Subject Benchmark Statement

Physics, Astronomy and Astrophysics: Draft for consultation

April 2016

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How can I use this document?

This document is a Subject Benchmark Statement for Physics, Astronomy and Astrophysics that defines what can be expected of a graduate in the subject, in terms of what they might know, do and understand at the end of their studies.

You may want to read this document if you are:

- involved in the design, delivery and review of programmes of study in Physics, Astronomy and Astrophysics or related subjects
- a prospective student thinking about studying Physics, Astronomy and Astrophysics, or a current student of the subject, to find out what may be involved
- an employer, to find out about the knowledge and skills generally expected of a graduate in Physics, Astronomy and Astrophysics.

Explanations of unfamiliar terms used in this Subject Benchmark Statement can be found in the Quality Assurance Agency for Higher Education's (QAA's) glossary.[1]

[1] The QAA glossary is available at: www.qaa.ac.uk/about-us/glossary.

About Subject Benchmark Statements

Subject Benchmark Statements form part of the UK Quality Code for Higher Education (Quality Code) which sets out the Expectations that all providers of UK higher education reviewed by QAA are required to meet.[2] They are a component of Part A: Setting and Maintaining Academic Standards, which includes the Expectation that higher education providers 'consider and take account of relevant Subject Benchmark Statements' in order to secure threshold academic standards.[3]

Subject Benchmark Statements describe the nature of study and the academic standards expected of graduates in specific subject areas, and in respect of particular qualifications. They provide a picture of what graduates in a particular subject might reasonably be expected to know, do and understand at the end of their programme of study.

Subject Benchmark Statements are used as reference points in the design, delivery and review of academic programmes. They provide general guidance for articulating the learning outcomes associated with the programme but are not intended to represent a national curriculum in a subject or to prescribe set approaches to teaching, learning or assessment. Instead, they allow for flexibility and innovation in programme design within a framework agreed by the subject community. Further guidance about programme design, development and approval, learning and teaching, assessment of students, and programme monitoring and review is available in Part B: Assuring and Enhancing Academic Quality of the Quality Code in the following Chapters:[4]

- *Chapter B1: Programme Design, Development and Approval*
- *Chapter B3: Learning and Teaching*
- *Chapter B6: Assessment of Students and the Recognition of Prior Learning*
- *Chapter B8: Programme Monitoring and Review*.

For some subject areas, higher education providers may need to consider other reference points in addition to the Subject Benchmark Statement in designing, delivering and reviewing programmes. These may include requirements set out by professional, statutory and regulatory bodies, national occupational standards and industry or employer expectations. In such cases, the Subject Benchmark Statement may provide additional guidance around academic standards not covered by these requirements.[5] The relationship between academic and professional or regulatory requirements is made clear within individual statements, but it is the responsibility of individual higher education providers to decide how they use this information. The responsibility for academic standards remains with the higher education provider who awards the degree.

Subject Benchmark Statements are written and maintained by subject specialists drawn from and acting on behalf of the subject community. The process is facilitated by QAA. In order to ensure the continuing currency of Subject Benchmark Statements, QAA initiates regular reviews of their content, five years after first publication, and every seven years subsequently.

[2] The Quality Code, available at www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code, aligns with the *Standards and Guidelines for Quality Assurance in the European Higher Education Area*, available at: www.enqa.eu/wp-content/uploads/2015/05/ESG_endorsed-with-changed-foreword.pdf.
[3] Part A: Setting and Maintaining Academic Standards, available at: www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/quality-code-part-a.
[4] Individual Chapters are available at: www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/quality-code-part-b.
[5] See further Part A: Setting and Maintaining Academic Standards, available at: www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/quality-code-part-a.

Relationship to legislation

Higher education providers are responsible for meeting the requirements of legislation and any other regulatory requirements placed upon them, for example by funding bodies. The Quality Code does not interpret legislation nor does it incorporate statutory or regulatory requirements. Sources of information about other requirements and examples of guidance and good practice are signposted within the Subject Benchmark Statement where appropriate. Higher education providers are responsible for how they use these resources.[6]

Equality and diversity

The Quality Code embeds consideration of equality and diversity matters throughout. Promoting equality involves treating everyone with equal dignity and worth, while also raising aspirations and supporting achievement for people with diverse requirements, entitlements and backgrounds. An inclusive environment for learning anticipates the varied requirements of learners, and aims to ensure that all students have equal access to educational opportunities. Higher education providers, staff and students all have a role in, and a responsibility for, promoting equality.

Equality of opportunity involves enabling access for people who have differing individual requirements as well as eliminating arbitrary and unnecessary barriers to learning. In addition, disabled students and non-disabled students are offered learning opportunities that are equally accessible to them, by means of inclusive design wherever possible and by means of reasonable individual adjustments wherever necessary.

[6] See further the *UK Quality Code for Higher Education: General Introduction*, available at: www.qaa.ac.uk/publications/information-and-guidance/publication?PubID=181.

About this Subject Benchmark Statement

This Subject Benchmark Statement refers to bachelor's degrees in Physics, Astronomy, and Astrophysics, and integrated master's degrees in Physics, designated Master of Physics (MPhys) and Master of Natural Science (MSci), and Bachelor of Science (BSc) degrees.[7]

This version of the Statement forms its third edition, following initial publication of the Subject Benchmark Statement in 2002 and review and revision in 2008.[8]

Note on alignment with higher education sector coding systems

Programmes of study which use this Subject Benchmark Statement as a reference point are generally classified under the following codes in the Joint Academic Coding System (JACS):[9]

F300 (Physics)
F310 (Applied physics)
F311 (Engineering physics)
F320 (Chemical physics)
F321 (Solid-state physics)
F330 (Environmental physics)
F331 (Atmospheric physics)
F332 (Marine physics)
F340 (Mathematical & theoretical physics)
F341 (Electromagnetism)
F342 (Quantum mechanics)
F343 (Computational physics)
F350 (Medical physics)
F351 (Radiation physics)
F360 (Optical physics)
F361 (Laser physics)
F370 (Nuclear & particle physics)
F390 (Physics not elsewhere classified)
F500 (Astronomy)
F510 (Astrophysics)
F520 (Space & planetary sciences)
F521 (Space science)
F522 (Planetary science)
F530 (Solar & solar terrestrial physics)
F540 (Astronomy observation)
F550 (Astronomy theory)
F590 (Astronomy not elsewhere classified).

Some programmes may have codes which did not appear on the JACS list at the time this statement was written, so this should be taken as an indicative rather than a complete list.

[7] Bachelor's degrees are at level 6 in *The Framework for Higher Education Qualifications in England, Wales and Northern Ireland* and level 10 in *The Framework for Qualifications of Higher Education Institutions in Scotland*, as published in *The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies*, available at: www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/qualifications.
[8] Further information is available in the *Recognition scheme for Subject Benchmark Statements*, available at: www.qaa.ac.uk/publications/information-and-guidance/publication?PubID=190.
[9] Further information about JACS is available at: www.hesa.ac.uk/content/view/1776/649.

Summary of changes from the previous Subject Benchmark Statement (2008)

This Statement has seen a number of minor revisions since the 2008 version.

The review group agreed that wholesale changes to the Statement were not needed, and concentrated on updating terminology and clarifying certain points. The importance of Mathematics has been made clearer. The description of ethical behaviour has been changed to professional behaviour and expanded to include matters beyond ethics, such as an understanding of a safe working environment.

The Statement retains a description of the typical and threshold standards for bachelor's degrees and integrated master's degrees in the subject. For integrated master's degrees, they have been simplified to remove duplication and concentrate on the additional capabilities and skills needed beyond the bachelor's level.

1 Introduction

1.1 This Subject Benchmark Statement characterises the skills and achievements that graduates of physics-based degrees have. There is a wide range of such degrees reflecting the varying aspects of the discipline. These include single honours degrees in Physics, Theoretical Physics, Applied Physics, Astrophysics and Astronomy. There are also joint and dual honours degrees in Physics where it is expected that graduates should meet the standards in this Statement. Throughout this Statement references to Physics should be considered as encompassing Astronomy and Astrophysics Programmes, unless otherwise stated.

1.2 Physics is a major subject in the UK higher education system producing highly employable graduates who play a major role in the UK economy. Physics is, however, not simply a discipline for the training of scientific personnel, but is at the core of our intellectual understanding of all aspects of nature and is the foundation of many of the sciences.

1.3 Designated Master of Physics (MPhys) and Master of Natural Science or Master in Science (MSci) are included in this Statement. An integrated master's degree is awarded after an extended programme of study which allows students to study Physics to a greater depth than is possible on a bachelor's programme and to extend the opportunities to develop their generic skills and undertake project work. These master's degrees are classified degrees that provide a coherent and broad-based education in Physics. They are to be distinguished from Master of Science (MSc) programmes in Physics, which are self-contained programmes, normally involving one or two years of postgraduate study in a specialist area. MSc programmes are not covered by this Statement.

1.4 Physics is a demanding discipline. A deep understanding of the frontiers of Physics often requires advanced knowledge, which cannot necessarily be acquired during a bachelor's or master's degree programme. This Statement has taken this into account in interpreting the generic statements of *The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies*[10] honours and master's level degree programmes.

1.5 Physics degrees will continue to evolve in response to developments in the subject and to reflect changes in the school curriculum. This Statement, therefore, concentrates on general graduate outcomes and does not specify a core Physics curriculum. The document *The Physics Degree* from the Institute of Physics is widely used as a source of guidance on possible curriculum content.

[10] Available at: www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code/qualifications

2 Nature and extent of Physics, Astronomy and Astrophysics

2.1 Physics is concerned with the observation, understanding and prediction of natural phenomena and the behaviour of fabricated systems. It deals with profound questions about the nature of the universe and with some of the most important practical, environmental and technological issues of our time. Its scope is broad and involves mathematics and theory, experiments and observations, computing and technology. Ideas and techniques from physics also drive developments in related disciplines, including Chemistry, Computing, Engineering, Materials Science, Mathematics, Medicine, Biophysics and the Life Sciences, Meteorology, Environmental Science and Statistics.

2.2 Physics is a continually evolving discipline that has theoretical, computational and experimental aspects; many physicists span these categories. It is characterised by the idea that systems can be understood by identifying a few key quantities, such as energy and momentum, and the universal principles that govern them. Part of the appeal of the subject is that there are relatively few such principles and that these apply throughout science and not just in Physics. The laws of mechanics are a good example; deduced by Newton after studying observations of planetary motion, they govern systems familiar from everyday life as well as many of the phenomena observed in the movement of stars and galaxies.

2.3 In order to make quantitative predictions, Physics uses theoretical models usually expressed in mathematical terms and often involving approximations. The types of approximation used to find satisfactory models of experimental observations turn out to be very similar whether the underlying laws are those of classical physics, statistical mechanics or quantum theory. Typically, an idealised model of some phenomenon is established, the equations for the model are solved (often with further approximations) and the results related back to what is observed experimentally. Sometimes a model turns out to be appropriate in very different circumstances. For example, the same model describes the behaviour of electrons in metals and in white dwarf stars.

2.4 Physics uses mathematical and computational techniques for analysis and simulation. A computational approach may be valuable where theoretical or experimental approaches are currently impossible or hard to achieve, for example in the study of emergent phenomena or the microscopic behaviour of systems. It can also be valuable in the analysis of large scale datasets.

2.5 Physics is an empirical science. The skills and methods used to make measurements are an integral part of physics and the final test of the validity of any theory is whether it agrees with experiment. Many important discoveries are made as the result of the development of some new experimental technique. For example, the techniques developed to liquefy helium subsequently led to the totally unexpected discovery of superconductivity, superfluidity and the whole field of low temperature physics. Instruments developed originally in Physics can find applications in other branches of science; for example, the electromagnetic radiation emitted by electron accelerators, which were originally designed to study elementary particles, is now used to study the properties of materials in Engineering, Biology and Medicine.

2.6 Progress in Physics requires imagination and creativity. It is often the result of collaboration between physicists with different backgrounds and can involve the exchange of ideas and techniques with people from outside the discipline.

2.7 Studying Physics brings benefits that last a lifetime, and knowledge and skills that are valuable outside Physics. Such benefits include a practical approach to problem solving, often using mathematical formulation and solution, the ability to reason clearly and to communicate complex ideas, information and communication technologies (ICT) and self-study skills and the pleasure and satisfaction that comes from being able to understand the latest discoveries in science. After graduation, physicists work in a wide variety of employment, including research and development in industry and academia, education, business and finance, and Government and public service, where they are sought for their pragmatic and analytical approaches to the solution of problems.

3 Subject-specific knowledge and understanding

3.1 Bachelor's degrees with honours in Physics include the more general and fundamental topics of Physics alongside a selection of more advanced topics. They also develop investigative, experimental, mathematical, computational, modelling and other generic skills. Degree programmes vary in the emphasis given to different areas of Physics. For example, theoretical Physics programmes generally include more mathematical and computational skills, usually replacing much or possibly all conventional laboratory work. Applied Physics programmes often have a technological focus. Some degree programmes offer placements in schools, higher education provider research groups or industry. Joint and dual honours programmes vary in the amount and extent of Physics content, depending on the precise definition and title of the programme in question, but still cover the fundamental topics of Physics. In addition to this, integrated master's degree programmes provide a greater depth of knowledge that is informed by current research, further development of subject-specific skills and enhanced project work.

3.2 Honours degrees Physics programmes cater for students planning to move on to research (in industry or academia), as well as for students looking for a broad-based Physics education which will make them numerate, articulate and eminently employable. The fundamentals, which all Physics degrees cover to some extent, include electromagnetism, quantum and classical mechanics, statistical physics and thermodynamics, wave phenomena and the properties of matter.

3.3 Students also study the application of the fundamental principles to particular areas. These may include (but need not be limited to) atomic physics, nuclear and particle physics, hard and soft condensed matter, medical physics, environmental physics, materials, optics, plasmas, and fluids as well as the application of Physics to other disciplines.

3.4 Astrophysics and Astronomy programmes generally include the application of physical principles to cosmology; the structure, formation and evolution of stars and galaxies, planetary systems, and high-energy phenomena in the universe. A Physics degree should equip students with skills that will enable them to develop expertise in applying physics to unfamiliar areas that they may encounter post-graduation. In addition, programmes expose students to recent research in order to develop some qualitative understanding of current developments at the frontiers of the subject.

3.5 Mathematics is an essential part of a Physics degree and students learn that Physics is a quantitative subject. Students gain sufficient mathematical skills to enable modelling of the physical world, solving problems and working with probabilities and statistics.

3.6 Physics programmes give students experience of the practical nature of Physics. They provide students with the skills necessary to plan investigations, analyse data, including estimation of inherent uncertainties and appreciation of limitations. Graduates in Physics have some appreciation of natural phenomena in an experimental context. Except for non-experimental Physics degrees where the skills identified here are gained in other, clearly specified ways, practical work is thus a vital and challenging part of a Physics degree. Students also become proficient in presenting experimental results or theoretical conclusions, and in the communication of complex data and ideas.

3.7 Open-ended project work is used to facilitate the development of students' skills in research and planning (by use of databases and published literature) and their ability to assess critically the link between theoretical results and experimental observation.

Subject-based skills, generic skills and attributes

3.8 Bachelor's and integrated master's degrees in Physics provide the opportunity for students to acquire and demonstrate a wide range of competences in both subject-specific and generic skills, of which the following are particularly relevant.

Physics skills

3.9 Physics skills include the ability to:

- i formulate and tackle problems in Physics. For example, students learn how to identify the appropriate physical principles, how and when to use special and limiting cases and order-of-magnitude estimates to guide their thinking about a problem and how to present the solution, making their assumptions and approximations explicit
- ii use Mathematics to describe the physical world. Students gain an appreciation of mathematical modelling, computing, and of the role of approximation
- iii plan, execute and report the results of an experiment or investigation
- iv use appropriate methods to analyse data, to evaluate the level of its uncertainty and to take this into account in the development of work and to relate any conclusion made to current theories of the Physics involved
- v use appropriate software such as programming languages and purpose-written packages
- vi compare critically the results of theoretical and computational modelling with those from experiment and observation.

Generic skills

3.10 Generic skills include:

- i problem-solving skills - Physics degree programmes require students to solve problems with well-defined solutions. They also allow students to gain experience in tackling open-ended problems that may cross subject boundaries. Programmes allow students to demonstrate their ability to formulate problems in precise terms and to identify key issues. They enable students to develop the confidence to try different approaches in order to make progress on challenging problems
- ii investigative skills - Physics degrees provide students with the opportunity to develop their skills of independent investigation. Students gain experience of using textbooks, and other available literature, of searching databases and the internet, and of interacting with colleagues to derive important information
- iii communication skills - Physics, and the mathematics used in Physics, deal with surprising ideas and difficult concepts; good communication is essential. A Physics degree allow students to demonstrate their ability to listen carefully, to read demanding texts, and to present complex information in a clear and concise manner to a range of different audiences
- iv analytical skills - Physics degrees help students learn the need to pay attention to detail and to demonstrate their ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly
- v ICT skills - Physics degrees provide the opportunity for students to acquire these skills in a variety of ways
- vi personal skills - Physics degrees allow students to demonstrate their ability to work both independently and in a group. Independently they are able to use their initiative, be organised and meet deadlines. In a group they are able to interact constructively as part of a team.

Professional behaviour

3.11 Physics degrees allow students to develop:

i an appreciation that to fabricate, falsify or misrepresent data or to commit plagiarism constitutes unethical scientific behaviour. A professional physicist is objective, unbiased and truthful in all aspects of their work and recognises the limits of their knowledge

ii the ability for students to identify the potential ethical issues in their work

iii where appropriate, an appreciation of intellectual property, environmental and sustainability issues

iv an understanding of what constitutes a safe working environment.

4 Teaching, learning and assessment

4.1 Physics is a hierarchical discipline that lends itself to systematic exposition and the ordered and structured acquisition of knowledge. It is also an empirical subject. Practical skills, including an appreciation of the link between theory and experiment, are developed. This leads to teaching methods that may include:

- lectures supported by problem classes and group tutorial work
- practical work
- the use of textbooks, electronic resources and other self-study materials
- open-ended project work, some of which may be team-based
- activities devoted to generic and subject-specific skills development.

4.2 The balance between these may vary between providers, programmes and modules, and will evolve with time due to advances in information technology and pedagogical thinking.

4.3 Approaches to skills development encompass both generic and subject-specific skills. It may well be most appropriate to develop both within the physics context. Development between levels of study may be evident; for example laboratory work may become open-ended with more demanding reporting criteria at the higher levels. Computer skills may include programming and the use of software packages for simulation, for computer algebra and for data analysis. Skills may also be developed in the use of computers for the control of experiments and the acquisition of data.

Assessment

4.4 A variety of assessment methods are appropriate within a physics programme, some of which are more suitable to formative assessment. Evidence of the standards achieved could be obtained from many of the following:

- time-constrained examinations
- closed-book and open-book tests
- problem based assignments
- laboratory books and reports
- observation of practical skills
- individual project reports (including placement or case-study reports)
- team project reports
- oral and/or poster presentations; possibly including seminar presentation
- viva voce interviews
- essays
- project artefacts such as computer programs or electronic circuits
- electronic media such as videos or websites
- computerised adaptive testing
- peer and self-assessment.

4.5 Examination and test questions are graded to assess a student's understanding of concepts and the ability to develop mathematical models, complete calculations, solve new problems and communicate physical arguments. Time-constrained work has its place in testing the student's capacity to organise work, as well as to think and to communicate under pressure. Such assessments may be augmented by others, such as presentations and project reports, which allow students to demonstrate what they can achieve with less severe time constraints. Skills such as project planning and execution, research skills, application of ICT and report writing, may be best assessed in this way.

4.6 The performance of an individual student may vary significantly between modules and the student's marks on some modules may not be commensurate with their overall performance. This is an inherent feature of the subject and reflects both its conceptual difficulty and the need to solve quantitative problems. In assessments that include significant amounts of problem solving, frequently requiring extensive use of mathematics, marks often span the entire range (0-100 per cent). Students towards the lower end of the performance range may fail some modules while still meeting the overall learning outcomes of the programme. Assessment regulations need to be flexible enough to take account of the variability, and providers allow examiners to judge the overall performance against the learning outcomes for the programme.

5 Benchmark standards

Introduction

5.1 All graduates with honours degrees in physics have demonstrated that they have acquired knowledge, abilities and skills in the areas identified in the previous sections, but there will inevitably exist significant differences in their level of attainment. In particular, there will be differences between the level of attainment demonstrated by a typical bachelor's graduate and a typical integrated master's graduate.

5.2 This Statement provides threshold and typical standards for both bachelor's and integrated master's degrees. However, providers expect that students demonstrate a higher level of attainment in early years in order to continue onto the later stages of an integrated master's programme. Therefore providers expect all students progressing to the final years of an integrated master's degree to meet the typical level and only rarely will an integrated master's graduate have met the threshold level only.

5.3 In discussing the range of knowledge and levels of attainment in this Section, the topics to be covered are those outlined in Section 3.

Benchmark standards for honours degrees

Threshold level

5.4 A graduate who has reached the bachelor's degree with honours threshold level has demonstrated an ability to:

i comprehend basic physical laws and principles
ii identify and use relevant principles and laws when dealing with simple problems
iii execute and analyse the results of an experiment (if on an experimental programme) or investigation. Such analysis will include the evaluation of the level of uncertainty in their results, a comparison of the results with expected outcomes, theoretical and computational models or published data and, hence, an assessment of their significance
iv safely use basic laboratory apparatus in an experimental procedure (if on an experimental programme)
v competently use appropriate ICT software packages/systems for the analysis of data, simulation of physical systems and the retrieval of appropriate information
vi undertake numerical manipulation and to present and interpret information graphically
vii communicate scientific information, in particular through scientific reports
viii manage their own learning and to make use of appropriate texts and learning materials.

Typical level

5.5 A graduate who has reached the bachelor's degree with honours typical level has demonstrated the capabilities and skills of the threshold honours degree level in 5.4 and competence in:

- i the application of physical principles to diverse areas of Physics
- ii the solution of problems in Physics by selecting and using appropriate mathematical and physical techniques
- iii making appropriate approximations when solving problems
- iv critical analysis of the results of an experiment or investigation, evaluation of their significance and setting them in context
- v the design and execution of an experiment to test a Physic's hypothesis, if on an experimental programme
- vi use of mathematical and computational techniques and analysis to model physical behaviour
- vii clear and accurate communication of scientific information
- viii management and use of research-based materials.

Benchmark standards for integrated master's degrees

Threshold level

5.6 The level of attainment required to progress on to the latter stages of an integrated master's degree means most graduates will have met the typical level capabilities described in 5.8, and few will graduate having only met the threshold level described in 5.7.

5.7 A graduate who has reached the integrated master's degree with honours threshold level has demonstrated the capabilities and skills of the typical BSc level and will have:

- i a working knowledge of a variety of experimental, mathematical and/or computational techniques applicable to current research or applications within Physics
- ii has undertaken an extended investigation and exhibited the ability to do so
- iii encountered research-level material.

Typical level

5.8 A graduate who has reached the integrated master's degree with honours typical level has demonstrated the capabilities and skills of the integrated master's threshold level and an ability to:

- i apply fundamental laws and principles to a variety of areas in Physics, some of which are at (or are informed by) the forefront of the discipline
- ii solve advanced research informed problems in Physics
- iii interpret and contextualised mathematical descriptions of physical phenomena
- iv demonstrate some originality during an extended investigation
- v show the competent use of specialised equipment or research grade software or methods
- vi master new techniques in a theoretical, computational or experimental context
- vii communicate complex scientific ideas, the conclusions of an experiment, investigation or project concisely, accurately and informatively
- viii plan and execute an open-ended extended research project
- ix demonstrate an understanding of scientific research and propose realistic suggestions as to how it may progress further.

Appendix: Membership of the benchmarking and review groups for the Subject Benchmark Statement for Physics, Astronomy and Astrophysics

Membership of the review group for the Subject Benchmark Statement for Physics, Astronomy and Astrophysics (2015)

Professor Michael Edmunds (Chair)	Cardiff University
Robyn Henriegel	Institute of Physics
Dr Mark Everitt	Loughborough University
Professor Alan Fitzsimmons	Queen's University, Belfast
Professor Robert Lambourne	The Open University
Dr David Sands	University of Hull

Student Reader
Karl Nordström

QAA Officer

Simon Bullock	Quality Assurance Agency for Higher Education

Membership of the review group for the Subject Benchmark Statement for Physics, Astronomy and Astrophysics (2008)

Details provided below are as published in the second edition of the Subject Benchmark Statement.

Dr Nick d'Ambrumenil	University of Warwick
Dr Richard Bacon	University of Surrey
Professor Susan Cooper	University of Oxford
Professor Michael Edmunds (Chair)	Cardiff University
Robyn Henriegel (Secretary)	Institute of Physics
Professor James Hough	University of Hertfordshire
Dr Robert Lambourne	The Open University
Professor Andrew Long	University of Glasgow
Professor Peter Main	Institute of Physics
Professor Richard Thompson	Imperial College London
Dr Alison Voice	University of Leeds

Membership of the original benchmark statement group for Physics, Astronomy and Astrophysics (2002)

Details below are as published in the original Subject Benchmark Statement for Physics, Astronomy and Astrophysics.

Dr Nick d'Ambrumenil	University of Warwick
Dr Craig Adam	Staffordshire University (now at University of Keele)
Professor Mick Brown	University of Cambridge
Mr Philip Diamond (Secretary)	Institute of Physics
Professor Michael Edmunds	University of Wales, Cardiff
Professor Peter Main	University of Nottingham
Dr Tony Phillips	University of Manchester
Professor David Saxon	University of Glasgow
Dr Edward Slade (Chair)	University of Keele (until July 2001)
Dr Alison Voice	University of Leeds
Dr Robin Walker	University of Bristol
Dr Nicola Wilkin	University of Birmingham
Professor John Young	Sheffield Hallam University

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