Subject Benchmark Statement

Materials: Draft for consultation

April 2016

Contents

How can I use this document?

This document is a Subject Benchmark Statement for Materials 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 Materials or related subjects
- a prospective student thinking about studying Materials, 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 Materials.

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 (for example BSc, BEng) and integrated master's (for example MEng, MSci) degrees in Materials.[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 2007.[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]

F131 (Crystallography)
F161 (Polymer chemistry)
F200 (Materials science)
F290 (Materials science not elsewhere classified)
F321 (Solid-state physics)
H161 (Biomaterials)
J200 (Metallurgy)
J210 (Applied metallurgy)
J220 (Metallic fabrication)
J230 (Corrosion technology)
J290 (Metallurgy not otherwise classified)
J300 (Ceramics and glasses)
J400 (Polymers and textiles)
J410 (Polymers technology)
J420 (Textiles technology)
J500 (Materials technology not otherwise specified)
J510 (Materials technology)
J511 (Engineering materials)
H161 (Biomaterials)
B890 (Medical technology not elsewhere classified).

Summary of changes from the previous Subject Benchmark Statement (2007)

This Statement has seen a number of revisions since the 2007 version.

While the 2016 review group agreed that major changes to the statement were unnecessary, the introduction was expanded to account for the full breadth of the subject. The section on the nature and extent of Materials was updated to better reflect core features of modern Materials programmes such as characterisation and simulation, and the fields and industries within which graduates may work.

---

[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.

The three main parts of the Knowledge, understanding and skills section were revised and the lists of skills were updated.

1 Introduction

1.1 Materials science and engineering is an interdisciplinary subject combining Chemistry, Physics and increasingly Biology with Engineering so as to understand what makes any specific material, from graphene to wood, behave in a particular way.

1.2 This understanding, or materials know-how, is generally achieved through the study of how a material's chemical and physical characteristics, from the atomic level to the macro-structural (engineering) level, combine to control all aspects of a material's properties, from its ability to efficiently harvest energy from sunlight or direct bone regeneration around a hip replacement, to its suitability for use in the construction of a low impact, carbon neutral house or the International Space Station.

1.3 Key to this field is the knowledge that the route used to synthesise or fabricate a material (ie processing) will also significantly impact its chemical and physical structure, and thus the characteristics and performance of the material. Knowledge of this processing-structure-property relationship is exploited to fine tune a material's behaviour, to model its performance under specific environmental conditions and in the discovery and design of new materials.

1.4 This Statement is primarily concerned with honours degree programmes with a major materials science or materials engineering component. However, parts are applicable to interdisciplinary programmes with a minor materials component and to taught master's programmes with significant materials science or engineering content.

1.5 Accreditation of particular programmes by the professional engineering institutions, for their own membership requirements, is an entirely separate exercise, but this statement is intended to assist professional institutes during the accreditation and programme review process. This statement, revised in 2016, is primarily concerned with the bachelor's degree with honours and with integrated master's (for example MEng, MSci) degrees which are required to complete the academic requirements for the achievement of Incorporated Engineer (IEng) and Chartered Engineer (CEng) status in accordance with the United Kingdom Standards for Professional Engineering Competence (UK-SPEC) published by the Engineering Council UK[10] and Chartered Scientist (CSci) status in accordance with the United Kingdom Standards for Chartered Scientist Status as published by the Science Council UK.[11]

[10] Available at: www.engc.org.uk.
[11] Available at: www.sciencecouncil.org.

2 Nature and extent of Materials

2.1 The academic study of Materials links the natural sciences[12] (at length scales from nm to mm) with engineering applications (at length scales from cm to km). At the core of the subject is how the (bio)chemical composition and physical microstructure of a material can be understood and, hence, designed or controlled by processing in order to optimally fulfil an engineering application.

2.2 The range of programmes to which this Statement applies is diverse and extends from science-based to engineering-based programmes.

2.3 Materials science is predominantly concerned with the relationships between the microstructure and composition of a material and its physical, chemical and mechanical properties; it generally uses imaging, characterisation and simulation tools to achieve these aims. On the other hand, Materials Engineering seeks to design or optimise a particular microstructure or composition, through synthesis, processing, manufacture or modelling in order to meet an engineering or product need. Materials Engineering and Materials Science are strongly interlinked and cannot be delivered in isolation, although a particular taught programme may choose to emphasise these two aspects differently.

2.4 Materials are central to the socio-economic well-being of the country. Materials scientists and engineers help to develop the materials required for new products, improve and lower the cost of manufacturing routes, and enhance the performance of existing materials. They consider the environmental impact and sustainability of their products. They discover how to optimise the selection of materials and create sophisticated models and databases from which properties and service behaviour can be predicted.

2.5 Materials scientists and engineers may be employed in a wide range of industrial and commercial sectors, with careers in manufacturing, research, product or process development, production management, consultancy and technical sales as well as education. As Materials science and engineering is a broad underpinning subject, Materials graduates may be involved with advanced transport systems (aircraft, automotive and high-speed rail), healthcare (implant materials, diagnostic methods and medical devices), energy generation (efficient thermal, photovoltaic, nuclear, wind), forensics, high-performance sports equipment, environmental protection (recycling and pollution control), electronics (from consumer products to novel smart devices) as well as many more traditional sectors (materials production, construction, packaging and domestic goods).

[12] Principally physics and chemistry, but also increasingly some biology.

3 Knowledge, understanding and skills

Introduction

3.1 This Section describes the knowledge, skills and attributes that Materials graduates are expected to possess, and includes reference to Materials-specific aspects, background science and generic skills. The knowledge and skills are grouped into Materials-related, scientific and engineering, and generic.

Materials-related knowledge and skills

3.2 Materials programmes may be general or specialist, theoretical or applied. Degree programmes offered by individual providers may vary considerably. However, it is expected that Materials graduates have an awareness of the full range of materials including metals, alloys, composites, ceramics, polymers, glasses and biomaterials.

3.3 A key to the application of Materials is to understand the links between structure and properties, and between processing and structure. Hence Materials graduates have the ability to choose materials, and their synthesis/fabrication routes, in order to provide desired properties.

3.4 Materials graduates are also familiar with at least a majority of the concepts under each of the following headings:

Structure

- i atomic bonding, crystalline lattices, defects and disorder, amorphous materials
- ii phase equilibria and phase transformations, multiphase materials, thermodynamic and kinetic aspects
- iii structure on the nano, micro, meso and macro scales.

Properties

- i mechanical behaviour - elastic and plastic deformation, creep and fatigue, fracture, strengthening, toughening and stiffening mechanisms
- ii functional behaviour - electrical, optical and magnetic properties, and their control through composition and structure, biocompatibility and its control through composition and structure.

Characterisation

- i structural characterisation - optical and electron microscopy techniques, electron and X-ray diffraction, scanning probe techniques, thermal analysis
- ii compositional analysis - spectroscopic methods (electron/X-ray probe/ infra-red/ultra-violet techniques), chemical analysis
- iii mechanical test methods, continuum mechanics
- iv techniques for determining electrical, optical and magnetic properties
- v functional analysis - biocompatibility testing (acellular, cellular, in vivo), accelerated ageing, environmental wear testing.

Modelling and simulation

- i computational simulation of materials across the length-scales and corresponding time-scales, from atomistic (classical and quantum) to finite elements.

Processing

i materials synthesis - vapour, liquid, colloidal, powder and solid-state deposition techniques
ii bulk processing, heat and mass transfer, fluid mechanics
iii joining methods, surface treatment and the application of coatings
iv layered and additive manufacturing techniques, including the creation of 'intelligent' products by incorporating sensors and so on.

Application

i materials design - compositional and processing selection to achieve required microstructures, and hence properties
ii materials selection - consideration of all material types, materials processing methods, and product costs
iii degradation/durability of materials - effect of environment upon performance, corrosion, wear, biodegradation
iv lifecycle analysis, and sustainability and environmental impact.

3.5 Materials graduates have had opportunities, through practical work, for first-hand experience of a range of techniques and materials (artefact analysis, characterisation, processing, computational simulation, testing and so on) designed to develop the ability to plan, implement and interpret experimental investigations.

Scientific and engineering-related knowledge and skills

3.6 In order to understand the Materials topics discussed above, Materials graduates need to acquire an adequate knowledge of mathematics and science to prepare a foundation for learning within the subject. Examples of these requirements are given below. It is not expected that Materials graduates have studied all of these (for example biology). Materials graduates also need to acquire adequate engineering knowledge and skills in order to understand aspects of materials production and service and to be able to communicate effectively within the engineering profession at large.

3.7 Such requirements include:

i **mathematics**: fluency in mathematics, and familiarity with a range of mathematical and computational methods, for expressing the laws of science, for formulating and solving problems, for experimental design and for assessing and presenting experimental data including competency in probability and statistics
ii **chemistry**: an adequate understanding of organic, inorganic and physical chemistry to support a range of Materials subjects. Thermodynamics and kinetics are essential components, alongside chemical characterisation techniques, and chemical aspects of materials production, processing, stability and degradation
iii **physics**: a broad foundation in physics for understanding and characterising materials' structures and properties, including solid-state physics, waves and optics, electronics and mechanics
iv **biology**: appropriate understanding of biology where required to support programmes which include aspects of biomaterials or tissue engineering (for example basic cellular structure and function, protein structure, physiology, pathology, regenerative medicine and so on)
v **engineering principles**: including design, manufacturing and processing.

Generic skills/graduate expectations (specific to Materials)

3.8 Those graduating with a degree in Materials have good professional judgement, be able to exercise critical thought, and, having gained experience, take responsibility for the direction of important tasks. In order to demonstrate these skills they need to possess:

- i the ability to communicate in writing, orally and using graphical representations
- ii the ability to demonstrate critical thinking in reviewing the state of the art and in the analysis of experimental data both in isolation and in the context of the wider literature
- iii the relevant mathematical and computational skills
- iv problem-solving skills
- v competence in using information technology effectively
- vi the ability to work in a team and an awareness of functions required for organisational success
- vii the ability to manage time, resources, projects and finances
- viii study skills needed for planning, monitoring and recording continuing professional development
- ix an awareness of sustainability and environmental issues
- x ethical aspects
- xi entrepreneurship and an awareness of issues related to intellectual property and its protection.

3.9 In addition to the above, graduates would generally have had opportunities to tackle open-ended problems which provide opportunities to demonstrate problem-solving skills, creativity, leadership and team working. These activities would also embed aspects of ethics, health, safety and environmental considerations.

4 Teaching, learning and assessment

Teaching and learning

4.1 Existing Materials programmes have been developed over many years and deploy a diverse range of teaching, learning and assessment methods to enhance and reinforce the student learning experience. The programmes covered by this Statement encompass a wide range of types of material and are offered through many modes and patterns of study. Teaching, learning and assessment methodologies are justified in terms of the learning outcomes of the programmes and the background of the students. The methods used are made explicit to the students taking each programme, and evaluated regularly (and modified where appropriate) in response to generic and subject-specific developments.

4.2 Programme design is informed by research, scholarship and an understanding of the potential destinations of graduates. It is not possible for students to achieve a satisfactory understanding of Materials science and Engineering without significant exposure to laboratory work and without undertaking a substantial project. The programme develops in graduates both independence of thought and the ability to work effectively in a team. Where appropriate, all teaching is placed within the context of social, legal, environmental and economic factors relevant to the production and use of materials.

Assessment

4.3 Methods of assessment reflect the specified learning outcomes. A balance is struck between the need to test a student's understanding, knowledge and ability for the purposes of awarding a qualification and providing an appropriate and valuable incentive to student development. Where possible, assessment methods reflect the demands that graduates are likely to face in their future careers, including problem solving and the need to express technical material clearly and accurately in writing. An important element of assessment is that students are given feedback to allow continuing personal development.

4.4 Examples of teaching and assessment methods which might be appropriate for use within Materials programmes are given in Appendix 1. However, these lists are not intended to be either prescriptive or comprehensive, since imaginative innovation in teaching often plays a large role in motivating students and expanding their interest in the subject.

Project work

4.5 Materials graduates are expected to have carried out a group (minimum requirement for bachelor's level) or individual project (minimum requirement for master's level). These projects develop competence in investigating, managing and applying knowledge, usually in the solution of a complex materials problem. Such a project is described in a report, which demonstrates the abilities to:

- demonstrate understanding of the published literature on the topic of the investigation encompassing both what is known and the limits of current knowledge
- utilise critical analysis in the evaluation of the current literature
- formulate the problem in appropriate terms and select appropriate methodologies to undertake investigation
- present findings in a clear and concise manner
- analyse findings qualitatively and quantitatively as appropriate, and use appropriate statistical methods to assess the uncertainty of any quantitative results
- critically interpret and discuss findings in the light of current knowledge
- summarise the main conclusions and provide an accurate synopsis of the work undertaken.

4.6 Team working and experience of leadership on a project is a necessary requirement for MEng and for CEng registration according to the UK-SPEC.

Professional experience

4.7 The opportunity to gain experience in a professional environment during the degree is highly recommended. This may be acquired via, for example, speakers from industry and commerce, Materials-related work placements, site visits, and participation in external projects. Materials graduates are also familiar with the organisation and structure of business, the relevant legislative requirements and ethical professional behaviour.

5 Benchmark standards

5.1 The standards of student achievement are divided into three attainment levels: excellent; typical; and threshold for a bachelor's degree with honours in Materials.

Benchmark standards for honours degrees

Attainment level: threshold

i Understanding of the subject and techniques is basic and selective. There is a recognition of what generic knowledge should apply to a new situation, but there may be less confidence in how to use it. The methodology for solving problems can be explained even if it cannot be applied. New knowledge is acquired with perseverance.

ii Routine calculations, explanations, interpretations and analysis can be identified but may require checking and assistance to complete the task. There is general competence in answering questions concerning routine aspects. There is selective knowledge of terms and their application. Some assistance may be required in explaining fundamental concepts. Mistakes can be identified, but not necessarily rectified.

iii Project or practical work is planned and executed with reasonable success but writing up may require help. The full significance of the results may not be immediately identified and some assistance may be required in their interpretation and discussion. A list of essential literature may be quoted without critical analysis. There is an indication of future work.

iv Practical or relevant competence is selective, but may be good in specific areas.

v Generic skills may be good in certain aspects.

5.2 A graduate at this level would be a good potential trainee for either a technical or general management position. After an appropriate period of professional experience, the graduate is likely to develop into a good practitioner in a specific field, where an awareness of materials is essential but without the need to apply fundamental knowledge on a regular basis, for example production control.

Attainment level: typical

i Understanding of the subject and techniques is good, but generally confined to the information provided in the programme. There is an understanding of what knowledge and techniques can be applied to new situations. The methodology for solving problems can be clearly demonstrated. New knowledge is readily acquired.

ii Routine calculations, explanations, interpretations and analysis are executed accurately. Understanding of relevant facts and techniques is good. There is a fluency and confidence in the method of approach over most of the subject.

iii Project or practical work is planned, executed and written up with guidance. Results are analysed and discussed in a competent manner. There is good understanding of literature and relevant practice with suggestions for future work.

iv Practical or relevant competence is demonstrated over most of the range expected. The ability to innovate is demonstrated.

v Students have good generic skills and time-management ability.

5.3 After an appropriate period of professional experience, the graduate would become a good practitioner capable of exercising sound judgement. Career prospects could include research, innovation or technical management, with the expectation of significant managerial responsibility and the possibility of achieving a senior management position.

Attainment level: excellent

i Understanding of the subject and techniques is extensive, extending beyond the information provided in the programme. Knowledge and techniques are applied quickly and readily to new situations, including any unseen or open-ended problems. Both the problem and the solution can be critically appraised. New knowledge is acquired quickly and accurately.

ii Routine calculations, explanations, interpretations and analysis are executed swiftly and accurately. Understanding of relevant facts and techniques is excellent. There is a fluency and confidence in the method of approach.

iii Project or practical work is planned, executed and written up with little assistance. There is clear evidence of critical thinking in the analysis and discussion of results, with excellent understanding of literature and of relevant practice. There is a clear plan of future work.

iv Practical (or relevant) competence is clearly demonstrated. The ability to innovate is also clearly demonstrated.

v Students have excellent generic skills and time-management ability.

5.4 A graduate at this level would be a highly sought-after honours graduate. After an appropriate period of professional experience, the graduate would become an excellent practitioner capable of exercising sound judgement. Career prospects could include research, innovation or technical management with the expectation of significant managerial responsibility. There is likely to be rapid progress to a senior executive position.

Integrated master's (MEng, MSci)

5.5 An MEng or MSci is an integrated master's programme in engineering which provides an extended and enhanced programme of study, it is usually designed with reference to UK-SPEC or the Science Council CSci standards as a preparation for professional practice and attracts the more able student. The period of study is usually equivalent to at least four years of academic learning (five years in Scotland) and the programme of study is both broader and deeper than a corresponding bachelor's degree with honours and has an increased emphasis on industrial relevance.

5.6 MEng or MSci students undertake both an individual research/design project and a more wide-ranging group project with strong industrial involvement, and undertake master's level work at the higher levels of the programmes, with more industrially-focused or advanced specialist interest modules in the fourth year. MEng and MSci students also have good generic skills, with particular emphasis on critical thinking and leadership. Further guidance can be found in the Subject Benchmark Statement for Engineering (2015)[13].

Threshold performance for integrated master's (MEng, MSci)

5.7 As above, with greater attainment in fundamental knowledge and generic skills. MEng or MSci graduates reach at least the typical attainment level and would not be able to progress within/onto the master's programme if this attainment level is not met.

[13] The Subject Benchmark Statement for Engineering can be found at http://www.qaa.ac.uk/publications/information-and-guidance/publication?PubID=2910

Appendix 1: Examples of teaching and assessment methods

This appendix contains examples of teaching and assessment methods which may be appropriate for specific elements of Materials programmes. The lists are intended to be illustrative and not exhaustive.

Teaching/study methods

Formal lectures
Interactive lectures
One-to-one tutorials
Small group tutorials
Laboratory classes - structured or open-ended
Examples classes
E-learning tools
Guided reading
Student study groups
Peer mentoring
Library/information retrieval tasks
Field trips/works visits
Training during work placements
Case studies
Problem-based learning
Individual projects
Team projects
Reflective journals
Concept mapping

Assessment methods

Timed examinations
Open-book or untimed examinations
Laboratory examinations
Oral examinations
Computer-aided assessment
Problem-solving tasks
Essays
Oral presentations
Poster presentations
Laboratory reports
Work-placement reports
Learning logs/portfolios
Project reports
Self-assessment
Peer assessments
Critical review of literature

Appendix 2: Membership of the benchmarking and review groups for the Subject Benchmark Statement for Materials

Membership of the review group for the Subject Benchmark Statement for Materials (2015)

Dr Cris Arnold	Swansea University
Dr Zoe Barber	University of Cambridge
Professor Peter Haynes (Chair)	Imperial College London
Dr Karin Hing	Queen Mary University of London
Professor Stuart Lyon	University of Manchester
Professor Rachel Thomson	Loughborough University

QAA officer

Simon Bullock	Quality Assurance Agency for Higher Education

Membership of the review group for the Subject Benchmark Statement for Materials (2007)

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

The revision to this Subject Benchmark Statement was coordinated by:

Professor Peter J Goodhew	University of Liverpool
Emeritus Professor Frank Robert Sale	University of Manchester

The review involved extensive consultation across the sector.

Membership of the original benchmark statement group for Materials (2002)

Details below are as published in the original Subject Benchmark Statement for Materials (2002).

Dr Cris Arnold	University of Wales, Swansea
Dr Chris Bowen	University of Bath
Professor Robert Freer	University of Manchester Institute of Science and Technology
Professor Peter Goodhew (Vice-Chair)	University of Liverpool
Dr Marianne Gilbert	Loughborough University
Dr Henry McShane	Imperial College, London
Professor Panos Tsakiropoulos	University of Surrey
Dr John Parker	University of Sheffield
Professor Frank Sale (Chair)	University of Manchester
Dr Ray Smith	Queen Mary and Westfield University, London
Dr John Sykes	University of Oxford
Dr Michael Wise	Tetronics Ltd, Faringdon, Oxon (previously University of Birmingham)

QAA1537 - April 2016

Tel: 01452 557 050
Web: www.qaa.ac.uk