analysis
PHYS10180E	Digital Electronics
PHYS10181F	Special Topics in Physics
PHYS10181L	Light and Optics (Philosophy and Mathematics and Physics)

Additional Core

PHYS10471(M)	Random Processes in Physics
MATH10111	Foundations of Pure Mathematics (15 credits)
MATH10121	Calculus and Vectors (20 credits)
PHIL10021	Introduction to Ethics (20 credits)

Additional Programme Information

1. **Mathematics and Physics:** Students take 65 credits in semester 1 and 55 credits in semester 2.

2. **Physics with Study in Europe:** Students take a language course appropriate in level to their initial knowledge of the language. LEAP courses (see section 6.5) are 10 credits in S1 and 10 credits in S2. Students in Physics with Study in Europe who begin with limited language skills may have to do extra work to reach the appropriate level by the end of first year. Students who have already reached the appropriate standard will be excused the language course and will be required to choose alternative course units.

S1 Options List

Students with an option choose 1 course from the following and are responsible for checking that they fulfil any course pre-requisites and that any external options don't clash with other courses.

Physics Option List 1	
PHYS10461	Physics in Everyday Life
PHYS10471(M)	Random Processes in Physics

External Option List 1E	
EART10111	Planet Earth
ECON10221	Microeconomics 1
HSTM10221	Science and the Modern World

LEAP

Study of a foreign language as a double option (studied in semester 1 and 2) (LEAP – see section 7.5) may be taken by first year students on the Physics programme (<http://www.ulc.manchester.ac.uk/languages/leap/>).

BMAP

Business and Management Options (see section 7.6) (<http://courseunits.humanities.manchester.ac.uk/Undergraduate/Manchester-Business-School>)

Tutorials and Workshops

All students (except Mathematics and Physics) have 2 tutorials, plus a 2 hour workshop, each week in both semesters. Physics with Philosophy students will be told about tutorial arrangements in Philosophy by the School of Social Sciences. Mathematics and Physics students attend 1 physics tutorial each week, and 1 hour of workshop in semester 2.

First Year – Semester 2

MPhys/BSc programmes (These are the same in Y1 and Y2).

Students take 60 credits per semester as specified below. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths.

Programme	PHYS10302	PHYS10342	PHYS10352	PHYS10372	Lab.	Additional Core	Option
Physics	✓	✓	✓	✓	✓	✗	See List
Physics with Astrophysics	✓	✓	✓	✓	✓	PHYS10672(M) or PHYS10692	✗
Physics with Study in Europe	✓	✓	✓	✓	✓	Language Course	✗
Physics with Theoretical Physics	✓	✓	✓	✓	✗	PHYS10672(M)	See List
Physics with Philosophy	✓	✓	✓	✓	✗	PHIL10622 (20 credits)	✗
Mathematics and Physics^[1]	✓	✓	✓	✗	✗	MATH10212 (15 credits) MATH11222	✗

Physics Core Courses

PHYS10302	Vibrations and Waves
PHYS10342	Electricity and Magnetism
PHYS10352	Properties of Matter
PHYS10372	Mathematics 2
PHYS10180	First Year Laboratory, including:
PHYS10180E	Digital Electronics
PHYS10182C	Circuits

Additional Core

PHYS10672(M)	Advanced Dynamics
PHYS10692	Physics of the Solar System
MATH10212	Linear Algebra (15 credits)
MATH11222	Calculus & Applications
PHIL10622	Introduction to Metaphysics and Epistemology (20 credits)

Additional Programme Information

1. **Mathematics and Physics:** See programme information in semester 1.

S2 Options List

Students with an option choose 1 course from the following and are responsible for checking that they fulfil any course pre-requisites and that any external options don't clash with other courses.

Physics Option List 2	
PHYS10622	Physics of Energy Sources
PHYS10672(M)	Advanced Dynamics
PHYS10692	Physics of the Solar System
PHYS10792	Statistical Methods

External Option List 2E	
EART10272	Introduction to Planetary Science
ECON10252	Macroeconomics 1

LEAP

Taking a foreign language will be advised by the Language Teaching Centre of their lecture/ tutorial arrangements in semester 2. (LEAP – see section 7.5) (<http://www.ulc.manchester.ac.uk/languages/leap/>).

BMAP

Business and Management options (see section 7.6), (<http://courseunits.humanities.manchester.ac.uk/Undergraduate/Manchester-Business-School>).

Tutorials and Workshops (Refer to semester 1)

Vacation Essay (part of PHYS20811 Professional Development)

All students are required to write a physics essay during the summer vacation to be handed in at the start of the first teaching week of their second year. Titles will be circulated by the year tutor after Easter.

Second Year – Semester 3

MPhys/BSc programmes (These are the same in Y1 and Y2).

Students take 60 credits per semester as specified below. All courses are 10 credits unless otherwise indicated. Please note that PHYS20811 is compulsory for all programmes. It is not credit-weighted, but the mark counts towards the year mark, and your degree result.

Courses marked with (M) require a higher than average aptitude for maths.

Programme	PHYS20101	PHYS20141	PHYS20161	PHYS20171	PHYS20811 (0 Credits)	Lab. 20180	Lab. 20280	Additional Core	Option
Physics	✓	✓	✓	✓	✓	✓	✗	✗	See List
Physics with Astrophysics	✓	✓	✓	✓	✓	✓	✗	PHYS20491	✗
Physics with Study in Europe	✓	✓	✓	✓	✓	* ^[1]	✗	PHYS20401(M) Language Course ^[1]	✗
Physics with Theoretical Physics	✓	✓	✓	✓	✓	✗	✓ Not PHYS20181E	PHYS20401(M)	✗
Physics with Philosophy	✓	✓	✗	✓	✓	✗	✓ Not PHYS20181E	PHIL20261 (20 credits),	✗
Mathematics and Physics	✓	✓	✗	✗	✓	✗	* Not PHYS20181E	MATH20111, MATH20401 (20 credits)	PHYS20280 or MATH20201 ^[2]

Note * indicates a choice of courses to be made.

Physics Core Courses	
PHYS20101	Introduction to Quantum Mechanics
PHYS20141	Electromagnetism
PHYS20161	Introduction to Programming for Physicists
PHYS20171	Mathematics of Waves and Fields
PHYS20180	Second Year Laboratory (Double unit S3 & S4, 20 credits) includes if appropriate
PHYS20181E	Amplifiers and Feedback
PHYS20280	Second Year Laboratory (S3 only, 10 credits)
PHYS20811	Professional Development (0 credits)

Additional Core and Options	
PHYS20401(M)	Lagrangian Dynamics
PHYS20491	Galaxies
MATH20111	Real Analysis
MATH20201	Algebraic Structures 1
MATH20401	Partial Differential Equations and Vector Calculus (20 credits)
PHIL20261	Philosophy of Science (20 credits)

Additional Programme Information

1. **Physics with Study in Europe:** Students who have already reached a satisfactory level in their language in 1st year and who are not doing a language course will do lab; otherwise a language course is taken instead.
2. **Mathematics and Physics:** Students usually take EITHER MATH20201, MATH20212 and PHYS20280 (S4) OR PHYS20280 (S3), MATH20122 and MATH20502. If after taking MATH20201, the follow-up course is considered inadvisable by the student and their personal tutor, MATH20122 may be substituted. Other deviations from the recommended maths courses may be allowed for BSc candidates only, after consultation with their personal tutor. However they should note that they have a second opportunity to take some year 2 options in year 3, but if they don't take the recommended courses in 2nd year they may find that they have a very restricted choice in 3rd year.

S3 Options List

Students with an option choose 1 from the following and are responsible for checking that they fulfil any course pre-requisites and that any external options don't clash with other courses.

Physics Option List 3	
PHYS20401(M)	Lagrangian Dynamics
PHYS20491	Galaxies
EART20281	Atmospheric Physics & Weather

External Option List 3E	
EART10111	Planet Earth
ECON10221	Microeconomics 1
ECON20101	Economics for Environmental Management
HSTM10221	Science and the Modern World
MCEL10001	Exploring Enterprise
MCEL30001	Tools and Techniques for Enterprise

LEAP

Study of a foreign language as a double option (studied in S3 and S4) (LEAP – see section 7.5) may be taken by honours Physics students (<http://www.ulc.manchester.ac.uk/languages/leap/>).

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory (see section 7.7). (<http://www.college.manchester.ac.uk/courseunits/>)

BMAP

Business and Management Options (see section 7.6), (<http://courseunits.humanities.manchester.ac.uk/Undergraduate/Manchester-Business-School>)

Tutorials

All students attend one physics tutorial each week in both semesters. Physics with Study in Europe students also attend Physics in a Foreign Language tutorials as part of their programme in the second year. Physics with Philosophy students will be told about tutorial arrangements in Philosophy by the School of Social Sciences.

Second Year – Semester 4

MPhys/BSc programmes (These are the same in Y1 and Y2).

Students take 60 credits per semester as specified below. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths.

Programme	PHYS20252	PHYS20312	PHYS20352	Lab.	Additional Core	Option
Physics	✓	✓	✓	✓	x	2 from List
Physics with Astrophysics	✓	✓	✓	✓	PHYS20692	1 from List
Physics with Study in Europe	✓	✓	✓	✓	Language Course, PHYS20672(M)	x ^[1]
Physics with Theoretical Physics	✓	✓	✓	x	PHYS20672(M), PHYS20872	1 from List ^[2]
Physics with Philosophy	✓	✓	✓	x	PHIL20242 (20 credits)	MATH20302 or HSTM20282
Mathematics and Physics	✓	✓	✓	*	MATH20142	MATH20122 and MATH20502, or MATH20212 and PHYS20280 ^[3]

Note * indicates a choice of courses to be made.

Physics Core Courses	
PHYS20252	Fundamentals of Solid State Physics
PHYS20312	Wave Optics
PHYS20352	Thermal and Statistical Physics
PHYS20180	Second Year Laboratory (Double Unit S3 & S4, 20 credits)
PHYS20280	Second Year Laboratory (S4 only, 10 credits)

*Please note that PHIL20212 clashes with PHYS20312

Additional Core and Options	
HSTM20282	The Information Age
PHYS20672(M)	Complex Variables and Integral Transforms
PHYS20692	Astrophysical Processes
PHYS20872	Theory Computing Project
MATH20122	Metric Spaces
MATH20142	Complex Analysis
MATH20212	Algebraic Structures II
MATH20302	Introduction to Logic
MATH20502	Fluid Mechanics
PHIL20212*	Locke, Berkeley, Hume (20 credits)

Additional Programme Information

1. **Physics with Study in Europe:** If students do not need to take a language course then they have an option.
2. **Physics with Theoretical Physics:** May not take PHYS20762
3. **Mathematics and Physics:** See S3 notes.
4. **Examples Classes for Year Abroad Students:** All students planning to spend year 3 abroad (including Physics with Study in Europe) must attend additional maths examples classes in S4, and approval to go on the year abroad will depend on satisfactory attendance, and completion of associated coursework.

S4 Options List

Students with an option or options choose from the following courses and are responsible for checking that they fulfil any course pre-requisites and that any external options don't clash with physics core. NB: If a core course appears as an option, students must select another option from the list to achieve 60 credits during the semester. Note: Not more than 20 credits of level 1 options may be taken in second year.

Physics Option List 4	
PHYS10622	Physics of Energy Sources
PHYS10672(M)	Advanced Dynamics
PHYS10692	Physics of the Solar System
PHYS10792	Statistical Methods
PHYS20612	Introduction to Photonics
PHYS20672(M)	Complex Variables and Integral Transforms
PHYS20692	Astrophysical Processes
PHYS20762	Computational Physics

External Option List 4E	
EART10262	Earth Resources
ECON10252	Macroeconomics 1
HSTM20282	The Information Age
MATH20222(M)	Introduction to Geometry
MATH20302(M)	Introduction to Logic
MATH20502(M)	Fluid Mechanics
MATH20912(M)	Introduction to Financial Mathematics
MCEL10002	Entrepreneurial Skills B

BMAP

Business and Management Options (see section 7.6), (<http://courseunits.humanities.manchester.ac.uk/Undergraduate/Manchester-Business-School>)

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory. See section 7.7 (<http://www.college.manchester.ac.uk/courseunits/>)

General Physics Paper

All students sit a General Physics Paper (PHYS20040/20240) in May/ June as part of the assessment for second year. The questions are based on the core physics units in Year 1 and in semester 3. Your Tutor can help you to prepare for this paper. See section 2.5.

Tutorials (Refer to Y2 semester 3)

Vacation Essay

All students are required to write a Physics essay during the summer vacation (as per P. 40)

BSc Third Year – Semester 5

Students take 60 credits per semester as specified below. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths. [Courses marked (M) or (A) may count towards the MPhys fourth year requirements for Physics with Theoretical Physics or Astrophysics respectively, see MPhys 4th year syllabus]

Programme	PHYS30101 or PHYS30201(M)	PHYS30121	PHYS30151	Lab or ^[2] Dissertation	Option ^[1] or Additional core
Physics	✓	✓	✓	✓✓	1 from list 5 or 5(2) or 5E(2) or 5E(3)
Physics with Astrophysics	✓	✓	✓	✓✓	PHYS20401 or PHYS30511
Physics with Theoretical Physics	PHYS30201(M)	✓	✓	✓✓ (Lab & Dissertation))	PHYS30471(M) or MATH35001(M) or PHYS30441(M)
Physics with Philosophy	PHYS30101	✓	✓	✓ (Lab)	1 Philosophy Option (20 credits)
Mathematics and Physics	PHYS30101 or PHYS30201(M) or PHYS30441(M)	✓	✓	✗	PHYS20161, 20 credits of Mathematics Options ^[3]

[1] You may not take more than 30 credits of external options, nor more than 20 credits of level 2 options, in year 3.

[2] **Laboratory.** Each ✓ indicates 10 credits, either a 6 week lab experiment (PHYS30180/30280) or a 6 week BSc project (PHYS30880). In semester 5 and semester 6 Physics and Physics with Astrophysics students do two lab experiments and a BSc Dissertation. The timing will depend on the dissertation chosen.

[3] Maths options for Maths/Physics students can be found at: <http://www.physics.manchester.ac.uk/study/undergraduate/undergraduate-courses/matphysjoint>

Physics Core Courses	
PHYS30101	Applications of Quantum Physics or
PHYS30201(M)	Mathematical Fundamentals of Quantum Mechanics
PHYS30121	Introduction to Nuclear and Particle Physics
PHYS30151	Thermal Physics of Bose and Fermi Gases
PHYS30180	Third Year Laboratory (Double Unit 20 credits)
PHYS30280	Third Year Laboratory
PHYS30811	2 nd Vacation Essay (3 credits)
PHYS30880	BSc Dissertation

Additional Core and Options	
PHYS20161	Introduction to Programming for Physicists
PHYS20401	Lagrangian Dynamics
PHYS30441(M)	Electrodynamics
PHYS30471(M)	Introduction to Nonlinear Physics
PHYS30511	Nuclear Fusion and Astrophysical Plasmas
MATH35001(M)	Viscous Fluid Flow

S5 Options List

Students with an option or options choose from the following courses and are responsible for checking that they fulfil any course pre-requisites. Students can take courses with a one hour clash as agreed by the Year Tutor. Please fill out the following form which needs to be signed by the Year Tutor

https://online.manchester.ac.uk/bbcswebdav/pid-5363502-dt-content-rid-16754973_1/orgs/I3039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/Clash_Approval_Draft%2017-18%281%29.pdf?target=blank

Physics Options List 5:

PHYS30141	Electromagnetic Radiation
PHYS30441(M)	Electrodynamics
PHYS30471(M)	Introduction to Nonlinear Physics
PHYS30511(A)	Nuclear Fusion and Astrophysical Plasmas
PHYS30611	Lasers and Photonics
EART30351	Meteorology and Atmospheric Physics
MATH35001(M)	Viscous Fluid Flow

Physics Options from Y2 List 5 (2):

PHYS20401(M)	Lagrangian Dynamics
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External Option List (level 3) 5E (3):

MATH34001	Applied Complex Analysis (May not be taken if PHYS20672 has been taken)
MCEL30001	Tools and Techniques for Enterprise

External Option List (level 2) 5E (2)

ECON20341	Business Economics 1A
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LEAP

Study of a foreign language as a double option (studied in S5 and S6) (see section 7.5) may be taken, but the course should normally be Level 2 or above (<http://www.ulc.manchester.ac.uk/languages/leap/>).

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory. See section 7.7 (<http://www.college.manchester.ac.uk/courseunits/>)

Example Classes

In semester 5 all students attend two examples classes each week to cover core courses.

BSc Third Year – Semester 6

Students take 60 credits per semester. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths. [Courses marked (M) or (A) may count towards the MPhys fourth year requirements for Physics with Theoretical Physics or Astrophysics respectively, see MPhys 4th year syllabus]

Programme	Lab or Dissertation	Core	Options ^[1]
Physics	✓	1 from list 6C	4 from list 6C or 6 or 6E(2) or 6E(3)
Physics with Astrophysics	✓	PHYS30392, PHYS40692	3 from list 6C or 6 or 6E(2) or 6E(3)
Physics with Theoretical Physics	✗	PHYS30672(M), 1 from list 6C	4 from list 6C or 6 or 6E(2) or 6E(3)
Physics with Philosophy	Dissertation	1 Philosophy Option (20 credits), PHYS41702 1 from list 6C	1 from list 6C or 6
Mathematics and Physics	PHYS30880 or MATH30022	1 from (list 6C or PHYS40202(M))	30 credits of Mathematics Options ^[3] , 1 from (list 6C or 6, or 6E(2), or 6E(3), or PHYS30280)

Notes:

[1] You may not take more than 30 credits of external options, nor more than 20 credits of level 2 options, in year 3.

[2] Physics students must have taken PHYS20672 as pre-requisite for MATH41022.

[3] See S5 note [3]

Physics Core Courses	
PHYS30180	Third Year Laboratory (wks 1-6 or 7-12) (S5 & S6 20 credits)
PHYS30280	Third Year Laboratory (wks 1-6 or 7-12)
PHYS30880	BSc Dissertation

Additional Core and Options	
PHYS30392(A)	Cosmology
PHYS30672(M)	Mathematical Methods for Physics
PHYS40202(M)	Advanced Quantum Mechanics
PHYS40692(A)	Stars and Stellar Evolution
PHYS41702	Physics and Reality
MATH30022	Project

S6 Options List

Students with an option or options choose from the following courses and are responsible for checking that they fulfil any course pre-requisites. Students can take courses with a one hour clash as agreed by the Year Tutor. Please fill out the following form which needs to be signed by the Year Tutor https://online.manchester.ac.uk/bbcswebdav/pid-5363502-dt-content-rid-16754973_1/orgs/I3039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/Clash_Approval_Draft%2017-18%281%29.pdf?target=blank

Core for MPhys; list 6C:	
PHYS40222	Particle Physics
PHYS40322	Nuclear Physics
PHYS40352	Solid State Physics
PHYS30392(A)	Cosmology

Physics Option List 6:	
PHYS30632	Physics of Medical Imaging
PHYS30672(M)	Mathematical Methods for Physics
PHYS30732	Physics of Living Processes
PHYS30762	Object-Oriented Programming in C++
PHYS31692(A)	Exoplanets
PHYS40202(M)	Advanced Quantum Mechanics
PHYS40422	Applied Nuclear Physics
PHYS40692(A)	Stars and Stellar Evolution
PHYS40712	Semiconductor Quantum Structures
PHYS41702	Physics and Reality
EART30362	Climate and Energy
MATHS35012(M)	Waves

External Option List 6E (2):	
ECON20342	Business Economics 1B
HSTM20282	The Information Age
MATH20302(M)	Propositional Logic

External Option List 6E (3):	
COMP39112	Quantum Computing
EART30232	Comparative Planetology
HSTM31212	The nuclear age
MATH41022(M)	Analytic Number Theory ^[2]
MATH39032(M)	Mathematical Modelling of Finance
MCEL30002	Tools and Techniques for Enterprise
MCEL30012	Advanced Technology Enterprise (follow-on from MCEL 30001)
MCEL30022	Interdisciplinary Sustainable Development

LEAP

Study of a foreign language as a double option (studied in S5 and S6) (see section 7.5) may be taken, but the course should normally be Level 2 or above (<http://www.ulc.manchester.ac.uk/languages/leap/>).

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory. See section 7.7 (<http://www.college.manchester.ac.uk/courseunits/>)

General Physics Paper

All students sit a General Physics Paper (PHYS30010/30210) in May/ June as part of the final examinations. The questions are based on the core physics units in Year 1, Year 2 and semester 5. See section 2.5.

Examples Classes

In semester 6 students attend two examples classes each week, one covering core courses and one covering general physics.

MPhys Third Year – Semester 5

Students take 60 credits as specified below. All courses are 10 credits unless otherwise indicated.

Courses marked with (M) require a higher than average aptitude for maths. [Courses marked (M) or (A) may count towards the MPhys fourth year requirements for Physics with Theoretical Physics or Astrophysics respectively, see MPhys 4th year syllabus]

Programme		PHYS30101 or PHYS30201(M)	PHYS30121	PHYS30151	PHYS30141 or PHYS30441(M)	Lab	Option ^[1] or Additional core
Physics		✓	✓	✓	✓	✓	1 from list 5 or 5(2) or 5E(2) or 5E(3)
Physics with Astrophysics		✓	✓	✓	✓	✓	PHYS20401 or PHYS30511
Physics with Theoretical Physics		PHYS30201(M)	✓	✓	PHYS30441(M)	✓	PHYS30471(M) or MATH35001(M)
Physics with Philosophy		PHYS30101	✓	✓	✓	✗	1 Philosophy Option (20 credits)
Mathematics and Physics^[3]	Strand A	PHYS30101 or PHYS30201(M) or PHYS30441(M)	✓	✓	[see col 1]	✗	PHYS20161, 20 credits of Mathematics Options
	Strand B	PHYS30201(M)	✓	✓	PHYS30441(M)	✗	20 credits of Mathematics Options

Notes:

- [1] You may not take more than 30 credits of external options, nor more than 20 credits of level 2 options, in year 3.
- [2] **Quantum Fast Stream:** (PHYS40481 (M) and PHYS40682 (M)). In order to study theoretical particle physics in year 4, it is necessary to take PHYS30201 (M), PHYS30441 (M), PHYS40222 and PHYS40202 (M) in year 3.
- [3] **Mathematics and Physics** students who wish to follow the Quantum Fast Stream (see note [2] above) follow Strand B in S5 and S6. All others follow Strand A in both semesters. Maths options for Maths/Physics students can be found at: <http://www.physics.manchester.ac.uk/study/undergraduate/undergraduate-courses/matphysjoint>
- [4] **Physics with Study in Europe** students study abroad during their third year. Students are required to produce a year abroad report; see Section 2.6 for further details.

Physics Core Courses	
PHYS30101	Applications of Quantum Physics
PHYS30201(M)	Mathematical Fundamentals of Quantum Mechanics
PHYS30121	Introduction to Nuclear and Particle Physics
PHYS30141	Electromagnetic Radiation
PHYS30151	Thermal Physics of Bose and Fermi Gases
PHYS30180	Third Year Laboratory (wks 1-6 or 7-12) (Double Option S5 & S6, 20 credits)
PHYS30280	Third Year Laboratory (wks 1-6 or 7-12)
PHYS30441(M)	Electrodynamics
PHYS30811	2 nd vacation essay (3 credits)

Additional Core and Options	
PHYS20161	Introduction to Programming for Physicists
PHYS20401	Lagrangian Dynamics
PHYS30471(M)	Introduction to Nonlinear Physics
PHYS30511(A)	Nuclear Fusion and Astrophysical Plasmas
MATH35001(M)	Viscous Fluid Flow

S5 Options List

Students with an option or options choose from the following courses and are responsible for checking that they fulfil any course pre-requisites. Students can take courses with a one our clash as agreed by the Year Tutor. Please fill out the following form which needs to be signed by the Year Tutor https://online.manchester.ac.uk/bbcswebdav/pid-5363502-dt-content-rid-16754973_1/orgs/I3039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/Clash_Approval_Draft%2017-18%281%29.pdf?target=blank

Physics Options List 5:	
PHYS30141	Electromagnetic Radiation
PHYS30441(M)	Electrodynamics
PHYS30471(M)	Introduction to Nonlinear Physics
PHYS30511(A)	Nuclear Fusion and Astrophysical Plasmas
PHYS30611	Lasers and Photonics
EART30351	Meteorology and Atmospheric Physics
MATH35001(M)	Viscous Fluid Flow

Physics Options from Y2 List 5 (2):	
PHYS20401(M)	Lagrangian Dynamics

External Option List (level 3) 5E (3):	
MATH34001	Applied Complex Analysis (May not be taken if PHYS20672 has been taken)
MCEL30001	Tools and Techniques for Enterprise

External Option List (level 2) 5E (2) as of August 2017:	
ECON20341	Business Economics 1A

LEAP

Study of a foreign language as a double option (studied in S5 and S6) (see section 7.5) may be taken, but the course should normally be Level 2 or above (<http://www.ulc.manchester.ac.uk/languages/leap/>).

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory. See section 7.7 (<http://www.college.manchester.ac.uk/courseunits/>)

Example Classes

In semester 5 all students attend two examples classes each week to cover core courses.

MPhys Third Year – Semester 6

Students take 60 credits per semester. All courses are 10 credits unless otherwise indicated. Courses marked with (M) require a higher than average aptitude for maths. [Courses marked (M) or (A) may count towards the MPhys fourth year requirements for Physics with Theoretical Physics or Astrophysics respectively, see MPhys 4th year syllabus]

Programme		Lab	Core	Options ^[1]
Physics		✓	All (4) from list 6C	1 from list 6 or 6E(2) or 6E(3)
Physics with Astrophysics		✓	PHYS30392, PHYS40692 + 2 from list 6C	1 from list 6C or 6 or 6E(2) or 6E(3)
Physics with Theoretical Physics		✗	PHYS40202(M), PHYS30672(M), PHYS40352 + 2 from list 6C	1 from list 6C or 6 or 6E(2) or 6E(3)
Physics with Philosophy		✓	1 Philosophy Option (20 credits), PHYS41702 + 2 from list 6C	✗
Mathematics and Physics^[3]	Strand A	*	3 from (list 6C or PHYS40202(M) or Lab)	30 credits of Mathematics Options (3 x 10 level 3, or 2 x 15 level 4)
	Strand B	✗	MATH36032, PHYS40202(M) and PHYS40222	30 credits of Mathematics Options (3 x 10 level 3, or 2 x 15 level 4)

Notes:

- [1] See S5 note [1]
- [2] Physics students must have taken PHYS20672 as pre-requisite for MATH41022.
- [3] **Mathematics and Physics:** See S5 note [3]. Note that by the end of year 4, you must have taken at least 120 credits of level 4 course units. Any level 4 credits taken in year 3 count towards that total, and to give you some choice of level 3 options in year 4, you are advised to take at least 20 credits of level 4 course units in S6.
- [4] **Provisional MPhys:** Any student whose MPhys registration is provisional (usually because they did not achieve 55% in year 2), and whose programme is changed to BSc in February, should take the BSc Dissertation (PHYS30880) in weeks 7-12 of S6, in place of one S6 physics or outside option course unit.

Physics Core Courses	
PHYS30180	Third Year Laboratory (wks 1-6 or 7-12) (S5 & S6 20 credits)
PHYS30280	Third Year Laboratory (wks 1-6 or 7-12)
PHYS30392(A)	Cosmology
PHYS40222	Particle Physics
PHYS40322	Nuclear Physics
PHYS40352	Solid State Physics

Additional Core and Options	
PHYS30672(M)	Mathematical Methods for Physics
PHYS40202(M)	Advanced Quantum Mechanics
PHYS40692(A)	Stars and Stellar Evolution
PHYS41702	Physics and Reality
MATH36032	Problem Solving by Computer

S6 Options List

Students with an option or options choose from the following courses and are responsible for checking that they fulfil any course pre-requisites. Students can take courses with a one our clash as agreed by the Year Tutor. Please fill out the following form which needs to be signed by the Year Tutor https://online.manchester.ac.uk/bbcswebdav/pid-5363502-dt-content-rid-16754973_1/orgs/I3039-COMMUNITY-EPS-PHYS-UG-COMMON-ROOM-1/Clash_Approval_Draft%2017-18%281%29.pdf?target=blank

Core for MPhys; list 6C	
PHYS40222	Particle Physics
PHYS40322	Nuclear Physics
PHYS40352	Solid State Physics
PHYS30392(A)	Cosmology

Physics Option List 6:	
PHYS30632	Physics of Medical Imaging
PHYS30672(M)	Mathematical Methods for Physics
PHYS30732	Physics of Living Processes
PHYS30762	Object-Oriented Programming in C++
PHYS31692(A)	Exoplanets
PHYS40202(M)	Advanced Quantum Mechanics
PHYS40422	Applied Nuclear Physics
PHYS40692(A)	Stars and Stellar Evolution
PHYS40712	Semiconductor Quantum Structures
PHYS41702	Physics and Reality
EART30362	Climate and Energy
MATH35012(M)	Waves

External Option List 6E (2):	
ECON20090	Operational Research 1 (S5 & S6)
ECON20342	Business Economics 1B
HSTM20282	The Information Age
MATH20302(M)	Propositional Logic

External Option List 6E (3):	
COMP39112	Quantum Computing
EART30232	Comparative Planetology
HSTM31212	The nuclear age: Hiroshima to nuclear terrorism
MATH41022(M)	Analytic Number Theory ^[2]
MATH39032(M)	Mathematical Modelling of Finance
MCEL30002	Tools and Techniques for Enterprise
MCEL30012	Advanced Technology Enterprise (follow-on from MCEL 30001)
MCEL30022	Interdisciplinary Sustainable Development

LEAP

Study of a foreign language as a double option (studied in S5 and S6) (see section 7.5) may be taken, but the course should normally be Level 2 or above (<http://www.ulc.manchester.ac.uk/languages/leap/>).

University College

Options offered through the University College may be taken, if the timetable does not clash with physics core, including laboratory. See section 7.7 (<http://www.college.manchester.ac.uk/courseunits/>)

General Physics Paper

All students sit a General Physics Paper (PHYS30010/30210) in May/ June as part of the final examinations. The questions are based on the core physics units in Year 1, Year 2 and semester 5. See section 2.5.

Examples Classes

In semester 6 students attend two examples classes each week, one covering core courses and one covering general physics.

MPhys Programmes Fourth Year – Semesters 7 and 8

Options

Year 4 options are in lists 7, 7E, 8 and 8E below. Options may also be chosen from lists 5, 5E(3), 6C, 6 and 6E(3), with the following constraints:

- 1 *You must take at least 120 credits at level 4 in years 3 and 4 together;*
- 2 *You may not take more than 30 credits of options from the external (E) lists in year 4.*

Physics, Physics with Astrophysics and Physics with Theoretical Physics

Students do 60 credits per semester. All students do PHYS40181/2 (MPhys project, 20 credits) in each semester, leaving 40 credits of options in S7 and S8. To qualify for Physics with Astrophysics or with Theoretical Physics, at least 30 credits must be taken in year 4 marked with (A) or (M) for Astrophysics and Theoretical Physics respectively (may include designated projects). Students who have spent year 3 abroad must take at least 90 credits of level 4 courses in year 4.

Physics with Study in Europe

Students do 60 credits per semester. The following are the usual rules, but they may be varied in exceptional circumstances by agreement with the Programme Director. In S7 students take PHYS40580 (level 4 (3rd year) lab, 10 credits) and in S8 PHYS40182 (MPhys Project, 20 credits), leaving 50 and 40 credits of options in semesters 7 and 8 respectively. As far as possible, gaps in third year core (usually Solid State and/or Particle and Nuclear Physics) must be covered. At least 90 credits of level 4 material must be taken in year 4.

Physics with Philosophy

Students do courses to a total credit rating of 120 or 125 for the year. Subject to that constraint, 55, 60 or 65 credits may be taken in each of S7 and S8. Students do either an MPhys Project (PHYS40181 or PHYS40182 (20 credits)) or a Philosophy Extended Essay (PHIL40000) (10 credits) in each of S7 and S8, e.g., if PHYS40181 is taken in S7 then the extended essay must be taken in S8. In addition to project work Physics with Philosophy students choose one of the following:

- (a) 2 units of level 6 Philosophy (30 credits) or 1 level 6 and 1 level 3 module (35 credits) and 6 units of Physics (60 credits)
- (b) 2 units of level 6 Philosophy (30 credits), one unit of mathematical logic (15 credits) and 5 units of Physics (50 credits)
- (c) 1 unit of level 6 Philosophy (15 credits), 2 units of mathematical logic (30 credits) and 5 units of Physics (50 credits)

Mathematics and Physics

Students do courses to a total credit rating of 120 or 125 for the year. Subject to that constraint, 55, 60 or 65 credits may be taken in each of S7 and S8. At least 50 credits in Physics and 50 credits in Mathematics over the course of the year must be taken, including MATH40011 *or* MATH40022 (Mathematics Project, 15 credits) and PHYS40181 *or* PHYS40182 (MPhys Project, 20 credits). (The two projects should be taken in different semesters). In addition CARS21001 (Career Management Skills) may be taken (note this does not contribute to the minimum of 50 credits in either subject area). The remaining options are chosen from the lists 5, 6C, 6, 7 and 8, and Mathematics course units. PHYS30672(M) (Mathematical Methods in Physics) cannot be taken.

Option List 7:	
PHYS40411	Frontiers of Solid State Physics
PHYS40421	Nuclear Structure and Exotic Nuclei
PHYS40451	Superconductors and Superfluids
PHYS40481(M)	Quantum Field Theory
PHYS40521	Frontiers of Particle Physics 1
PHYS40571(M)	Advanced Statistical Physics
PHYS40591(A)	Radio Astronomy
PHYS40631	Laser Photomedicine
PHYS40771(M,A)	Gravitation
PHYS46111	Frontiers of Laser Physics
PHYS40811	Physics Professional Placement

Option List 7E:	
MCEL30011	Advanced Technology Enterprise (level 4)
MCEL30051	Enterprise Strategy and Marketing
HSTM33201	Climate Change and Society (level 3)

Option List 8:	
PHYS40612	Frontiers of Photon Science
PHYS40622	Nuclear Forces & Reactions
PHYS40652	Physics of Fluids
PHYS40682(M)	Gauge Theories
PHYS40722	Frontiers of Particle Physics 2
PHYS40732	Biomaterials Physics
PHYS40752	Soft Matter Physics
PHYS40772(M,A)	Early Universe
PHYS40992(A)	Galaxy Formation

Option List 8E:	
MCEL30012	Advanced Technology Enterprise (level 4)
MACE31642	Reactor Systems (PHYS40422 is a pre-requisite for Physics students) (level 3)

Year 4 options are in lists 7, 7E, 8 and 8E. Options may also be chosen from lists 5, 5E(3), 6C, 6 and 6E(3), with the following constraints:

- 1 You must take at least 120 credits at level 4 in years 3 and 4 together;
- 2 You may not take more than 30 credits of options from the external (E) lists in year 4.

7. Course Units

7.1 Credit Rating

10 Credit Rated Units

- All Physics one-semester units are worth 10 credits except the MPhys Project
- A typical 10 credit unit consists of 22 lectures or 10-12 full day lab sessions
- The recommended number of hours required to complete a 10 credit unit is 100 hours (30 hours = lectures/tutorials/workshops/lab and 70 hours of independent study)

20 Credit Rated Units

- Fourth Year MPhys Projects are worth 20 credits

60 Credit Rated Units

- PHYS40811 Physics Professional Placement. Students taking this option do not take the MPhys Projects.

0 Credit Rated Units

The following units are *not* credit rated (and so are not subject to regulations on minimum pass marks)

1. PHYS20811 / 20821 Professional Development
2. PHYS20040 / 20240 2nd Year General Paper
3. PHYS30811 2nd Vacation Essay
4. PHYS30010 / 30210 3rd Year General Paper

Note: Although these units are not credit rated the marks do count towards the relevant end of year marks. The weighting of these units in the end of year marks is described in the next section.

The yearly work load consists of units with a total of 120 credit points, but students should note the degree programmes are not a collection of unrelated credit-rated course units. An understanding of basic ideas and methods are developed by physics course units and this understanding is assessed in general physics examinations.

7.1.1 General Paper, Vacation Essay and Professional Development weighting

The General Paper and Professional Development course units, though not credit-weighted, count in the mark for the year as follows;

- Professional Development has a weight corresponding to 9 credits.
- The 2nd Vacation Essay has a weight corresponding to 3 credits.
- The general paper has the same weight as a 10 credit unit (except for those programmes which do a reduced-length paper where the weight is given in section 2.5).

More details about the general paper can be found in section 2.5.

7.1.2 Credits and Progression

To progress from one year to the next the 120 credits of course units must be successfully completed.

- In principle, this means that the assessment of each unit is passed at 40%.
- However up to 40 credits may be allowed with marks between 30% and 39%; this is termed compensation.

Further details are given in section 8 Professional Development, the 2nd year Vacation Essay and the general paper, not being credit weighted, do not have to be passed for progression.

7.2 Core and Options

The School's degree programmes are based on a core of physics and mathematics, with different programmes distinguished by the course units which supplement the core. 'Physics with' programmes comprise about two-thirds core physics with most of the remainder of the material in the appropriate

specialisation. The Mathematics and Physics joint honours programme is split 50:50 between the core areas of the two disciplines.

Because the core is common, students on 'Physics with' programmes have the option of transferring to honours Physics at the start of any year. Similarly, students in honours Physics who follow the relevant option pathway may transfer to a 'Physics with' programme at the start of any year with permission from the Programme Director. In addition, transfers between honours Physics and Physics with Astrophysics are normally possible at the start of the second semester in any year. The transfer to Physics with Philosophy is only permitted in the first six weeks of Semester 1 of first year. If you would like to change degree programme, you should email physics@manchester.ac.uk

Transfer from the Mathematics and Physics joint honours programme into honours Mathematics is normally possible at the start of the second year, and into honours Physics at the start of the second or third year, subject to the normal progression criteria (See Section 9).

7.3 Option Choice

Details on the number of optional units that can be chosen in the various degree programmes are given in Section 7; the number is largest for Honours Physics. A student's Personal Tutor is responsible for advising that a sensible combination of options is chosen and this must be approved by your Personal Tutor. In non-standard cases i.e. options not listed in the UG Handbook, lecture clashes in 3rd and 4th year or any option changes after the deadline of week 2, then these should be agreed and approved by your Year Tutor. Students should avoid changing options beyond the end of week 2 as it may have a detrimental effect on their study.

Programme Changes Table

Programme to change	To be approved by	Deadline to change
Straight Physics to Physics with Astrophysics	Programme Director	Start of any Semester (subject to suitable option choice)
Physics with Astrophysics to Straight Physics	Programme Director	Start of any Semester
Physics to Maths and Physics	Programme Director	Start of Year 1
Maths and Physics to Straight Physics	Programme Director	Start of Year 1, 2 and 3 (subject to suitable option choice)
Straight Physics to Physics with Theoretical Physics	Programme Director	Start of Year 1, 2 and 3 (subject to suitable option choice)
Physics with Theoretical Physics to Straight Physics	Programme Director	Start of any Year
Straight Physics to Physics with Philosophy	Programme Director	First 6 weeks of Year 1 (mid-November)
Physics with Philosophy to Straight Physics	Programme Director	Start of any Year
Straight Physics to Physics with Study in Europe	Programme Director	Start of Year 1 or Year 2 (if language qualification adequate)
Physics with Study in Europe to Straight Physics	Programme Director	Start of Year 1, 2 and 3

*Subject to the normal progression criteria (see section 10)

Option changes Table

Option to change	To be approved by	Deadline to change
Option (see section 7)	Personal Tutor	End of week 2 each semester
Option not listed in UG Handbook	Year Tutor	End of week 2 each semester
Lecture clashes in years 3 and 4	Year Tutor	End of week 2 each semester
Option changes after week 2	Year Tutor	Beyond week 3 would be detrimental to the student

The policy of the school is to make available as many appropriate options as possible subject to the constraints of the timetable. However, an option may be withdrawn if fewer than fifteen students register for it.

7.4 Changes in Course Unit Availability

When planning their studies, students should take note that changes occur in degree programmes and in the availability of course units. Section 7 details the current arrangements in each year of study. The tables list the course units which, barring unforeseen circumstances, should be in place.

7.5 The LEAP (Language Experience for All) Programme

Foreign language courses - Offered as part of the University Language Centre's institution-wide language programme (LEAP), these courses are available to students from across the University and may be studied on a credit or on a non-credit basis to complement your degree. Currently there are 17 languages, ranging from the main international languages (e.g. *French, Spanish, Arabic, Chinese, German*) to a number of lesser taught

languages (e.g. *Japanese, Hebrew, Persian, Turkish*), offered at various levels. For more information on the full range of languages and levels that are available, please consult the University Language Centre website via the link given below.

Note that the course code (e.g. ULXXn0xys) indicates the language (XX) and the level (n). Pre-requisites are listed separately for each course.

Information about these and other available units is given on the University Language Centre website - <http://www.languagecentre.manchester.ac.uk/>

You are strongly advised to read the FAQ's on the LEAP website.

Most units are year-long units counting for twenty credits and are open to undergraduates, providing that they are taking the unit as an integral part of their degree. Because of the nature of language learning, 100% attendance is expected on these courses. Students may not normally register for a language course which is more than one level beneath their own, e.g. a level 1 course in third year. Exceptions are occasionally made where the student wishes to take the course for good reason (e.g. career-related) and the Year Tutor is satisfied that the course represents a sufficient academic challenge in the light of the student's prior knowledge of foreign languages.

Undergraduate students who do not have credits available but would still like to take a language course, can do so after payment of a fee. Please see Language Centre website for further information.

Registration of Physics Students:

1st year Physics with Study in Europe students should register as soon as possible in Registration Week. Students should register in person in room S3.3 in the Samuel Alexander Building.

2nd and 3rd year students can register from April onwards either in person in the LEAP office or by post after downloading and completing a LEAP enrolment form. Lists for those students who have successfully registered by Registration Week should be posted in the Samuel Alexander Building, outside SG14.

Class lists including 1st year students will be posted early in the 1st teaching week.

Students needing general advice on language course units should contact the Study in Europe Co-ordinator.

7.6 MBS Business and Management for all programmes (BMAP)

Business and Management for all Programmes (BMAP) is a suite of about 25 undergraduate business and management courses at varying levels offered by Manchester Business School. The courses are open to all undergraduate students across the University who are eligible to take 'free choice' options as part of their degree structure, providing they meet the entry criteria for the course(s) concerned. Physics students may take units which are not more than one level below their own (e.g. 1st and 2nd year students can take level 1 courses, but 3rd year students cannot.) Further details are available at <https://www.mbs.ac.uk/study/undergraduate/>.

7.7 University College.

The University College for Interdisciplinary Learning presents an opportunity for students to broaden their educational horizons. It offers courses that showcase the research and knowledge found at the University and encourages students to go beyond the boundaries of their degree programme. See <http://www.college.manchester.ac.uk>.

Students in Physics and Astronomy who have options in second and third year may take University College Courses, subject to timetable constraints.

7.8 Study Abroad

There are opportunities for a limited number of students to study abroad at an English-language university in their third year, as part of their Manchester degree. The Study Abroad programme is available to MPhys and MMath&Phys students on all degree programmes.

There are many benefits to studying abroad:

1. It is the opportunity of a lifetime
2. It helps you grow as a person
3. It gives you a new perspective on your subject area and on higher education
4. It helps you in the job market
5. It broadens your horizons

Physics students can apply to study abroad in 3rd year. Most students apply to The University of California but students have on occasion gone to other partner universities, such as the National University of Singapore and universities in Canada. Exchanges are dependent on the availability of courses at the host university that match the Manchester core material. Available courses can change over time, and this may necessitate changes to the possible exchange partners.

Information about the Study Abroad programme is given at an open meeting in the School, during October. All second-year students are informed by email of the date of this meeting. The deadline for applications is normally in December, in the academic year before the intended exchange. Applications are made to the International Programmes Office of the University, who will allocate available places.

All applications need to be approved by the Academic Exchange Advisor. Approval depends on the proposed course of study, academic achievement, and tutorial attendance and performance.

The Study Abroad programme is academically challenging.

- *The School requires an average grade for the core Physics modules in excess of 70%.*
- *The opinion of the academic tutors will normally be sought.*
- *All students going abroad in year 3 are required to attend additional maths examples classes in S4, and satisfactory attendance and completion of coursework are required for approval to go abroad.*
- *The School reserves the right to withdraw a student from the exchange programme if the academic performance or tutorial attendance drops below these minimum levels at any time before the exchange.*

- *Students will also be withdrawn from the exchange if they fail to proceed on the MPhys programme, or if the School judges them to be at risk of failing the MPhys progression criteria during the year abroad.*

Further information about administrative aspects of the exchanges may be obtained from the International Programmes Office.

8. Assessment and Examinations

The purposes of assessment are to encourage learning, to monitor progress, to determine eligibility to proceed to subsequent years and to determine the class of the degree.

Lecture, project work and laboratory units are credit rated in a way that reflects the work needed to complete the unit satisfactorily.

- The norm for a ten-credit unit is 100 hours of work.
- Credit-rated course units are either continuously assessed or examined in January or in May/June, at the end of the semester in which they occur.
- Mid-semester tests are also used in some course units (November).

8.1 Examinations

Examinations on general physics are taken at the end of years two and three. These examinations test the ability to identify the general and basic concepts met in physics core units and to use them to solve problems. The Professional Development course unit also forms part of the assessment in year 2. It includes the vacation essay, written before the start of year two, which tests the ability to explain physical phenomena to encourage public engagement. General Physics examinations and PHYS20811/20821 including the Vacation Essay are not part of the 120 credits for the year. Nevertheless, they contribute to the marks for the year, as detailed in section 7.1.1. The second vacation essay (PHYS30811) contributes to the mark for third year.

In examination papers, a marking scheme is given as a guide to the relative importance of different parts of each question. Examiners follow these guidelines, but they may make small amendments in order to take into account how questions have been answered by the majority of students.

- No additional credit is given to students who answer more than the number of questions specified on the exam paper.
- If, for example, three questions have been answered (in whole or in part) when only two are required, then the last question attempted will be ignored.
- If you have attempted a question, but do not wish it to be marked, because you wish a later answer to be marked instead, you should cross through the unwanted attempt.
- Examiners will use their discretion to judge what constitutes an attempt.
- If students write more than one answer to the same question part, they should indicate which they wish to have marked, i.e. by putting a line through the other.
- If more than one alternative attempt remains undeleted, only the first attempt will be marked.

8.2 Examinations Schedule

Examinations are scheduled by the Examinations Team in the Student Services Centre. Exam timetabling is an extremely complex task given the large number of students taking a wide variety of courses in different schools and the necessity to avoid clashes for all students. Please note that this may mean you have exams scheduled on consecutive days or even two exams scheduled on one day (morning and afternoon). You should plan your revision and exam preparation well beforehand, and make sure that preparation for all papers is substantially completed before your first scheduled exam, as the intervals between exams may be short.

8.3 Registration for Examinations

IMPORTANT Please note: If you do not register for your course options by the Exams Office deadline your units will not appear on your exam timetable and you will not be officially registered for those exams. This

will result in a separate invigilation and exam room being required and set up by the School. This will incur an administrative fee of £75.00. Deadlines will be circulated by email. *

**If you can prove that you have encountered technical issues (screen shot etc.), this will be considered.*

8.4 Use of Calculators in Examinations

Small calculators may be used in all physics examinations. However calculators with facilities for storing and retrieving information are not permitted. In particular, calculators with a full range of alphabetic keys (i.e. A-Z) are not permitted.

Any candidate found using an unauthorised calculator in an examination will be reported for suspected cheating and the calculator will be confiscated.

8.5 MPhys and BSc degree programmes, Certificates and Diplomas

- Most students initially register for an MPhys programme.
- Whatever their initial registration, however, the point at which they need to make their final decision between BSc and MPhys is before the start of the third year.
- Eligibility to continue on the Masters programme depends on satisfying the relevant criteria at the end of the second and third years; these are more stringent than the criteria for the BSc programmes and are set out in section 9.1 and below.

MPhys and classified BSc degrees are described as being “with honours”, which is the norm for degrees in England. An ordinary BSc may be awarded to a third-year honours candidate who has failed to satisfy the requirements for third-class honours.

Students who successfully complete the first year but do not continue are eligible for a Certificate in Higher Education. Similarly after the second year a Diploma may be awarded.

Undergraduate degrees at the University of Manchester are based on the National Framework for Higher Education Qualifications (FHEQ). This framework requires students to achieve credit at every level of the

award. For a standard undergraduate programme this will normally mean passing 120 credits in each of your three or four years of study.

The University sets standards relating to your performance on every unit but also on your progression from one year to the next. Your programme and course unit specifications set out the requirements for passing the credit on individual units; however, the University requires that you pass all 120 credits in order to progress to the next year of an undergraduate degree programme.

8.6 EXAMINATIONS FAQs

What happens if I fail some units in first or second year?

- The regulations require you to pass (a mark of 40% or more) a minimum of 60 credits at the first attempt in each year, including lab.
- If you don't achieve this the Examination Board will probably withdraw you from the course.
- If you pass a minimum of 60 credits including lab, but fail up to 60 of the remaining credits, you will be able to have one more attempt at the assessment. This is known as ‘referred assessment’ and these referrals (or ‘resits’) will take place in August or early September. **ONLY FOR YEAR 1 and YEAR 2. No resits in YEAR 3 and 4.**
- If you pass a minimum of 60 credits including lab, and only ‘just’ fail some of your course units, there may be a possibility of the examination board compensating this failed credit. This means if your mark was between 30-39% the examination board is able to compensate up to a maximum of 40 credits, per year.
- Your transcript of results will show the actual mark achieved (e.g. 38C) and this will be used to calculate your final degree classification.
- If you have more than 40 credits with marks in the compensation zone, or any marks less than 30%, the exam board will probably ask you to resit all failed core courses, and any options less than 30%.

- Referred assessment will be capped at 30%, or the first attempt mark if higher, and this is the mark that will be shown on your transcript, as 30R. It is this mark that will be used to calculate your final degree classification.

What happens if I fail my resits?

- If you fail to pass 120 credits after resits (including up to 40 compensated credits), the examination board will make a decision with regard to your progression.
- This may include carrying forward a maximum of 20 credits into a subsequent year (you will have to have passed 100 credits) in order to retake these units in attendance.
- The physics exam board does not normally allow this, and very rarely for core courses. Exceptionally it may allow carrying forward option credits if your year average is high, and then it does not normally allow more than 10 credits to be carried in this way.
- Otherwise resit failure normally results in an exit award.

What if I fail units in third or fourth year?

- Compensation does not apply in third or fourth year and you will not be able to resit any failed units.
- However, you may be eligible for 'special' compensation of up to 60 credits in your final year. But a penalty may be applied and your classification reduced to below that which would have been awarded had you passed everything.

How is my degree class calculated?

- To be considered for a Bachelors degree with honours a student must have achieved 120 credits in each year of a three year programme, totalling 360 credits passed.
- Referrals or compensated fails count towards your credit total.
- See section 9 for details of the year weightings, degree class boundaries and decision-making at the boundaries.

When and how are decisions made about results and progression?

- There are normally three available assessment opportunities: January, May/June and August/September within each academic year.
- It is expected that all your attempts at referred assessment will take place in the same academic year in which the assessment was first taken.
- After the June and August assessment periods there is a meeting of the school 'Examination Board'.

8.7 Examination Board

Members of the Examination Board normally include your course unit tutors, programme directors and one or more external examiners from other universities. It is the job of the Exam Board anonymously to review all the results and make decisions on the awarding of credit, who can resit exams, and who can progress to the next year. It is also the job of the Examination Board to decide who cannot continue and may leave the University with an exit award.

External Examiners are individuals from another institution or organisation who monitor the assessment processes of the University to ensure fairness and academic standards. They ensure that assessment and examination procedures have been fairly and properly implemented and that decisions have been made after appropriate deliberation. They also ensure that standards of awards and levels of student performance are comparable with those in equivalent higher education institutions.

Some students will narrowly miss the threshold for a degree classification and so we look at their pattern of marks (Mark Distribution) and their examined work (Mark Review). If neither of these results in a recommendation for the higher class, you will be called for a *viva voce* (oral examination) as part of Mark Review.

The External Examiners for the degree programmes are:

Prof. Alan Heavens, Imperial College London

Prof. Veronica Sanz, University of Sussex

Prof. Robert Taylor, Oxford University

Please note that it is inappropriate for students to make direct contact with External Examiners under any circumstances, in particular with regards to a student's individual performance in assessments. Other appropriate mechanisms are available for students, including through the School's own procedures and committees, the University's appeals or complaints procedures and the UMSU Advice Centre. In cases where a student *does* contact an External Examiner directly, External Examiners have been requested not to respond to direct queries. Instead, External Examiners should report the matter to their School contact who will then contact the student to remind them of the other methods available for students. If students have any queries concerning this, they should contact the Teaching and Learning office.

The external examiners have asked to meet some students from all years, informally, to discuss the course in general. This will be arranged on the day of the finals examination meeting, in June 2018. The date will be available on Blackboard once confirmed. Any student still in Manchester then will be invited to meet them over lunch.

8.8 Degree Classification

The process of determining degree classification is given in section 9.

8.9 Borderline students and interviews

- Students who are borderline between classes of degree or borderline for progression to year 4 may be called for an interview. This is in order to make decisions about degree classification and to decide on progression to year 4. For details, see section 9.1.
- Dates when students may be called for interview will be communicated well in advance; it is students' responsibility to ensure that the Teaching and Learning office knows how to contact them in this period.
- This may apply to any student in year 3 or year 4.

8.10 Examination Results

Overall examination results are posted on Blackboard. Individual course unit results are accessible through the student system.

8.11 Transcripts

Official transcripts should be requested from the Student Services Centre. There is a charge for this and students should note that it usually takes around 6-8 weeks.

8.12 Mitigating Circumstances

Unfortunately students may suffer from some illness or misfortune that adversely affects their ability to complete an assessment or the results they obtain for an assessment. Therefore, the University has a Mitigating Circumstances Form and a process to support such students during these difficult times.

The Mitigating Circumstances Form should be completed by any student who experiences unpreventable or unforeseeable circumstances that could have a significant adverse effect on their academic performance either in progression to the following year or their final degree classification. Such requests will be considered by the School's Mitigating Circumstances Committee.

When making a submission for mitigation a student will be asked to specify which assessments have been affected. If something is specified on the form then the MCC will not attempt to extrapolate to cover assessments not included on the form. If a student feels that something else has been affected then they should fill in an additional request for mitigation.

We strongly recommend that you read through the advice below before submitting your form. You may also wish to refer to the <http://documents.manchester.ac.uk/display.aspx?DocID=4271> (updated June 2017).

What are 'mitigating' circumstances?

Grounds for mitigation are *unpreventable* or *unforeseeable* circumstances that could have, or did have, a significant adverse effect on the academic performance of a student. Possible mitigating circumstances include:

- significant illness or injury
- the death or critical/significant illness of a close family member/dependent
- significant family crises or major financial problems leading to acute stress
- absence for public service, e.g., jury service

Circumstances that will not normally be regarded as grounds for mitigation include:

- holidays, moving house and events that were planned or could reasonably have been expected
- assessments that are scheduled close together
- misreading the timetable or misunderstanding the requirements for assessments
- inadequate planning and time management
-
- failure, loss or theft of a computer or printer that prevents submission of work on time (students should back up work regularly and not leave completion so late that they cannot find another computer or printer)
- consequences of paid employment (except in some special cases for part-time students)
- exam stress or panic attacks not diagnosed as illness or supported by medical evidence
- disruption in an examination room during the course of an assessment which has not been recorded by the invigilators

Events may arise during pregnancy that may constitute mitigating circumstances, and these need to be judged on an individual basis.

If your circumstances are chronic and/or ongoing and relate to an illness or disability, you should register with the University's Disability Advisory and Support Service - <http://www.dso.manchester.ac.uk/> rather than submitting mitigating circumstances applications. Bear in mind that if your problems are continuing, the panel will look for reassurance that you are able to manage them in the future.

Do I need to submit supporting evidence?

Yes! All mitigating circumstances applications must be supported by independent evidence.

The nature of this documentation will vary according to the nature of the circumstances, but it must be sufficiently independent to confirm the case you are making. Examples of evidence include a signed and dated letter from a medical or health practitioner or a letter from a registered counsellor.

- Because of the importance of independent evidence, it is strongly recommended that you register with a local GP when you arrive in Manchester, even if you are an international student and plan to return home for treatment. It is vitally important that you submit your application as early as possible, and it must be supported by evidence. Guidance on finding and registering with a GP can be found on your My Manchester *Wellbeing* page <https://my.manchester.ac.uk>
- If your evidence is in a language other than English, it is your responsibility to include certified translation(s).
- Hospital attendance slips, not including any diagnosis signed by a medical practitioner, are not considered to be evidence.
- If you are unsure about the type of evidence to provide, please contact the Student Support Officer, Géraldine Garrabet Geraldine.Garrabet@manchester.ac.uk Tel: 0161 275 4100 or email physics.support@manchester.ac.uk

If supporting evidence has not been received before the Mitigating Circumstances Committee meets, your application will not normally be processed further. However, Students should still submit an application

form, to ensure that the School is aware of their situation, even if evidence is not available in time for the Mitigating Circumstances Committee to accept it. You should hand in your supporting evidence to the

Teaching and Learning reception desk. If needed, we can photocopy evidence and return the original to you. If the evidence is confidential, please put it in an envelope and mark it confidential.

Students who have a disability

There have been some changes to the assessment of applications for mitigating circumstances from students who have a disability in order to improve the support we provide.

If you need to apply for mitigating circumstances due to issues directly related to your disability, you do not need to provide any additional supporting evidence if you are registered with the Disability Advisory and Support Service (DASS). These are normally dealt with by *reasonable adjustments* to the teaching or assessment process. In cases where the reasonable adjustments have not been put in place in time, or a change, worsening or flare-up of the condition has meant that the reasonable adjustments were not sufficient, the student may apply for this to be taken into account as mitigating circumstances. You do not need to provide any additional supporting evidence. However, you *must* provide a detailed explanation of how your disability is currently affecting your studies. It is not sufficient to indicate only that you are registered with DASS. A Disability Advisor from DASS will be in liaison with the Mitigating Circumstances Committee that will consider your application.

If you need to apply for mitigating circumstances for an issue that is **not** directly related to your disability, or you have a disability but are not registered with DASS, you must provide supporting evidence (see above for details).

When should I submit my mitigating circumstances form?

1. If you have missed an examination or assessment deadline, or your performance has been affected, you should submit your mitigating circumstances application before the examination or assessment deadline or exceptionally, within 5 working days.
2. If your problems are ongoing or you feel that circumstances have affected your performance in examinations, or caused you to miss any examinations, you should submit your mitigating circumstances form by the following deadlines.

For 2017/18 academic year: Please note all claims for mitigating circumstances must be submitted in time for them to be considered by the Examinations board e.g. by the end of the examination period.

- Semester one - late deadline for issues arising during the examination period: **4pm on Monday 29th January 2018.**
- Semester two - late deadline for issues arising during the examination period: **4pm on Thursday 7th June 2018.**
- Resit period - late deadline for issues arising during the examination period: **4pm on Monday 3rd September 2018.**

Late requests for mitigation will *not* be considered without a credible and compelling explanation as to why the application was not made at the appropriate time.

Requests made after the above deadlines will be treated as appeals under Regulation XIX, but again, there should be a credible and compelling explanation why you did not bring the circumstances to the attention of your School at an earlier stage.

Academic and professional support staff are here to help you. We understand that students may be reluctant to discuss personal problems, but please note that whatever you disclose to us will be treated

confidentially. For this reason, reluctance to disclose problems cannot be considered as sufficient justification for submitting a late application for mitigating circumstances.

Personal Tutor and the Student Support & Welfare Team

- All personal tutors are provided with comprehensive guidance and advice regarding mitigating circumstances to ensure they are following the correct procedure.
- However, it is essential that you also speak with the Student Support and Welfare team in the Teaching and Learning Office in order to receive the correct information in writing.
- Just telling your personal tutor that you are ill is not considered to be supporting evidence.
- It is a student's responsibility to submit the mitigating circumstances application and ensure it complies with University and School rules.

Always submit your mitigating circumstances form as soon as you can. Do not wait for evidence before you submit your form. This should be submitted by the deadline otherwise it may not be considered.

What happens next?

Mitigating Circumstances Committee (MCC)

- The Mitigating Circumstances Committee (MCC) meets to rule on requests for mitigation. If the MCC accepts the case then the MCC proposes mitigation to the examination board.
- Mitigating Circumstances relating to coursework are normally dealt with by the relevant course tutor and reported to the MCC to ensure consistency of practice.
- At times, decisions may have to be made outside of the MCC and such cases will be dealt with by the Director of Teaching & Learning, Chief Examiner and the relevant year examiner.
- Students will be contacted and informed of their Mitigating Circumstances outcome by the Teaching and Learning team within 10 working days from when the committee meets. Remember to check your University email account regularly.

PLEASE NOTE: The decision of the panel is provisional and is reviewed by the Board of Examiners at their meeting in June or September.

Possible Mitigation

It is extremely rare for a student to be excused a full year or given a degree on the basis of previous performance. In general the MCC will attempt to give students who have accepted mitigating circumstances opportunities to retake assessments where possible within University regulations, but this is usually not possible in the 3rd and 4th years. The options discussed below are always at the discretion of the MCC and should not be considered as guaranteed even once a given circumstance is accepted. Please note, in some cases, mitigating circumstances can be flagged for consideration in future years.

- **1st and 2nd years:** In cases where accepted circumstances are localized to a particular assessment then students will normally be allowed to take the resit exam for that particular course as a first attempt if it is preventing their progression. NB. there are no resits for lab and some other continuously assessed courses. If the student has demonstrated their ability to pass a course unit, but the MCC accepts that the circumstance has had a significant effect on their performance, one or more course units may be excluded from the year average. This does not normally extend to excluding the whole year. In more serious cases, affecting a full semester or the whole year, the MCC may allow any failed courses to be re-taken as a first attempt, and others compensated. In very serious cases the MCC may advise the student to interrupt their studies in order to clear up their problems.
- **3rd and 4th years:** In cases where accepted circumstances are localized to particular assessments then students may be excused specific courses. In this case the year average is computed over all non-excused course units. In more serious cases, affecting a full semester, or if it has affected the whole year, then the MCC will review i.e. a boundary of typically not more than an additional 2%, in the

selection for viva-voce at a class borderline. In very serious cases the MCC may advise a student to interrupt their studies in order to clear up their problems.

What support is available to help me complete my application?

There are two main sources of support outside of the School of Physics and Astronomy for completion of Mitigating Circumstances applications.

Staff within The Atrium (<https://uomtheatrium.wordpress.com/>) can help you complete your application, as can the Student Union Advice Centre (<http://manchesterstudentsunion.com/top-navigation/advice-service/academic-advice/mitigating-circumstances>)

The Student Union Advice Centre has produced a booklet to guide you through the process which is available to download here.

<http://s3-eu-west-1.amazonaws.com/nusdigital/document/documents/7108/42839c8986ee8e9c51d07e0111df7162/AG2.Mitigating.Circmstances.pdf>.

We strongly advise all students to speak to their personal tutor before submitting a mitigating circumstances application. However, please note that your personal tutor will not be eligible to provide a supporting statement as evidence to support your application.

How do I submit my form?

***You can complete the Mitigating Cicumstances Online Form at
<https://apps.mhs.manchester.ac.uk/surveys/TakeSurvey.aspx?PageNumber=1&SurveyID=863J3833&Preview=true>***

Email any supporting evidence and documentation to physics.support@manchester.ac.uk before the deadline, otherwise your case may not be considered

You should bring any outstanding supporting evidence to the Teaching and Learning Office reception in the School of Physics as soon as possible after submission of the form. **Alternatively, you can email your supporting documentation to physics.support@manchester.ac.uk BEFORE the deadline.**

Teaching and Learning Office
School of Physics and Astronomy
Room 1.61
Braddick Library
Schuster Building
Brunswick Street
M13 9PL

Tel: 0161 275 4100

Email: Geraldine.Garrabet@manchester.ac.uk

Email: physics.support@manchester.ac.uk

8.14 Penalty for Late Submission of Continuous Assessment

Students should take note of the deadline set for the submission of a report, essay or other continuously assessed work. They should see the appropriate member of staff if they are uncertain about the deadline or if there are special circumstances which prevent them from meeting the deadline.

The penalty for late submission is as follows:

Work submitted after the deadline will be marked but the mark awarded will reduce progressively for each day, or part thereof by which the work is late. The mark awarded will reduce by 10 marks per day for 5 days (assuming a 0-100 marking scale), after which a mark of zero will be awarded.

Loss of marks is applied after conversion to a percentage; thus a piece of work graded at 60% which is up to one day late will be awarded 50%.

Unless specified to the contrary, this will apply to coursework for any unit with a component of continuous assessment. This includes lab reports, vacation essays, BSc dissertations and MPhys projects. Currently the only exceptions are lab interviews, PHYS20161 Introduction to Programming for Physicists and the “Mastering Physics” element of PHYS10101 Dynamics. The penalties associated with late submission in these are detailed in the corresponding syllabus pages.

For further information on late submission and how it could effect progression and graduation, please see section 9.3. Please also see the Guidance on Late Submission <http://documents.manchester.ac.uk/display.aspx?DocID=29825> and the Policy on Submission of Work for Summative Assessment <http://documents.manchester.ac.uk/display.aspx?DocID=24561>

**Please request an extension from the Student Support team if required
physics.support@manchester.ac.uk**

8.15 Plagiarism

Plagiarism is a serious offence, akin to cheating in exams. However past experience suggests that not all students realise what may constitute plagiarism. The full University guidances on the avoidance of plagiarism and other forms of academic malpractice are in the appendix to this handbook and at <http://documents.manchester.ac.uk/display.aspx?DocID=2870>

Please note in particular that both the words and the ideas in a text are the copyright of the author. The following actions are therefore plagiarism:

- Plagiarism is presenting the ideas, work or words of other people without proper, clear and unambiguous acknowledgement.
- Copying someone else's words, even as little as a sentence or phrase;
- If you include too much copied text in quotation marks, you will be marked down. It is important that you use your own words;
- Paraphrasing someone else's words but following the structure of their text;
- Using striking analogies or metaphors from someone else's text,
- Reproducing or copying images or figures without acknowledgment.
- Students should take care not to use ‘self plagiarism’ which occurs where, for example, you submit work that you have presented for assessment on a previous occasion.

If in doubt, use quotation marks and give the source explicitly; merely including the source in the bibliography is not enough. However, do not quote heavily as this will affect your mark.

Please note that it is an offence to hand in work for assessment which is based on the work performed by other students, or to allow other students to submit your work as their own for assessment.

Penalties will always be imposed; these can be as severe as the denial of a degree. Plagiarism, cheating in exams, and other student misconduct are covered by Regulation XVII, “Conduct and Discipline of Students”, which can be found at <http://documents.manchester.ac.uk/display.aspx?DocID=6530>

8.16 Academic Appeal

If a student is concerned about their examination results, this can usually be resolved by contacting their Personal Tutor, or the relevant Year Tutor.

If a student wishes to make an informal appeal, this should be submitted in writing to the Chief Examiner or Undergraduate Manager.

If the informal appeal is unsuccessful and a student decides to make a formal appeal against a decision of the Examiners, an application should be submitted in writing with supporting evidence to the Science and Engineering Faculty Officer for Appeals, Complaints and Discipline **not later than 20 working days** after the publication of the examination results. There is no provision for appeal against the academic judgement of the Examiners. An appeal may be made only on the grounds alleging:

1. That there exists or existed circumstances affecting the student's performance of which the Examiners had not been made aware when the decision was taken; or
2. That there was a material administrative error or procedural irregularity in the examination process; or
3. That there is evidence of prejudice or bias or of inadequate assessment on the part of one or more of the Examiners.

Academic Appeal is covered by Regulation XIX. Other student complaints are covered by Regulation XVIII. See

<http://documents.manchester.ac.uk/display.aspx?DocID=1872>

<http://documents.manchester.ac.uk/display.aspx?DocID=1893>

The Academic Appeals Procedure is also described on the University Teaching and Learning Support Office website.

8.17 Interruption of Studies

The expectation is that a degree course is taken over three or four consecutive years, and interruptions are exceptional.

A student who encounters circumstances which make it impossible to continue studying, (exceptional circumstances, exemplified in the University Guidance on Interruptions, Appendix 1, <http://documents.manchester.ac.uk/display.aspx?DocID=26092>) should apply to take a Short Term Absence from their studies, with the intention of resuming at a later date, not more than one year after interrupting.

An interruption may also be requested to take advantage of an opportunity, such as a placement or intern position, which would be likely to have a significant positive impact on a student's future employability or career prospects.

There is no automatic right to interrupt. Applications should be submitted to the Teaching & Learning Office, and students who wish to explore this option should contact the Student Support and Welfare Officer in the first instance. An application to interrupt must be made before the proposed leave of absence.

Applications for interruption are considered by the school Interruptions Committee, who delegate this duty to one or more members of the Committee between meetings of the Committee.

Where a student is granted an interruption for medical reasons, they must supply, prior to re-registration, a note from a healthcare professional which states that they are fit to resume their studies.

Regulations which Apply on Resumption of Studies

Students should note that permission to interrupt will be given subject to the condition that the regulations on compensation, progression, award of degree etc. will be those applying to the cohort which they join, rather than those which applied before interrupting.

Repeating all or part of a year after an application for mitigating circumstances (see section on Mitigating Circumstances above)

Note that one possible outcome of a mitigating circumstances application will be *a recommendation by the mitigating circumstances committee* for a repeat of all or some of the assessments which were affected, with or without attendance again at the course units involved. This is a distinct process from applying for an

interruption, and will be initiated by the mitigating circumstances committee, or member delegated to act on the committee's behalf.

8.18 Religious Observance and Examinations

In accordance with University Policy

(<http://www.tlso.manchester.ac.uk/map/teachinglearningassessment/assessment/sectionb-thepracticeofassessment/policyonreligiousobservance>):

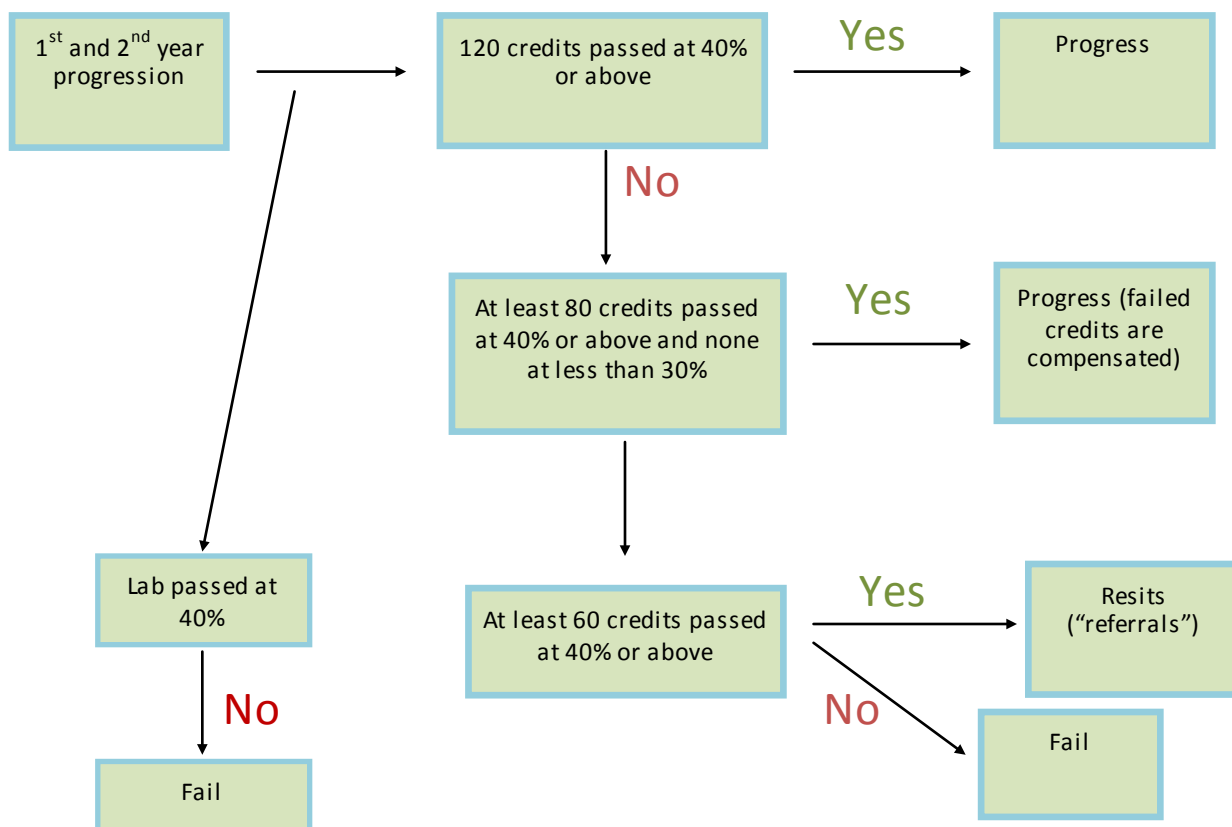
"7. If you have strict religious requirements that may affect your attendance at examinations arranged centrally, you must complete the Examination and Religious Observance form obtainable from the Student Services Centre in person or online. (Note that the major Christian festivals occur during vacations and hence are avoided automatically by examination periods.) You should then return the form to the Student Services Centre by dates that are published annually for each examination period. If you fail to submit a completed form to the Student Services Centre by the published date, we cannot accept responsibility if you are timetabled for an examination at a time when your religious requirements make it impossible for you to be present. The information about your faith is not given to anyone else, or used for any other purpose, or stored on computer.

8. Every effort will be made to accommodate your legitimate religious requirements, including discussing with your School whether it could make an alternative arrangement for the examination if you give adequate notice. However, if no reasonable alternative can be found, the University reserves the right to hold examinations on any days and times during examination periods. If that means you have to miss the examination, you will be required to take it when it is next held. This may involve an interruption of your programme and an extension to your period of study."

9. Progression and Degree Classification Regulations

9.1 Progression in 1st/2nd year

- You have to pass laboratory with a mark of 40% or above to pass the year. If you do not pass laboratory, you will be withdrawn.
- You have to pass a minimum of 60 credits at the first attempt in each year (including lab) to be allowed resits.
- If you do not pass 60 credits and have no accepted mitigating circumstances, you will be withdrawn.
- Up to 40 credits of marks below 40% but above 30% can be compensated and you do not have to resit.
- If you have more than 40 credits in the compensation zone, or any marks less than 30%, you have to resit all failed core courses and any options less than 30%.



1st year mark calculation

The year mark is the credit-weighted average over 120 credits. If you have resits, these are capped at 30% and it is the capped resit mark, or the first attempt mark if higher, which contributes to the year mark.

2nd year mark calculation

Professional Development (PHYS20811/20821) is worth the equivalent of 9 credits. The standard General Paper (PHYS20040) is worth the equivalent of 10 credits and the short version (PHYS20240) taken by Maths/Physics, Physics with Philosophy and direct entrants is worth the equivalent of 6 credits. All marks are combined into a year average using these credit weightings.

- You have to achieve a year mark of 55% or above to progress on the MPhys.
- If you achieve a mark of below 55% but above 53%, you can provisionally register on the MPhys with a review based on your Semester 5 exam results.
- If you get less than 53%, you have to change to the BSc.

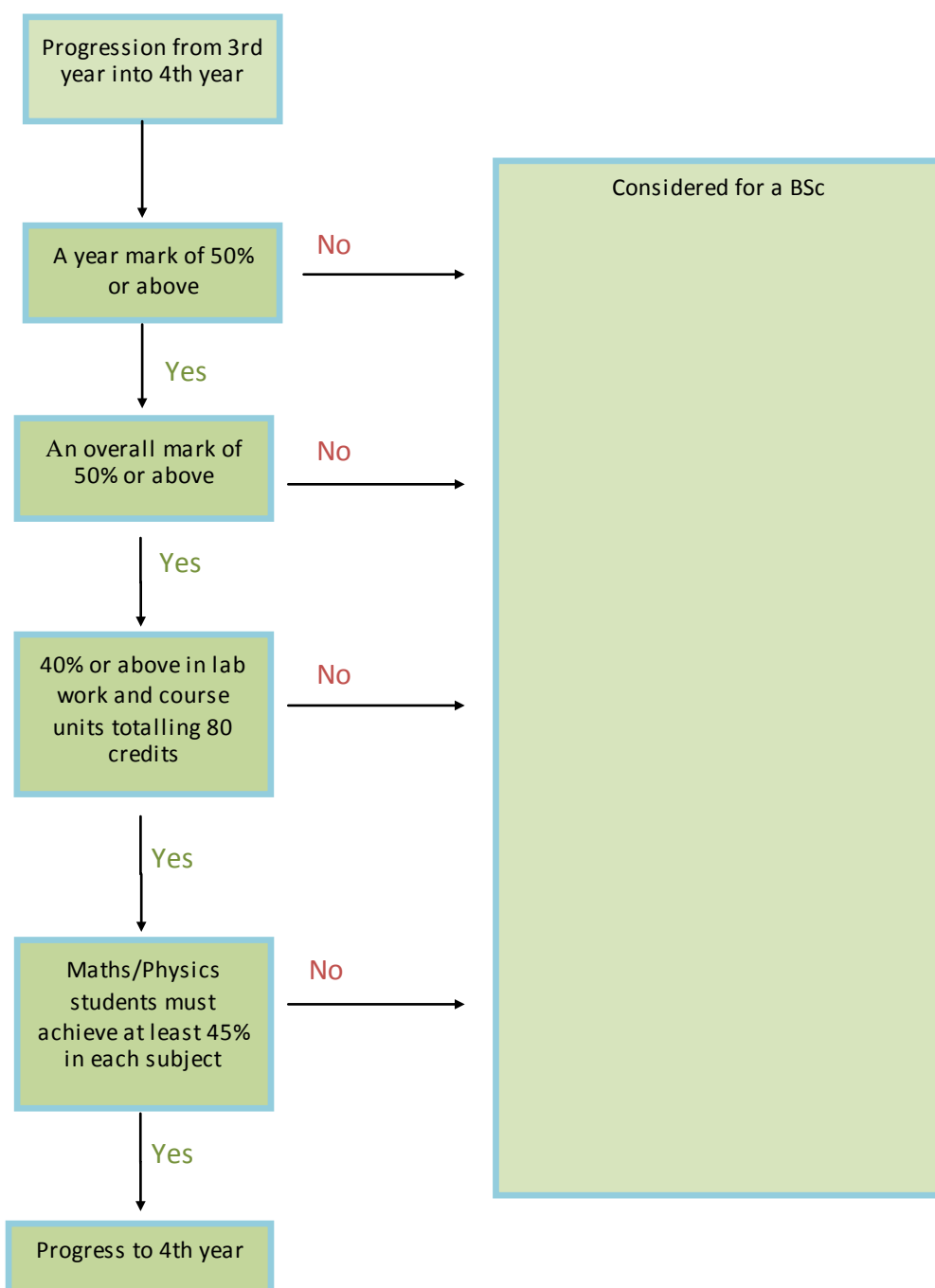
- Physics with Study in Europe students must achieve a year average of 60% or above to go abroad.

Progression in 3rd/4th Year

There are no resits for third and fourth year examinations, but there is also no minimum compensatable mark.

You can progress to the final year of the MPhys if you have:

- a year mark of 50% or above, *and*
- an overall mark of 50% or above, *and*
- 40% or above in lab work and other course units totalling 80 credits.
- Maths/Physics students must also achieve at least 45% in each subject.



3rd year mark calculation

The standard General Paper (PHYS30010) is worth the equivalent of 10 credits and the short version (PHYS30210) taken by Maths/Physics, Physics with Philosophy and direct entrants is worth the equivalent of 6 credits. The 2nd Vacation Essay (PHYS30811) is worth the equivalent of 3 credits. All marks are combined into a year average using these credit weightings.

4th year mark calculation

The year mark is the credit-weighted average over 120 or 125 credits.

9.2 Degree Classifications and Borderlines

Degree Calculation

Your credit-weighted year marks are combined as follows:

	Year 1	Year 2	Year 3	Year 4
BSc (All programmes)	10%	30%	60%	
MPhys/MMath&Phys (All programmes except Year 3 abroad)	6%	19%	37.5%	37.5%
All Programmes with Year 3 Abroad	8%	23%	23%	46%

BSc degree

A BSc student will be awarded a first, 2.1 or 2.2 degree if they have:

- an overall mark in the appropriate range:
- 70.0% or above for first class honours
- 60.0% or above for upper second class honours
- 50.0% or above for lower second class honours *and*,
- 40% or above in final year course units totalling at least 80 credits including lab and the dissertation

A BSc student will be awarded a third class degree if they have:

- an overall mark between 40.0-49.9% *and*
- 40% or above in final year course units totalling at least 60 credits, including lab work and the dissertation.

A student who has 40% or above in final year course units totalling 60 credits but less than 80, will be awarded a class of degree one lower than indicated by their overall mark (e.g. 60.0-69.9%, but with 60 or 70 credits passed is awarded a 2.2).

A student who fails to meet the criteria above may be awarded an Ordinary degree.

MPhys/MMathPhys degree

An MPhys student will be awarded a first, 2.1 or 2.2 degree if they have:

- an overall mark in the appropriate range:
- 70.0% or above for first class honours
- 60.0% or above for upper second class honours
- 50.0% or above for lower second class honours *and*,

- 40% or above in final year course units totalling at least 80 credits including project work

Students not satisfying the above criteria will be awarded a BSc on the basis of their marks in the first three years. Students on the BSc and MPhys who narrowly fail to meet the criteria for a degree class may undergo a mark review and viva voce examination.

9.3 Laboratory work/BSc Dissertation/MPhys Project work

The requirement of 40% or above in laboratory work/BSc dissertation/MPhys Project work must be met in order to progress or graduate before any late penalty is applied.

However, the late penalty mark must be applied to the year average and subsequently included in the number of credits passed in order to progress or graduate.

IMPORTANT: Submission Deadlines

Students should be aware that if they do not submit their laboratory/dissertation/MPhys projects by the agreed deadline, unless a formal extension has been agreed, their project work may not be assessed by the course leader and they will receive a mark of zero.

9.4 Consideration of candidates at borderlines

The “boundary zone” is up to 2% below the lower bound for each degree class listed above. However, the third class boundary zone is up to 3% below (i.e 37.0% -39.9%). The examiners consider marginal cases as follows:

For a student who obtains an overall mark in the boundary zone for a class and obtains the required number of credits for the final year with a mark not less than 40.0% or for a student whose degree class has been reduced because of insufficient credits passed at 40%, there will be a process in up to four stages:

STAGE / METHOD	YEAR	CLASSIFICATION/PROGRESSION	CREDITS/CRITERIA
Stage 1/METHOD A	3	BSc classification or progression to year 4	If students have gained marks for 80 or more credits in year 3 at or above the level required
Stage 1/METHOD A	4	MPhys or MMath&Phys classification	If students have gained marks for 75 or more credits in year 4 at or above the level required; then they will be awarded that class. If not, proceed to stage 2.
Stage 2/METHOD B	3,4	BSc classification or MPhys or MMath&Phys classification	1) 70 credits for the year at or above the level required, <i>and</i> 2) marks for final year project work, or dissertation, at or above the level required, <i>and</i> 3) A year average mark which is higher than the overall mark, then the external examiners have agreed that they will be recommended to be awarded that class. If not, proceed to stage 3.
Stage 3 (review of assessed work)	3,4	BSc classification or MPhys or MMath&Phys classification	The external examiners will review exam scripts, project reports etc. If they find evidence of the student's performance according to the relevant class descriptor described above, they may recommend to the

			exam board to award that class. If not, proceed to stage 4.
Stage 4 (viva voce examination)	3,4	BSc classification or MPhys or MMath&Phys classification	The external examiners will interview the student, and if they find evidence of the student's performance according to the relevant class descriptor described above, they may recommend to the exam board to award that class.

9.5 Borderline Interviews

A similar procedure will be applied to students who narrowly fail to satisfy the criteria for progression to the fourth year of MPhys or MMath&Phys. Therefore, **all** third and fourth year students may be called for an interview, and the dates of the interview will be notified in advance. **Failure to attend when invited for interview is likely to result in a recommendation for the lower class of degree, or for non-progression, as appropriate.**

9.6 School of Physics and Astronomy Scholarships and Prizes

Every year, the School of Physics and Astronomy makes a number of awards to students, subject to the availability of funds and of suitable recipients. The details and regulations of scholarships and prizes are as follows.

First Year

Heginbottom Exhibition

An award is given to the best performing student in annual examinations (including laboratory work) in the first year.

John Wiley Book Prize

The runner-up in the Heginbottom Exhibition will receive John Wiley books. This prize is administered by Prof. F. Loebinger.

Don Butler Prize

An award is given for the best performing student in 1st year laboratory.

Second Year

Hatfield Scholarship

An award is given to the best performing student at the end of second year, tenable in the third year of the degree.

Moseley Physics Prize

An award is made to the runner-up in the Hatfield Prize. The prize is normally awarded to a second year student.

Richard Davis Prize

An award is given for the best performing student in 2nd year laboratory.

Vacation Essay Prize

An award is made to the writer of the best vacation essay.

Walter Grattidge Prize

An award is made to the best performing student in the General Physics exam.

Third Year

Hatfield-Heginbottom Scholarship

An award is given to the best performing student in third year who is proceeding to MPhys.

Walter Grattidge Prize

An award is made to the best performing student in the General Physics exam.

Finals (BSc & MPhys)**Samuel Bright Research Scholarship in Physical Science**

An award is given to an MPhys Final student who is going on to do a Ph.D., not necessarily in Manchester.

Selina Bright Research Scholarship in Physical Science

An award is given to a BSc Final student who is going on to do a Ph.D., not necessarily in Manchester.

Platt Prize:

An award is given to both a BSc and an MPhys graduate for experimental work carried out in the final year of any undergraduate degree programme.

Franz Mandl Prize:

An award is given to both a BSc and an MPhys graduate for theoretical work carried out in the final year of any undergraduate degree programme.

Tessella Prize for Software

An award is given for the best use of software in an MPhys project.

University Outstanding Academic Achievement Awards

The examiners will consider nominations for these awards from amongst the students graduating with the highest overall marks.

Any Year**The Tony Phillips Prize**

An award is given to the undergraduate student who is deemed to have improved the most.

The Alison Uttley Prize

An award is given to the student who has contributed most to the life and work of the school.

The Alan Greenwood Prize

An award is given to the student who has contributed most to promoting and enhancing opportunities for equality and diversity within the school.

10. Work and Attendance Requirements

Studying at university is an activity undertaken by adults who take responsibility for ensuring that they study diligently, including attending all appropriate classes, in order to maximise the educational and learning benefit they derive from the course. Students who do this need not read the rest of this section.

However, experience shows that students sometimes need more formal encouragement to attend and work in a satisfactory manner, and the University encapsulates this formally in Regulation XX, “Monitoring Attendance and Wellbeing of Students

(<http://documents.manchester.ac.uk/display.aspx?DocID=1895>). For the purposes of the regulation, in the School of Physics and Astronomy, the “Programme Committee” is the school’s Teaching and Learning Committee, which discharges its responsibilities under this regulation by delegation to the respective Year Tutors and Year Laboratory Tutors.

You should aim to attend all lectures, laboratory classes, workshops, tutorials and examples classes associated with your programme, and the core and optional course units which you have selected. Each Year Tutor may designate attendance at certain classes as compulsory, and attendance at these classes is recorded and monitored. If you are unable to attend any such class because of poor health, you should complete a Short Term Absence form (see section 3.9).

Attendance at all your scheduled laboratory classes is compulsory, and you are required to complete experiments and submit reports as specified by the Year Laboratory Tutor. In all years, failure to reach the pass mark overall in lab (40%) means that you may not graduate or progress to the next year. There are no lab resits, so a failure in lab constitutes the end of your studies in the school. In your final year, submission of a satisfactory dissertation (BSc) or the satisfactory completion of project work (MPhys) are required in order to be awarded an honours degree.

You must hand in work in advance of tutorials to demonstrate satisfactory effort to study core course units, and you must attend all of your scheduled tutorials, workshops, examples classes and any other session designated compulsory by the Year Tutor.

Attendance at all examinations is compulsory. Any student who misses an exam for any reason whatsoever should contact the school undergraduate office immediately. (See section 3.10 for further details on what to do if illness is the reason). Any student who without good cause fails to attend all written papers in any examination period will be deemed to have withdrawn from the course.

Please note that if you are studying in the UK on a Tier 4 visa, you may be subject to additional attendance checks in order to comply with the terms of your visa.