

# rae2008

Research Assessment Exercise

# Research Assessment Exercise 2008: the outcome

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## 2008 Research Assessment Exercise: the outcome

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### Contents

	Page
Summary	2
A Introduction	3
B Overview of RAE2008	5
C Description of the RAE results	8
D Other published material from RAE2008	9
E Units of assessment	10
F Results: the quality profiles for each unit of assessment	21
G Annexes	
Annex A Quality profile	99
Annex B Core data in submissions	101
Annex C RAE2008 Units of assessment and main panels	103
Annex D National comparative data	105
Index of submissions by institution	111

## Summary

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This document reports the results of the 2008 Research Assessment Exercise (RAE2008), the sixth assessment in this current format of the quality of research conducted in UK higher education institutions. The UK funding bodies for England, Northern Ireland, Scotland and Wales will use the RAE2008 results to distribute funding for research from 2009-10.

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## A Introduction

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1. The results of the 2008 Research Assessment Exercise (RAE2008) provide evidence of the continuing high quality and international standing of research carried out in higher education institutions (HEIs) in the UK.

2. The results show that excellent research is conducted in many diverse institutions and departments of all sizes: the RAE2008 process has clearly recognised excellence wherever it exists. The assessment process was able to take account not only of the diversity of institutions in the UK higher education sector, but also the broad range of research activity undertaken: across the spectrum of applied and practice-based research, research informing policy, and basic/strategic research, wherever it is conducted. Assessment panels were able to take full account of the range of interdisciplinary and multidisciplinary research submitted.

3. Of the 2,363 submissions<sup>1</sup> received, and considering the overall quality profiles which are presented in blocks of 5%:

- in aggregate, across the exercise as a whole, 17% of submitted research activity was judged to be of world-leading quality, and 37% internationally excellent
- 84% of all submissions were judged to contain at least 5% world-leading quality research
- 150 of the 159 HEIs that took part in RAE2008 demonstrated at least 5% world-leading quality research in one or more of their submissions
- 9% of submissions were judged to contain at least 50% internationally excellent or world-leading quality research activity with the rest internationally recognised quality
- 49 HEIs have at least 5% world-leading quality research in all of their submissions.

4. In producing a quality profile for each submission rather than a single-point rating, RAE2008 assessment panels have been able to recognise the breadth of research quality evident in many departments and groups in UK

universities and colleges, including some world-leading research, in many submissions.

5. The results follow an expert review process conducted throughout 2008. Research in all subjects was assessed against agreed quality standards within a common framework that recognised appropriate variations between subjects in terms of both the research submitted and the assessment criteria. The expert review process was thorough, comprehensive and effective in producing robust outcomes, and justified the considerable effort that panels made.

### Key changes since RAE2001

6. In RAE2001 a single-point rating was awarded for each submission on a scale from 1 to 5\*. RAE2008 results are presented as quality profiles. The introduction of the quality profile has lessened the averaging effect of single-point ratings by allowing panels to exercise a finer degree of judgment, especially at grade boundaries. The quality profile was helpful in identifying pockets of high-quality research wherever these may be located. Quality profiles present the breadth of quality in each submission and will reduce any 'cliff-edge' effects in subsequent funding allocations.

7. Panels operated in a two-tier panel structure, with main panels coordinating and advising on the work of sub-panels within cognate disciplines. Each of the 15 main panels (A-O) worked with a broadly cognate group of no fewer than three sub-panels. The main panels provided leadership and guidance to the sub-panels in producing criteria for assessment and working methods. They worked closely with the sub-panels to ensure the consistent application of quality standards, common procedures and equal opportunities guidance during the assessment phase. International members of main panels played an important role in verifying and endorsing sub-panels' application of the world-leading quality criterion.

8. Changes in equalities legislation since 2001 were observed. All panels took account of these in drafting and adopting their criteria and working

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<sup>1</sup> There were 2,344 submissions from 159 HEIs. However, for these analyses joint submissions are treated as individual submissions and are therefore counted more than once.

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methods, and HEIs were required to make their submissions, including decisions about which staff to include, in line with the relevant legislation (see paragraphs 27-28). Panels reported very favourably on the evidence in submissions of much high-quality work undertaken by early career researchers, which they judged as a positive indicator of the sustainability of research in the UK.

### **The main panels' role in promoting consistency**

9. The main panels provided:

- a. Support to sub-panels within their remit to ensure that they developed and published broadly consistent criteria and working methods, while allowing for appropriate degrees of subject variation.
- b. Rigour in applying international quality standards.
- c. Advice on the coherent and consistent application of the published criteria in assessing all forms of research.

10. In 2006, each main and sub-panel published a statement describing its working methods and assessment criteria (RAE 01/2006, 'Panel criteria and working methods'), following a consultation in summer 2005.

11. All main panels benefited from the expertise of one or more international panel members. As practising researchers with a high level of knowledge and expertise in research across a broad discipline area internationally, including substantial experience in at least one country outside the UK, international members offered perspectives on the international context for and standards of research in the subjects covered by the main panels.

12. All research, whether applied, basic or strategic, was given equal weight, and all forms of output were treated on an equitable basis. Panels gave full recognition to the quality of work of direct relevance to commerce and industry, as well as to the health, public and voluntary sectors. Where appropriate, panels included research users and practitioners from these sectors.

13. Consistency in the application of quality levels and standards across all subject areas was discussed in a series of main panel chair meetings held throughout the assessment phase.

## B Overview of RAE2008

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14. RAE2008 was conducted jointly by the Higher Education Funding Council for England (HEFCE), the Scottish Further and Higher Education Funding Council (SFC), the Higher Education Funding Council for Wales (HEFCW) and the Department for Employment and Learning, Northern Ireland (DEL). It was managed by the RAE team, based at HEFCE, on behalf of the four UK higher education funding bodies.

15. The primary purpose of RAE2008 was to produce quality profiles (see Annex A) for each submission of research activity made by institutions. The four higher education funding bodies will use the quality profiles to allocate their grant for research to the institutions which they fund with effect from 2009-10. Any HEI in the UK that is eligible to receive research funding from one of these bodies was eligible to participate.

16. As in previous exercises, eligible HEIs were invited to submit their research activity for assessment. Submissions were made to a number of subject-based units of assessment (UOAs). HEIs were able to choose which of their staff to include in submissions, and which UOAs to enter: consequently the results for a particular UOA may represent only a subset of the total quantum of research being conducted in that UOA in the UK.

17. The information supplied by HEIs provided the basis for an expert review assessment of research quality by specialist panels. Panels assessed the research outputs, research environment, and esteem indicators in each submission. They developed a sub-profile for each of these three elements of the submission. The sub-profiles were then weighted according to the percentages specified in the published panel criteria and working methods (RAE 01/2006), and combined to create an overall quality profile.

18. Overall quality profiles are presented in blocks of 5%, using cumulative rounding. Therefore, very small proportions (ie, less than 5%) of research assessed at particular quality levels are not shown in the overall quality profile.

### Definition of research

19. The definition of research that applied in the exercise, as set out in 'Guidance on submissions' (RAE 03/2005), is as follows:

'Research' for the purpose of the RAE is to be understood as original investigation undertaken in order to gain knowledge and understanding. It includes work of direct relevance to the needs of commerce, industry, and to the public and voluntary sectors; scholarship\*; the invention and generation of ideas, images, performances, artefacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction. It excludes routine testing and routine analysis of materials, components and processes such as for the maintenance of national standards, as distinct from the development of new analytical techniques. It also excludes the development of teaching materials that do not embody original research.

\* Scholarship for the RAE is defined as the creation, development and maintenance of the intellectual infrastructure of subjects and disciplines, in forms such as dictionaries, scholarly editions, catalogues and contributions to major research databases.

20. Each panel's assessment criteria stated how it would deal with interdisciplinary research. Sub-panels considered requests from HEIs for parts of submissions to be cross-referred to other panels for advice. Sub-panels could also request cross-referral of parts of submissions to other sub-panels. Having received advice following cross-referral, the original sub-panel retained responsibility for the quality profile awarded.

21. Panels discussed the assessment of pedagogic research outputs in their criteria, and at a workshop in June 2006 attended by panel members from a wide range of disciplines. Basic principles to ensure equitable assessment of pedagogic research were circulated to all panels and published in the 'Policies and procedures' section of the RAE2008 web-site.

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## Submissions

22. Submissions were made in a standard form that included both quantitative and descriptive elements. Full details of the contents of, and arrangements for making, submissions were published in 'Guidance on submissions' (RAE 03/2005).
23. For RAE2008, 2,344 submissions were received from 159 HEIs, listing the work of more than 50,000 researchers.
24. The census date for the exercise was 31 October 2007. Institutions were invited to provide information on staff in post on that date, and on research outputs that they had produced during the assessment period. The assessment period was 1 January 2001 to 31 July 2007. The submission deadline was noon on 30 November 2007. After this point data were only amended as a result of data verification and audit procedures.
25. Institutions were invited to list up to four research outputs for each individual (Category A or C) whose research was to be assessed. Research outputs could be any form of available assessable output. Items eligible for submission had to be publicly available between 1 January 2001 and 31 December 2007. Confidential outputs were also eligible if they could be made available for assessment: they had to be lodged with the body to whom they were confidential between 1 January 2001 and 31 December 2007.
26. Details of the data collected in submissions and staff categories are in Annex B.

## Code of practice and equalities legislation

27. Each HEI was required to develop, adopt and document an appropriate internal code of practice in preparing its submissions and selecting staff for inclusion that attended to all relevant equal opportunities legislation in force on the submission date. In making their submissions, HEIs confirmed that they had met this requirement.
28. Panels were briefed twice on equalities legislation relevant to the exercise, via two guidance documents published in 2005 and 2007, (RAE 02/2005, 'Equality briefing for panel chairs,

members and secretaries'; RAE 02/2007, 'Updated equality briefing for panel chairs, members, advisors and secretaries'). All panels considered individual staff circumstances presented in submissions and used these to inform their assessments accordingly and in line with their published criteria and working methods.

## Verification of submitted data

29. The data supplied by HEIs for assessment were, on the whole, robust. All information provided in submissions underwent a process of checking and verification. Submissions were compared with other available datasets, including bibliographic resources, returns from the Higher Education Statistics Agency (HESA), and information held by the Research Councils. Since the basis of return for each of these datasets is different, an exact match was not expected. However, where there appeared to be major differences between the returns, further investigation was undertaken. In addition, at least one submission from each HEI was selected at random for audit. For HEIs making larger numbers of submissions or with higher volumes of staff, up to four submissions were audited.
30. HEIs were required to supply extracts from their payroll and personnel records, student and graduation records, finance records and such other information as was necessary to verify the data in their RAE submissions. Panel members were also asked to draw attention to any areas of concern in submissions, and all such concerns were investigated. Where necessary, submissions were amended and panels were supplied with the corrected information.

## Assessment process

31. The assessment process was based on expert review undertaken by specialist panels comprising academics and users of research. Assessment panels used their professional judgment to form a view about the overall quality of the research activity described in each submission, taking into account all the evidence presented. They formed their judgments in accordance with the statements of criteria and working methods

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published in advance in 'Panel criteria and working methods' (RAE 01/2006).

32. Panels were concerned only with the quality of the work submitted for assessment. In reaching their judgments, they only considered information available to them in the submission or provided as a result of data verification queries. In assessing research outputs, panels looked for evidence of quality irrespective of place or mode of dissemination.

33. Sixty-seven sub-panels conducted a detailed assessment of submissions within 67 UOAs. They worked under the guidance of 15 main panels. For each submission assessed, each sub-panel provided a provisional quality profile to the main panel for endorsement. Panels assessed submissions between January and November 2008. Although this expert review process was resource-intensive it was effective in ensuring a thorough and reliable outcome.

34. The UOAs are listed in Annex C. Some UOAs were reconfigured from the 2001 RAE, as described in RAE 03/2004, 'Units of assessment and recruitment of panel members'. A description of each UOA was published in 'Panel criteria and working methods' (RAE 01/2006) and is repeated, for ease of reference, in Section E.

35. Recruitment of the assessment panels, the method of their selection, and an account of their role and operation, are described in RAE 03/2004, 'Units of assessment and recruitment of panel members'. Panel members were nominated by appropriate nominating bodies, including learned societies and subject groups. Where appropriate, non-academic users of research – including those from industry, the healthcare and voluntary sectors, the professions and Government – sat on panels alongside academics. The membership of each panel was published in RAE 03/2007, 'Membership of RAE2008 panels'; an update of the membership is also available at [www.rae.ac.uk](http://www.rae.ac.uk) under Panels.

36. Sub-panels could request that parts of submissions, including but not limited to interdisciplinary research, were referred to specialist advisors if they believed that would

enhance the assessment process. Over 800 specialist advisors were appointed to a pool of advisors for the RAE2008 but not all of them were used. All specialist advisors were nominated by an appropriate nominating body.

37. Each main panel and its associated sub-panels were supported by a regular secretariat that advised the panels on applying their working methods and criteria and ensured consistency of approach. During the assessment phase, the secretariat for each main panel consisted of:

- a. A full-time panel secretary.
- b. A part-time panel advisor.

Where possible, the secretariat members were seconded from HEIs. A small number were appointed by the funding bodies.

38. Panels considered the material submitted in sufficient detail to be able to agree an overall quality profile presented in blocks of 5%, which represented their assessment of the quality of research in the department described in the submission. In developing the sub-profiles for research outputs, research environment and indicators of esteem, panels considered the information submitted at a level of detail necessary to fulfil their published criteria and working methods.

39. Each sub-panel indicated in its criteria and working methods the proportion of research outputs included in submissions that would be assessed in detail. The process of recording judgements required that in all cases panels assessed in detail at least the minimum specified in their published panel criteria and working methods (RAE 01/2006). Similarly, where a sub-panel's criteria were explicit that it would attribute a proportion of its assessment of research environment or indicators of esteem to particular features of the submission, this was built into its assessment methodology.

## C Description of the RAE results

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40. The RAE quality profiles present in blocks of 5% the proportion of each submission judged by the panels to have met each of the quality levels defined in Table 1. Work that fell below national quality or was not recognised as research was unclassified.

Table 1 **Definitions of quality levels**

4*	Quality that is world-leading in terms of originality, significance and rigour.
3*	Quality that is internationally excellent in terms of originality, significance and rigour but which nonetheless falls short of the highest standards of excellence.
2*	Quality that is recognised internationally in terms of originality, significance and rigour.
1*	Quality that is recognised nationally in terms of originality, significance and rigour.
Unclassified	Quality that falls below the standard of nationally recognised work. Or work which does not meet the published definition of research for the purposes of this assessment.

41. The ‘international’ criterion equates to a level of excellence that it was reasonable to expect for the UOA, even though there may be no current examples of such a level in the UK or elsewhere. It should be noted that ‘national’ and ‘international’ refer to standards, not to the nature or geographical scope of particular subjects.

42. The results are published as a series of tables, one for each UOA. Each table contains the quality profile awarded to each HEI that made a

submission to the UOA concerned. Alongside each submission’s quality profile is the full-time equivalent (FTE) number<sup>2</sup> of Category A<sup>3</sup> staff included in that submission. We have also presented results ordered by institution on the RAE web-site at [www.rae.ac.uk](http://www.rae.ac.uk).

43. Where the quality profile awarded is to a joint submission made by two or more HEIs, this is noted in the relevant UOA table.

44. National comparative data are included in Annex D. For each UOA, this gives the average quality profile of all submissions to the UOA (mean average, weighted for staff volume); and the minimum, lower quartile, median, upper quartile and maximum percentage for each quality level from 4\* to unclassified.

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<sup>2</sup> The FTE numbers of staff included in these tables is a snapshot taken at the end of the assessment phase (November 2008).

<sup>3</sup> Annex B defines Category A staff. Submissions from the Universities of Cambridge and Oxford could include college-employed research-active staff as Category A staff.

## D Other published material from RAE2008

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45. In addition to the results published in this document, the following material will be provided in confidence to HEIs:

- a. On 5 January 2009, each sub-profile (research outputs, research environment, esteem indicators) for each submission made by that HEI.
- b. On 5 January 2009, written feedback giving a reasoned case for the profile awarded to each submission.

46. In addition to the results published in this document, the following data relating to the results will be published on the RAE2008 web-site, [www.rae.ac.uk](http://www.rae.ac.uk):

- a. On 18 December 2008, a database of the results.
- b. On 5 January 2009, a short report by each sub-panel. These subject overview reports will make general observations about the subject based on the submissions made to that panel's UOA, including on perceived strengths, weakness and trends in the field(s) of work assessed. These may be accompanied by a statement from the main panel.
- c. In spring 2009, those parts of submissions that contain factual data and textual information about the research activity. This will include the names of selected staff and the listings of their research output. Personal and contractual details, and where relevant, items marked as confidential, will not be published. Institutions have been given an opportunity to indicate any details that should be omitted from the published list for reasons of confidentiality. The submissions will be published in the spring of 2009.
- d. In spring 2009, sub-profiles (research outputs, research environment, esteem indicators) for all submissions other than those with less than three members of staff.
- e. In spring 2009, the procedural minutes for each panel meeting held during the assessment phase.

47. A full publications schedule for the RAE2008 is available on the RAE web-site under Publications.

## **E Units of assessment**

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48. Each UOA is described below. This information is derived from the panel criteria and working methods statement of the relevant panel; any deviations from the criteria published in 2006 are to denote the exercise is complete. Full details of the coverage of each UOA may be found in RAE 01/2006, 'Panel criteria and working methods'.

### **UOA 1 Cardiovascular Medicine**

The UOA includes research into all aspects of cardiovascular science.

The UOA includes work where the primary focus of the research is in cardiovascular science, including basic science, epidemiology and clinical research. The UOA includes research where the focus is vascular aspects of stroke, and metabolic research where the focus is cardiovascular disease.

### **UOA 2 Cancer Studies**

The UOA includes research into all aspects of cancer, including laboratory and clinical studies.

The UOA covers the full range of research in this area, for example: basic cancer research, including cell and molecular biology, molecular genetics, immunology, physical sciences, cancer pathology; translational research including the full range of therapeutic strategies, eg, cancer pharmacology and drug development, radiation oncology, immunological, surgical and gene therapies; prevention strategies; epidemiology; palliative care in cancer and related fields; and clinical trials that relate to any aspect of the study of cancer as a disease.

### **UOA 3 Infection and Immunology**

The UOA includes research into all aspects of infection and immunology, and their cognate sub-disciplines.

The UOA includes research into infection and immunology, including basic and applied research on infectious disease and causative organisms including discovery, epidemiology, development and assessment of interventions; basic and clinical immunology including innate and adaptive

immunology and pathogenesis, allergy, auto-immunity, immunotherapy and immune suppression.

### **UOA 4 Other Hospital Based Clinical Subjects**

The UOA includes research into all aspects of hospital based clinical subjects and their cognate sub-disciplines excluding bodies of research more explicitly linked to UOA 1 (Cardiovascular Medicine), UOA 2 (Cancer Studies), UOA 3 (Infection and Immunology), UOA 5 (Other Laboratory Based Clinical Subjects), UOA 9 (Psychiatry, Neuroscience and Clinical Psychology), UOA 14 (Biological Sciences) and UOA 15 (Pre-clinical and Human Biological Sciences).

### **UOA 5 Other Laboratory Based Clinical Subjects**

The UOA includes research into all aspects of laboratory-based science associated with the study of human health and disease.

The UOA includes aetiology, pathogenesis, detection, intervention and monitoring of disease, and work where the primary focus is laboratory research that is not more readily related to the boundaries of UOAs within Main Panel A, or UOA 14, Biological Sciences.

### **UOA 6 Epidemiology and Public Health**

The UOA includes: public health research; epidemiology (including clinical epidemiology); medical statistics and biostatistics; and aspects of a number of other disciplines which have public health relevance, including medical sociology, population genetics, clinical trials, health economics, demography, modelling, health protection and international public health.

### **UOA 7 Health Services Research**

The UOA includes: research that can be applied, theoretical and methodological. It focuses on healthcare, healthcare systems, services and policy. Health services research informs decision making

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in healthcare, health services and policy, and may include research from any healthcare discipline including: medical sociology, medical statistics and biostatistics, health psychology, clinical psychology, health economics, modelling, clinical trial methodology and organisation, community-based clinical trials, medical anthropology, medical geography, medical ethics, medical education, healthcare policy evaluation, health service organisation and management, health technology assessment, patient experience, clinical epidemiology and decision analysis, methodologies for complex interventions and health informatics.

### **UOA 8 Primary Care and Other Community Based Clinical Subjects**

The UOA covers research that is focused on, in, or for primary care. The research may be applied, theoretical or methodological. It may include: anthropology, clinical trials, demography, epidemiology, ethics, healthcare organisation and management research, health economics, health services research, operational research and modelling (in the health context), psychology, sociology, statistics and multidisciplinary and/or multi-professional research where the main focus of work is primary care.

### **UOA 9 Psychiatry, Neuroscience and Clinical Psychology**

The UOA includes: psychiatry and its sub-specialities, neuroscience and its clinical sub-specialities, clinical psychology and its sub-specialities, and any aspects of science that are applicable or clinically relevant to these subjects.

### **UOA 10 Dentistry**

The UOA includes: research in basic and applied dental and craniofacial sciences including restorative dentistry (comprising prosthodontics, conservative (operative) dentistry, endodontology and periodontology), oral and maxillofacial surgery, orthodontics, paediatric dentistry, oral medicine, oral pathology, oral microbiology,

dental diagnostic sciences, dental special needs, dental public health, primary dental care, health services research (to include methodological work on quantitative and/or qualitative methods), dental education, biomaterials sciences and other such sciences relevant to dentistry.

### **UOA 11 Nursing and Midwifery**

The UOA includes research activity relevant to: the disciplines of nursing and midwifery; specialist community public health nursing; and all the contexts within which they operate, including policy, practice, education and management.

### **UOA 12 Allied Health Professions and Studies**

The UOA includes (but is not limited to): biomedical sciences; nutrition and dietetics; optometry and orthoptics; radiography; podiatry; occupational therapy; physiotherapy; speech and language therapy; arts therapies; health promotion; psychosocial and ethical aspects of health and healthcare; associated health services research (to include methodological work on quantitative or qualitative procedures).

### **UOA 13 Pharmacy**

The UOA includes research in pharmaceutical sciences, clinical pharmacy and pharmacy practice, including but not limited to pharmaceuticals, drug delivery, medicinal chemistry and drug design, natural product chemistry, pharmaceutical biochemistry, xenobiotic metabolism and toxicology, pharmaceutical microbiology, receptor biology and modes of drug action, pharmacogenomics, radiopharmacy, pharmacokinetics, pharmacoepidemiology, pharmaceutical analysis, pharmacoconomics, pharmaceutical technology, pharmaceutical materials science (as it relates to medical devices and medicinal products), sciences underpinning the discovery and development of medicines, health services and policy research (including health economics) applied to pharmacy and medicines, pharmaceutical public health, and pharmaceutical workforce and education.

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## **UOA 14 Biological Sciences**

The UOA includes research that encompasses the full spectrum of the basic and applied biology of micro-organisms, plants and animals from the molecular to the ecosystem level.

## **UOA 15 Pre-clinical and Human Biological Sciences**

The UOA covers all biomedical sciences including biochemistry, physiology, pharmacology and anatomy at the genetic, molecular, cell, organ system and whole organism level. It includes work relevant to all organ systems, including the nervous and cardiovascular systems, that is ultimately directed towards understanding human health.

## **UOA 16 Agriculture, Veterinary and Food Science**

The UOA includes all aspects of agricultural, veterinary and food science, including basic through to applied research, and interdisciplinary research with a significant content in any of these areas of science.

## **UOA 17 Earth Systems and Environmental Sciences**

The UOA encompasses earth, environmental and planetary sciences, including: geophysics; geochemistry; palaeontology; geology; mineral physics; planetology; cosmochemistry; earth surface processes; the physics, chemistry and biology of the environment including ecology; atmospheric, oceanic and freshwater sciences; global change; natural resources; and scientific aspects of environmental management, including pollution and conservation.

## **UOA 18 Chemistry**

The UOA includes all aspects of experimental and theoretical chemistry.

## **UOA 19 Physics**

The UOA includes theoretical, computational and experimental studies of: quantum physics; atomic, molecular and optical physics; plasma

physics; particle physics and nuclear physics; surface and interface physics; condensed matter and soft matter physics; biophysics; semiconductors, nanoscale physics, lasers, optoelectronics and photonics; magnetism, superconductivity and quantum fluids; fluid dynamics; statistical mechanics, chaotic and nonlinear systems; astronomy and astrophysics, planetary and atmospheric physics; cosmology and relativity; medical physics; applied physics; chemical physics; instrumentation; pedagogic research in physics.

## **UOA 20 Pure Mathematics**

The UOA includes, but is not restricted to, algebra, analysis, category theory, combinatorics, computational complexity, dynamical systems, geometry, mathematical logic, number theory, ordinary differential equations, operator theory and operator algebras, partial differential equations, probability, stochastic analysis and topology.

## **UOA 21 Applied Mathematics**

The UOA includes the development of, the analysis of, and the solution or approximate solution of problems arising from mathematical models of phenomena in physical and biological sciences, engineering, industry and finance, or any other area outside mathematics, and the development and application of mathematical theories and techniques that further these objectives. Associated experimental and computational studies are included.

## **UOA 22 Statistics and Operational Research**

The UOA includes methodological, applied and theoretical research in statistics, probability and the more mathematical aspects of operational research.

## **UOA 23 Computer Science and Informatics**

The UOA includes the study of methods for acquiring, storing, processing, communicating and reasoning about information, and the role of

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interactivity in natural and artificial systems, through the implementation, organisation and use of computer hardware, software and other resources. The subjects are characterised by the rigorous application of analysis, experimentation and design.

### **UOA 24 Electrical and Electronic Engineering**

The UOA includes research carried out in all areas of electrical and electronic engineering.

The UOA includes all areas of electrical and electronic engineering, including but not limited to: communications; electronic materials and devices; microelectromechanical systems (MEMS) and nanoelectronics; bioelectronics; electronic systems and circuits; optoelectronics and optical communications systems; communications and networks; multimedia; video and audio processing and coding; signal and image processing, modelling and estimation; radio frequency (RF) techniques up to terahertz; antennae and radar; measurement, instrumentation, sensors; control, robotics and systems engineering; electrical power systems, machines and drives; power electronics; computer and software engineering. The UOA also includes pedagogic research in electrical and electronic engineering.

### **UOA 25 General Engineering and Mineral & Mining Engineering**

The UOA includes: any multidisciplinary and interdisciplinary engineering research; mineral and mining engineering; and submissions from departments or centres which include two or more of the main branches of engineering, ie, chemical, civil, electrical and electronic, metallurgy and materials, mechanical, aero and manufacturing engineering. The UOA includes multidisciplinary areas such as offshore technology, renewable energy/energy conversion, industrial studies, medical engineering, bioengineering and environmental engineering. It also includes pedagogic research in engineering.

### **UOA 26 Chemical Engineering**

Chemical engineering includes product and process engineering, biochemical and biomedical engineering, fuel technology and energy engineering, environmental and systems engineering, food process engineering, and pedagogic research in chemical engineering.

### **UOA 27 Civil Engineering**

The UOA includes (but not exclusively): construction; design; infrastructure management; fluid mechanics; hydraulics and hydrology; computational mechanics and informatics; structures and materials; surveying; transportation; geotechnical and geoenvironmental engineering; environmental management (including water, waste and contamination); offshore and coastal engineering; including extreme events, impact of and adaptability to global change, sustainability, safety and risk assessment aspects of the above. It also includes pedagogic research in civil engineering.

### **UOA 28 Mechanical, Aeronautical and Manufacturing Engineering**

The UOA includes engineering research in: acoustics; aeronautical engineering; automotive engineering; bio-medical engineering; computational methods; control; dynamics; design; failure analysis; fluid power; fluid mechanics; fluidics; heat transfer; manufacturing (technology, processes and systems); engineering management; physical ergonomics; materials; material processing; maritime engineering; mechatronics; optical engineering; process engineering; solid mechanics; systems engineering; thermodynamics; turbomachinery and propulsion; and vibration. It also includes pedagogic research in mechanical, manufacturing and aeronautical engineering.

### **UOA 29 Metallurgy and Materials**

The Metallurgy and Materials UOA includes research into both fundamental and applied

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aspects of the study of the structure, properties, manufacture, processing and applications (and their interrelationships) of all categories and forms of materials. It also includes pedagogic research in metallurgy and materials.

### **UOA 30 Architecture and the Built Environment**

The UOA covers all forms of research that are relevant to the built environment, including research in architecture, building science and building engineering, construction, landscape, surveying, urbanism, and other research in which the built environment (including its operation and use) forms a major field for application or provides the context for research.

### **UOA 31 Town and Country Planning**

The UOA includes: the theory, analysis, policy, practice and governance of spatial planning, environment, communities, property markets, housing and transport; and their substantive knowledge fields.

### **UOA 32 Geography and Environmental Studies**

The UOA includes all aspects of research – conceptual, substantive and applied – conducted within the disciplines of geography and environmental studies, as broadly defined. This research embraces a wide range of enquiries into natural, environmental and human phenomena, and their interrelationships in particular systems, contexts and locations. It includes the fields of physical and human geography (eg, geomorphology, biogeography, Quaternary science; and economic, social, cultural and historical geography), as well as those of environmental geography and environmental studies (eg, environmental governance, management and economics). It includes work on the history of geographical and environmental enquiry, as well as on technologies that are central to some research in geography and environmental studies, such as remote sensing and geospatial

analyses. The UOA is therefore broadly based in its intellectual scope and substantive content, and is inherently interdisciplinary.

### **UOA 33 Archaeology**

The UOA covers archaeological theory and historiography, archaeology of human origins, and prehistoric and historic societies worldwide. This includes early civilisations, Egyptology, classical archaeology and related historical studies, medieval and post-medieval archaeology, colonial and industrial archaeology, landscape and environmental archaeology, archaeological science, public archaeology, archaeological aspects of heritage management and museum studies, pedagogic research in archaeology, and archaeological conservation.

### **UOA 34 Economics and Econometrics**

The UOA includes all aspects of economics and econometrics (including, where appropriate, economic history).

### **UOA 35 Accounting and Finance**

The UOA includes accounting and finance in all its forms. The research areas and sub-areas covered include, but are not confined to: accounting education, accounting history, accounting theory, auditing, accounting and computing; accounting and government, public sector and not-for-profit organisations; behavioural finance, computational finance, corporate finance, corporate governance; critical, social and environmental accounting; finance theory, financial accounting and reporting, financial econometrics, financial institutions, financial management, financial markets, financial mathematics, international accounting, international finance, management accounting, managerial finance, market-based accounting research, methodology and methods, studies of the accounting profession, taxation, treasury management; and other aspects of accounting and finance.

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## **UOA 36 Business and Management Studies**

The Business and Management Studies UOA consists of the areas of: accounting and finance, business history, business and industrial economics, employment relations, entrepreneurship and small firms, human resource management, information management, innovation and technology management, international business, management education and development, management science, marketing, operations management, organisational psychology, organisational studies, public sector management, service management, strategic management; and any other field or sub-field aligned to business and management.

## **UOA 37 Library and Information Management**

The UOA includes disciplines concerned with the management of information and knowledge in all formats, namely librarianship and information science, archives and records management, and information systems. This may include: research on the generation, dissemination and publication, exploitation and evaluation of information and knowledge; information policy; the information society; information media; information literacy; systems thinking; systems development; knowledge management systems; information retrieval; preservation and conservation; impact assessment; and historical and cultural aspects of the disciplines. The UOA includes research into the learning and teaching process in the disciplines.

## **UOA 38 Law**

The UOA includes all doctrinal, theoretical, empirical, comparative or other studies of law and legal phenomena including criminology.

## **UOA 39 Politics and International Studies**

The UOA includes (but is not restricted to): comparative, area, national and sub-national politics; public administration and policy studies, including science and technology policy; political

behaviour and political sociology, including gender; political theory and philosophy, including history of political thought; international relations, including strategic, war and peace studies, international history, international political economy and foreign policy analysis; methods in political studies; and HE pedagogic research in politics and international studies.

## **UOA 40 Social Work and Social Policy & Administration**

The UOA covers all forms of social work and social policy and administration, including governmental, voluntary and community, and private for profit and not for profit. Research in this area covers:

- a. Theory, methodology, ethics and values and pedagogy as they apply to social work, social care, social policy, criminology and criminal justice policy, and substantive issues in these areas of study.
- b. Comparative research and research into international institutions, policy and practice.
- c. Relevant links with other disciplines – most importantly demography, development studies, economics, education, health studies, history, law, politics, psychology and sociology – and with other stakeholders, professionals, service users and carers.
- d. Policy-making processes, practice, governance and management, service design, delivery and use, and inter-professional relationships.

## **UOA 41 Sociology**

The UOA includes quantitative and qualitative, empirical and theoretical study of the social structures, cultures and everyday practices of societies, including styles and material standards of living, opinions, values, and institutions. It covers all areas of social theory, historical and comparative studies, and social research methodology, philosophy of social science, and research on pedagogy in sociology.

The UOA includes women's studies.

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## **UOA 42 Anthropology**

Anthropology is understood to include the broad fields of biological anthropology, and social and cultural anthropology (including material culture studies, anthropology of development, visual anthropology, performance studies, area studies and medical anthropology).

## **UOA 43 Development Studies**

The UOA covers issue-driven research concerning the analysis of global and local processes of cultural, demographic, economic, environmental, political, technological and social change in low and middle income parts of the world, with particular reference to structures and institutions; the changing relationships between developed and developing countries; and the critical interrogation of theories of these processes and relationships, and of development policy.

## **UOA 44 Psychology**

The UOA includes: all branches of applied psychology (including clinical, counselling, educational, ergonomics, forensic, health, human factors and occupational psychology); all areas of biological psychology (including animal learning, behavioural and cognitive neuroscience, comparative and evolutionary psychology, psychopharmacology, and psychophysiology); critical psychology; developmental psychology; all areas of human experimental psychology (including cognition, perception, and psycholinguistics); individual differences; mathematical and statistical psychology; neuropsychology; qualitative psychology; social psychology. It includes psychologically relevant areas of neuroscience and cognitive science.

## **UOA 45 Education**

Research in education is multidisciplinary and closely related to a range of other disciplines with which it shares blurred boundaries. The Education UOA and its associated communities of users may be broadly described as concerned

with research in the areas identified in the following illustrative and non-exhaustive lists:

- a. Research which focuses on education systems including: pre-school, primary, secondary, further, higher, teacher or other professional, adult, continuing, vocational and community education or training; informal learning; work-based learning, lifelong learning.
- b. Research which addresses substantive areas such as: assessment, curriculum, teaching, pedagogy, learning, inter-professional education, information and communication technology in education, special educational needs; curricular areas; comparative, international and development education; education and industry; education policy; organisation, governance and management; social exclusion/inclusion and equity issues.
- c. Research which employs qualitative and quantitative methodologies drawn from a variety of disciplinary traditions (including but not limited to applied linguistics, economics, geography, history, humanities, linguistics, mathematics, philosophy, psychology, science, sociology and other disciplines of education) as well as other interdisciplinary methodologies, such as: action research, case study, ethnography, evaluation, literature review, critical theory, documentary analysis, analytic work.

## **UOA 46 Sports-Related Studies**

Research within the unit of assessment is diverse, multidisciplinary and interdisciplinary. It falls within a variety of disciplines within the main subject areas of physical activity, exercise, sport and leisure. These disciplines may include biochemistry, biomechanics, business and management, economics and finance, engineering, geography, health, history, law, medicine, motor learning and control, nutrition, outdoor education, philosophy, physical education, physiology, policy studies, politics, psychology, sociology and tourism studies.

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### **UOA 47 American Studies and Anglophone Area Studies**

The UOA includes research into the cultures and societies of the Americas: Canada, the United States, Latin America and the Caribbean, including their relations with the wider world. The UOA includes work from any disciplinary, cross-disciplinary or theoretical perspective.

### **UOA 48 Middle Eastern and African Studies**

The UOA includes the languages, literatures, history, religions, philosophies, politics and international studies, economics and development studies, cultural studies, sociology, anthropology, geography and art history of the Middle East and Africa and their diasporas.

### **UOA 49 Asian Studies**

The UOA includes: South Asia, Mainland and Maritime South-East Asia, Mainland China, Taiwan, Hong Kong and Inner Asia, North and South Korea, and Japan. In each area the disciplines and subjects included are: ancient, medieval, and modern languages, literature, arts, cinema, archaeology, religions, history and philosophy, economics, politics, law, international relations, development, geography, sociology and anthropology, social and economic history, and linguistics of each area, diaspora studies, media, cultural, gender and other interdisciplinary studies, and inter-regional and globalisation studies with reference to Asia.

### **UOA 50 European Studies**

The UOA includes elements of all disciplines in the humanities and social sciences. It includes interdisciplinary research into all aspects of European languages, cultures and societies. It covers all of Europe (broadly defined) including European diasporas and Europe's relations with the wider world.

### **UOA 51 Russian, Slavonic and East European Languages**

The UOA includes the following areas of Russian and other Slavonic and East European studies: languages, linguistics, translation studies, literature, culture, society, history and thought.

### **UOA 52 French**

The UOA includes the study of French and francophone literature and thought for all periods from the medieval to the present day; medieval and modern Occitan; cultural studies; theatre studies; film and media studies; language studies; translation studies; pedagogic research; political, social and historical studies; post-colonial studies; gender studies; philosophy and critical theory; comparative literature; and literature in relation to the other arts.

### **UOA 53 German, Dutch and Scandinavian Languages**

The UOA includes the languages, literature, cultures and societies of the German-speaking countries, the Low Countries, Scandinavia and Iceland, and relevant communities elsewhere, from the earliest times to the present day; Yiddish language and literature; and translation studies.

### **UOA 54 Italian**

The UOA includes: medieval literature, including Dante; Renaissance literature; early modern literature; modern and contemporary literature; theatre studies; linguistics, philology and history of the language; cultural studies and cultural history; film studies; media studies; gender studies; history of Italy; social and economic history; modern social and political studies; history of ideas; translation studies; teaching methodologies and teaching materials embodying research.

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## **UOA 55 Iberian and Latin American Languages**

The UOA covers Iberian and Latin American languages, literatures, cultures and social and cultural histories, political, social and historical studies, from medieval times to the present day. This might include: lusophone studies; Hispanic linguistics; translation and translation studies; film, media and theatre studies; gender studies; literary and cultural theory; comparative literature; cultural studies; thought and philosophy; pedagogical research.

## **UOA 56 Celtic Studies**

The UOA covers the Celtic languages, including continental Celtic, and – from the earliest times to the present – Irish, Scottish Gaelic, Welsh, Breton, Manx and Cornish, together with the literatures, civilisation and primarily non-material culture of the speakers of these languages. The UOA also covers new and emerging fields of study, such as the application of information technology to Celtic studies, and various other forms of applied research.

## **UOA 57 English Language and Literature**

The UOA includes: English and Scots language (historical and modern); English and Scots linguistic studies, including applied linguistics; Old Norse/Icelandic (language, literature and linguistic studies); English literature from the 9th to the 21st centuries; American literature; comparative literature; colonial and post-colonial literatures and language; women's writing; creative writing; life writing; children's literature; critical and cultural theory and cultural history; gender and gay studies; editorial scholarship, bibliography, textual criticism and theory, and history of the book; Irish literature in English; Scottish literature in English and Scots; Welsh literature in English; and applied, practice-based, and pedagogical research in English.

## **UOA 58 Linguistics**

The UOA covers all areas of theoretical, descriptive and applied linguistics. This includes, but is not limited to: clinical linguistics, computational linguistics, conversation and discourse analysis, educational linguistics, first and second language acquisition, forensic linguistics, historical linguistics, the history of linguistics, language evolution, morphology, neurolinguistics, philology, phonetics, phonology, pragmatics, psycholinguistics, semantics, sociolinguistics, speech and language technology, stylistics, syntax, text linguistics, and typology.

## **UOA 59 Classics, Ancient History, Byzantine and Modern Greek Studies**

The UOA includes the language, literature, history, culture, art, archaeology and thought (including ancient science and philosophy) of Greece and Rome from the earliest times to late antiquity; Latin language and literature of the Middle Ages and subsequent periods; Byzantine studies; modern Greek language, literature, history and culture; the classical tradition; and the reception of these periods and subjects.

## **UOA 60 Philosophy**

The UOA includes all areas and styles of, and approaches to, philosophy.

The UOA covers all areas of philosophy, including but not limited to (listed alphabetically):

- 19th and 20th century European philosophy including phenomenology, existentialism, critical theory, hermeneutics, and deconstruction
- aesthetics
- applied philosophy
- epistemology
- ethics including applied ethics
- feminist philosophy

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- history of philosophy including ancient, medieval, modern and recent
  - logic
  - metaphysics
  - non-Western philosophy
  - philosophy of language
  - philosophy of mathematics
  - philosophy of mind
  - philosophy of religion
  - philosophy of science
  - political and social philosophy
  - teaching philosophy.

This list is illustrative rather than exhaustive: it does not reflect any judgements about the relative significance of the subject areas, nor does it specify 'fields'.

## **UOA 61 Theology, Divinity and Religious Studies**

The UOA includes the study of the world's religions, specific or comparative, including their scriptures, thought, history, ethical teaching, social and cultural impact, practices and related areas.

The UOA includes technological, textual, philosophical, social scientific and applied approaches. It is not intended to exclude any of the areas normally studied under the rubric of theology, divinity, religious studies or biblical studies.

## **UOA 62 History**

The UOA includes all aspects of the study of the past except those specifically falling within the remit of other UOAs.

The UOA covers all areas of history, including but not limited to (listed alphabetically):

- business history
- cultural history
- economic history
- environmental history
- historiography

- history of Britain, Ireland and Continental Europe (late Roman to the present)
- history of ideas
- history of North America, South America, Africa, Asia and Australasia
- history of science, technology and medicine
- imperial/colonial history
- international history
- local and regional history
- media history
- military history
- oral history
- political history
- public history
- religious history
- social history
- women's and gender history.

This list is illustrative rather than exhaustive: it does not reflect any judgements about the relative significance of the subject areas, nor does it specify 'fields'.

## **UOA 63 Art and Design**

UOA 63 encompasses all disciplines within art and design, in which methods of making, representation, interrogation and interpretation are integral to their productions. The UOA covers all areas of art and design, including but not limited to:

- fine arts
- applied arts and crafts
- design
- spatial, two- and three-dimensional art and design
- photography, time-based and digital media
- critical, historical and cultural studies, where these relate to or inform art, media, design, production and practice

- contributions to policy, management and entrepreneurship in the creative industries, arts and design
- contributions to the construction of a scholarly infrastructure for arts and design through, for example, collections, archives, curation and pedagogy
- curatorship
- appropriate pedagogic research in any of the areas identified above.

### **UOA 64 History of Art, Architecture and Design**

The UOA encompasses the history, criticism, theory, historiography, pedagogy and aesthetics of art, design and architecture in their widest chronological and geographical framework. The UOA covers all areas of the history of art, architecture and design, including but not limited to:

- visual and material culture
- applied and decorative arts, and craft
- dress and fashion
- photography, time-based and digital media
- landscape and garden design
- museology and curatorship
- conservation and technical art history
- work in cognate fields such as cultural, social and gender studies, and archaeology and anthropology, where these relate to the visual arts.

### **UOA 65 Drama, Dance and Performing Arts**

The UOA includes all areas of drama, theatre, dance, performance, film, TV and video. The UOA encompasses the theories, histories, ethnographies, practices, analyses, technologies and pedagogies in the widest domains of drama, theatre, dance, performance, film, TV and video; and the broadest understanding of the subject disciplines and their relationship to the widest geographical, historical and cultural contexts.

### **UOA 66 Communication, Cultural and Media Studies**

The UOA includes research addressing or deploying theory, history, institutional, policy, textual, critical and/or empirical analysis, or practice within communication, culture, media, journalism and film studies. The UOA includes (but is not confined to):

- policy for regulation of culture and the media
- the organisation, institutions, political economy and practice of cultural production
- media and cultural texts, forms and practices
- media and cultural audiences, consumption and reception, including questions of power, identity and difference.

### **UOA 67 Music**

The UOA encompasses the history, theory, analysis, creation, performance and production of music, in any genre or medium, and the broadest understanding of the subject discipline and its relationship to current practices and cultures. The UOA covers all areas of music, including but not limited to:

- composition and creative practice
- performance
- musicology (including historical, critical, empirical, ethnographic, theoretical, analytical and organological approaches)
- scientific approaches to the study of music
- new technology and music
- musical acoustics and audio engineering (where the subject matter is music-related)
- appropriate pedagogic research.