**Royal Society of Biology response to the consultation on the Biosciences Benchmark**

**20th August 2015**

**Overall, does the revised subject benchmark statement continue to define the nature of the subject area and academic standards expected of graduates in the subject?**

Yes

No

Please add further comment

Overall the responses received from our members and member organisations regarding both benchmarks were supportive of the draft statements; respondents felt that they described the subject area well and reflected the standards expected of graduates within these fields.

**Does the information in the introductory section(s) successfully describe the nature of the subject and its defining principles?**

Yes

No

If not, what additional aspects might be included, excluded or elaborated?

Feedback from RSB’s community is positive; generally the respondents felt that the introductory sections successfully describe the subject and its defining principles. In section 1.1 to ensure that the broad nature of the biosciences is reflected in the benchmarks we would like to see the following phrase amended “*The subject area includes those science programmes whose primary focus is the biology of plants and animals, including humans, and ranges from generic programmes in botany and zoology to more specialised programmes in for example genetics, biochemistry, and ecology*” to “The subject area includes those science programmes whose primary focus is the biology of plants, **animals including humans, fungi and microorganisms** and ranges from generic programmes in botany and zoology to more specialised programmes in for example genetics, biochemistry, and ecology*”* We felt that this would better cover the range of living organisms and the breadth of study.

It was noted that within the ‘areas of employment’ in section 2.5, the statement may benefit from acknowledging that there are new and developing areas of the economy where bioscience graduates will be vital in supporting these emerging industries. The biosciences will be vital in solving 21st century problems.

In section 3.3 it states “*By the end of their programme students will be equipped with the skills necessary to enable them to plan and perform a research project and be aware of the need for Good Laboratory Practice9 and, if relevant, survey design and execution, health and safety, and legal and ethical aspects of research design and analysis*.” The specific reference to the Good Laboratory Guide may be misunderstood to infer that laboratory practice is the only way of conducting research. It would be useful to rephrase this to: “By the end of their programme students will be equipped with the skills necessary to enable them to plan and perform a research project. **They will be aware of the need for good practice in the laboratory9 and outside the laboratory which includes wet labs, dry labs and fieldwork,** and, if relevant, survey design and execution, health and safety, and legal and ethical aspects of research design and analysis.”

As the biosciences involve study across a breadth of different groups of organisms. We feel it would be beneficial for the benchmark statement to highlight that students should understand examples across a range of different life-forms within the core subjects that they study (e.g. anatomy, ecology, population biology, biochemistry, physiology, genetics, immunology, cell and molecular biology, bioinformatics and evolution). We suggest amending section 3.4 as follows to “The Biosciences Subject Benchmark Statement covers a range of programmes and subjects grouped around the investigation of life processes and the interrelationships of living organisms. This involves study and understanding of the interrelationships of a variety of levels from molecules to populations**, including examples from plants, animals, fungi and microorganisms”**. Evidence from the “[*UK Plant Science Current status and future challenges*](http://www.rsb.org.uk/images/pdf/UK_Plant_Science-Current_status_and_future_challenges.pdf)” report suggests that there is little exposure to plant science across some bioscience degrees and that undergraduates favour animal and human biology. Where it is appropriate to the bioscience degree we want to encourage the use of a variety of examples from a range of living organisms.

**Does the section on subject knowledge and understanding still describe the core aspects of the subject area?**

Yes

No

Are there any areas of knowledge that should be included to reflect newly emerged areas of teaching/research? Are there any areas that have become redundant?

We believe that the bioscience benchmark adequately describes the core aspects of the subject. In section 5.2 it sets out the approaches to study and forms of subject knowledge likely to be common to all bioscience degrees; some respondents suggested that it may be useful to expect all bioscience undergraduates to have a grounding in the philosophy of science and how knowledge is constructed.

Alongside this an area of increasing importance is the intersection of science with policy. Students of the biosciences need to know when and how scientific discoveries can influence decision makers and the public, and how science makes an impact on society - this should be embedded in all bioscience courses.

**Does the section relating to subject-specific skills cover adequately the skills expected of a graduate in the subject area?**

Yes

No

Please add further comment

We feel that this section is covered well.

**Is the coverage of the generic skills expected to be acquired by a graduate in the subject area adequate and appropriate?**

Yes

No

Please add further comment

Under section 4.3 there were some concerns raised that it needs to be explicit that students should have an understanding of the mathematical basis of the statistical work that they may do, and not just know how to use the software.

It was also noted for section 4.4 that a skill that future biologists will need is to be able to code software; programming may be something that we would like to see included on bioscience degree programmes.

**Does the section on teaching, learning and assessment continue to provide an appropriate indication of the types of teaching and assessment relevant to the subject area?**

Yes

No

Please add further comment

It was noted that there are a wide variety of strategies referenced in the benchmarks and we are pleased to see reference to the teaching, learning and assessment strategies not being static. We agree that they should be flexible and adaptable to best fit our current understanding of good practice in teaching. Developments in teaching development and design should be based upon recent educational research in design and delivery, and new subject content should be based upon up to date scientific research in the field. Point 6.2 highlights the expectation that teaching staff should have access to professional development opportunities; the RSB is fully supportive of this. The range of suggested activities is sufficiently broad for both teaching and assessment.

Under section 6.4, which lists learning and teaching strategies/ experiences that may be used during courses, it has been suggested that the point “*work-based and other placements”* could be expanded to say “*work-based, other placements or interactions with science professionals”****.*** There should be an expectation that students are able to experience their science within an appropriate context, but there are issues with being able to support access to placements for all students. Alternatives could include supplementary shorter visits and meetings with those working in industry. We would recommend that the final bullet point on the list is rephrased as it currently states “*use of distance-learning materials, including electronic multimedia, video, recordings and broadcasts”;* these modes of learning are commonly used as part of direct teaching in lectures and seminar sessions - they are not limited to distance learning.

**Does the benchmark standards section successfully articulate what is expected of a graduate in the subject area in terms of a threshold level of attainment (and where relevant, typical and excellent attainment)?**

Yes

No

Please add further comment

For the benchmark addressing the molecular aspects of biology, including biochemistry, the threshold standard point 7.*10 ‘iv) explain how the principles of genetics underlie much of the basis of molecular biology’*, was queried whether it is explicitly clear what the principles of genetics are. For example, will these be standardised across the breadth of the biosciences and is there a way in which the “principles” can be referenced?

Under the typical standard point ‘*7.11ix) demonstrate the ability to mine, manipulate and interpret data from small molecule and macromolecular databases’*, it has been raised that biochemists will not necessarily be exposed to small molecule databases but would be familiar with macromolecule databases. The point could perhaps be rephrased to “demonstrate an ability to mine, manipulate and interpret data from molecule databases (this could be small molecules or macromolecules)”.

Responses from the British Ecological Society (BES) and UK Plant Sciences Federation (UKPSF) regarding the benchmarks for Ecology and Environmental Biology noted that this section does not directly mention fieldwork skills (although referenced throughout the rest of the benchmark). We suggest that the following statement is included for clarity, “Practical fieldwork skills including but not limited to ecological survey techniques, identification of organisms and ecological impact assessments”. They particularly recommend the inclusion of identification skills as this has been shown to be a major skills gap by the Chartered Institute of Ecology and Environmental Management in their report “[*Ecological skills shaping the profession for the 21st century*](http://www.cieem.net/ecological-skills)” and the “[*UK Plant Science Current status and future challenges*](http://www.rsb.org.uk/images/pdf/UK_Plant_Science-Current_status_and_future_challenges.pdf)” report.

Feedback on the benchmark for courses that are based on the study of organisms raised that threshold items 7.13i) *describe the structure, diversity and reproduction of the organism studied* and 7.13ii) *describe basic organism structure and diversity*, did not map forward at the typical standard with items 7.14i) *critically analyse the impact of external influences on growth and reproduction, and explain reproductive strategies* and7.14ii) *critically recount the interactions of structure and metabolic function at cellular and organismal level.* It was also felt that threshold items 7.13i) and 7.13ii) were very similar and could be combined.

It was also noted by some respondents that within the typical benchmark statements the word “critical” is used frequently; they felt that this is perhaps an aspirational goal for some students, as they felt that a typical student may not be able to demonstrate critical thinking in a broad range of areas.

**Please use this space to add any further observations relating to the revised subject benchmark statement not covered in the questions above.**

Since the production of this document, the Society of Biology has been granted the use of the Royal title and is now known as the Royal Society of Biology. Where the Society is named within the document it should be updated to the Royal Society of Biology.