Royal Society of Biology

SUPPORTING THE ADVANCEMENT OF SKILLS AND EDUCATION IN THE BIOSCIENCES

THE INTERNATIONAL ACCREDITATION and CONSULTANCY HANDBOOK

Contents

About the Royal Society of Biology

The Royal Society of Biology (RSB) is a single unified voice for biology in the United Kingdom: advising the UK Government and influencing policy; advancing education and professional development; supporting our members; and engaging and encouraging public interest in the life sciences. With more than 18,000 individual members, almost 2,000 of which are from outside the UK, and over 100 member organisations, the Society represents a significant and diverse membership including students, practising scientists, industry leaders, academics and interested non-professionals.

The Society is now operating internationally, mainly through Accreditation of undergraduate and postgraduate degrees and academic consultancy; particularly in those countries that do not have a biology professional body that accredits degrees. Membership of the Society is open to all, and is not limited to UK nationals (see Membership at **https://www.rsb.org.uk/membership**).

The RSB is committed to promoting biology to students in schools, colleges and universities. Through Accreditation, we support and recognise excellence in biology teaching; champion a biology curriculum that challenges students and encourages their passion for biology. We provide career guidance at all levels. We offer a range of tools to assist the professional development of our members working in education (for example our Consultancy service). We respond to education policy consultations and we contribute to curriculum development. Through partnership with other leading science organisations, we aim to increase our influence over the advancement of biology education.

For more information about the Royal Society of Biology, see **www.rsb.org.uk**

About this document

This handbook is the main source of reference for those institutions seeking to apply for **International Accreditation,** or **International Consultancy** from the RSB.

International Accreditation is acknowledgement by an external body, that a degree programme meets a defined set of overarching criteria. Graduates from accredited degree programmes are equipped with well-rounded knowledge and skill sets, making them highly employable both within and beyond their chosen field. There are four routes to gain International Accreditation. The best route for your programme will depend on the level and content of the course.

International Consultancy is on offer to institutions that seek a detailed and constructive review of their biology programmes and student experience, and can be particularly useful for institutions working towards Accreditation, but who may not yet feel ready for the full Accreditation process. It includes ongoing support to implement change.

International Consultancy involves a review of the curriculum, delivery and student experience using the criteria for Accreditation as a template. Accreditation is not an immediate outcome of Consultancy. Instead, it is a point in time review which gives advice on how to develop the academic curriculum and set strategies for the ongoing enhancement of the student experience. We offer (depending on the package chosen) ongoing support over a fixed period, in the form of review and advice, as well as identifying aspects of good practice.

To discuss which option is best for your programme, please contact **accreditation@rsb.org.uk**. The Accreditation Team will have final say on which option is offered.

Introduction to Accreditation

International Accreditation, henceforth referred to as Accreditation, is acknowledgement by an external body that a programme meets a defined set of overarching criteria. Accreditation by the RSB recognises and supports the advancement of skills and education in the biosciences. Graduates from Accredited programmes are equipped with well-rounded knowledge and skills, making them highly employable both within and beyond their chosen field.

Accreditation aims to:

- Recognise academic achievement
- Drive up standards of learning and teaching in the biosciences
- Provide students with confidence about their chosen course
- Enhance competitiveness of students in a global jobs market
- Provide employers with an assurance of the level of employability skills and subject relevant bioscience skills provided by a programme
- Provide an international mark of "good practice" allowing wide ranging comparability among high performing institutions

The biosciences are predominately a set of experimental subjects, which require a hands-on approach to learning. Accredited programmes incorporate learning outcomes associated with key skills in laboratory and/or fieldwork thereby providing a high standard of competence in graduates. Transferable graduate skills such as communication, problem solving and team working are integral to the programmes. Biologists must be equipped with the skills necessary for self-learning and the ability to apply basic principles of maths, chemistry, physics and information technology to their learning and career. These should be taught and assessed at all levels, providing a gradual development of ability and self-confidence in students, culminating at graduation. Students will have been encouraged and supported to develop their creativity, innovation and entrepreneurship.

All graduates will have experienced self-learning and will have satisfactorily completed some form of integrating experience near the end of their course (the nature of which varies according to the level and type of programme) demonstrating independence of thought and analysis of data.

Accredited programmes are highly regarded within the learning and teaching community and by employers. Accredited programmes are delivered by subject experts and produce graduates who will excel in their chosen field.

Biology programmes are highly diverse and subject to rapid change in content; therefore, the Accreditation process does not seek to define a highly specified curriculum. Accreditation is built on the foundations set by various bodies (e.g. the UK's Quality Assurance Agency, QAA, the American Association for the Advancement of Science, AAAS etc.) as a general description about the broad minimum standards of achievement. In addition, the RSB focusses on those areas that fully prepare bioscience graduates (including those on specialist degrees) for their place in the world.

Accreditation is based on the assumption that the course can be defined as 'biology' or a sub-section or specialism within biology. It may not be appropriate for courses where the overall objective of the course is not biology *per se*, but where biology may be a component (e.g. pharmacy and health-care professions). Such courses are accredited by other professional or statutory bodies.

The RSB is keen to support all bioscience programmes that aim to meet the criteria for Accreditation. For established programmes, the learning outcomes attained by graduates will be judged. However, we also encourage universities to submit their new programmes for Accreditation, where there are still no graduates. Under these circumstances, the Accreditation process will include a review of the programme documentation and a site visit before the first cohort of students graduate. The Society may grant interim Accreditation pending first cohort graduation, with full Accreditation occurring afterwards, if appropriate. Universities with relevant programmes in development should refer to **Appendix G**, and contact the Accreditation Team to discuss interim Accreditation.

We also offer Consultancy for programmes that are in development and yet to recruit students.
We welcome applications from programmes taught in languages other than English; however, please note that all documentation and supporting evidence must be supplied in English for assessment purposes. The Society accredits programmes of study that lead to specified named awards. Only final awards are accredited.

Which type of Accreditation to apply for

All accredited programmes share core principles: to recognise academic excellence in bioscience degree programmes, drive up standards and meet the needs of employers. The type of Accreditation awarded will depend on the type of programmes submitted, please see below.

The Accreditation Team will make the final decision as to which criteria will be used for your application. Please contact the Accreditation Team as early as possible to discuss this further **accreditation@rsb.org.uk**.

RSB International Accreditation			
Route One page 18	**Route Two** page 27	**Route Three** page 39	**Route Four** page 55
Undergraduate programme that includes work based learning and foundation level experience	Undergraduate programme that includes an integrative experience	Undergraduate programme that includes a coherent capstone experience	Postgraduate programmes offering advanced research training and skills
Equivalent to Level 4-5 FHEQ e.g. Higher Diploma	Equivalent to Level 4 – 6 FHEQ e.g. BSc	Equivalent to Level 4 – 6 FHEQ e.g. BSc (Hons)	Equivalent to Level 7 FHEQ e.g. MSc, MPhil
Defining Features			
Work-based learning	Integrative experience	Capstone experience minimum ¼ of final year	Research component is equivalent to ⅓ minimum total credits accounted for by the project
	Graduate employability and transferable skills	Graduate employability and transferable skills	Period of Practice must be completed in an active research environment
Membership and Professional Development			
One year free membership at AMRSB (first year post graduation)	One year free membership at AMRSB (first year post graduation)	One year free membership at AMRSB (first year post graduation)	One year free membership at AMRSB (first year post graduation) AMRSB members can become MRSB after two further years of work or professional practice, rather than the usual three years

Benefits of Accreditation

Benefits of Accreditation for HEIs

Recognition of academic quality

Accreditation provides an externally-validated mark of 'good practice', as well as providing an assurance to employers that graduates have appropriate skills and knowledge, increasing graduate competitiveness in the global jobs market.

Enhanced student recruitment opportunities

Potential students have the confidence in knowing they will study a course that meets a set of criteria determined by bioscience professionals independent of the institution. Accreditation is informed by the needs of employers and developed in collaboration with experts from industry. Employers recognise the value of accredited degree programmes and the graduates they produce.

External review of programmes and mechanism to drive change within an institution

The process of Accreditation not only assesses degree programmes but also shares and highlights good practice. As part of the application process, programmes will be assessed by senior academics who may suggest improvements to the programme, and identify existing areas of excellence. As such, institutions that have undergone an assessment have reported that the process of Accreditation is extremely beneficial in its own right.

Publicity following successful Accreditation

Institutions will be entitled to use the RSB logo and associated literature to advertise that the degree(s) is accredited (online and in printed literature). The RSB will advertise the institution as accredited on our website, which is viewed by prospective students looking to study a bioscience degree. Institutions will be able to quote aspects of good practice, highlighted during the visit, on their website and at open days.

Benefits of Accreditation for students

Greater employability prospects and enhanced competitiveness in a global jobs market

The Accreditation programme establishes a profile of key skills that bioscience employers can recognise in graduates from accredited degrees. Students are able to provide tangible examples (i.e. taught, assessed and carried out in practice) of their skills (e.g. in the laboratory, team working etc.).

Professional body Accreditation of their degree

Students can be confident that the degree they are choosing is of a high standard and has been assessed and enhanced by the Accreditation process. The RSB bases Accreditation on a set of wide-ranging criteria, meaning students will be aware of not only the technical skills and knowledge gained in their course, but also the transferable skills such as teamwork, communication and entrepreneurship.

Free membership/registration to the RSB

Graduates from accredited programmes are entitled to a free year of membership to the Society. This will enable access to a significant network of bioscience professionals, making it easier to stay up-to-date with biology-related developments (e.g. via the free weekly bulletin of key discoveries, initiatives and policies worldwide) and provide graduates with additional recognition of their skills and experiences. This is extremely beneficial to graduates, particularly at a time when they are applying for their first employment. Membership of the Society gives students and graduates a feeling of belonging to a wide community of biologists, interested in biology for its own sake but also to contribute their knowledge and skills to help meet world challenges.

Quotes in support of Accreditation

International Institutions

"This is a major step forward in our quest to become a leader in higher education excellence in Africa. The validation of our training quality by the RSB helps us attract the best students and gives funders further confidence to invest in our programmes."

Professor Gordon Awandare | Head of Department of Biochemistry, Cell and Molecular Biology | University of Ghana

"The RSB team put us at ease i.e. that they were not there to attack the programme but to help us make it a better one and help guide us through the application procedure."

Dr Susan Ho | Deputy Enrolment Officer | Hong Kong Polytechnic University (PolyU)

"External audit of our programme in Biological Sciences through International Accreditation proved to be an excellent way to ensure that it remained relevant and of high quality. We found the process developed by the RSB to be well-thought-out, constructive and helpful. Accreditation will undoubtedly enhance the employment prospects of our graduates."

Professor C. David O'Connor | Head, Department of Biological Sciences | Xi'an Jiaotong-Liverpool University

UK Institutions

"Our experience with the RSB has been nothing other than superb; I would have no hesitation in recommending the RSB to all my colleagues and students. The Accreditation Team were exceptionally professional and more importantly knowledgeable and helpful which made the Accreditation process a joy."

Dr Chris Tselepis | Programme Director for Biomedical Science | University of Birmingham

[Accreditation] "was for us as a course(s) team, a very useful and rewarding experience. It made us reflect on our teaching and assessment, challenged us to be self-critical and gave us extremely valuable advice and guidance to improve our students' experience."

Dr Elaine Green | Associate Head (Quality and Accreditation) | Coventry University

"We have always had a good experience in the last few years of working with the Royal Society of Biology, and our experience of applying for Master's Accreditation was no exception. Throughout our engagement with the pilot phase of the Master's Accreditation scheme, it was clear that RSB were genuinely seeking to enhance education and skills within the sector. The site visit was professional, constructive and supportive, and while the recommendations made have enhanced our programmes it has also given us cause to reflect upon and celebrate the strengths of our postgraduate provision."

Dr Dan Lloyd | Director of Graduate Studies | University of Kent

"Thanks to [the panel] for their valuable feedback on our pathways - we very much appreciate their attention to detail and their positive approach to the discussion. It was a pleasure to engage with you all."

Dr Angela Mousley | Programme Coordinator (Biological Science) | Queen's University Belfast

"The Accreditation process was extremely useful to us, including the mapping out of our degree schemes and skills, meeting yourselves and getting the opportunity to share our Swansea University Bioscience experience and the positive outcome of gaining Accreditation…. it has really helped us to focus and refine our curriculum, it was a very positive experience."

Dr Penny Neyland | Biosciences Programme Director | Swansea University

Industry

"Covance is always in search of graduates who demonstrate they have industry skills, knowledge and, most importantly, the desire to be exceptional in their field. We've found graduates from the Degree Accreditation Programme bring diverse and emerging skills. Our hiring managers appreciate how quickly they demonstrate their academic rigor as they swiftly respond and adapt to real-world situations on the job."

Robert Watts | Covance

"We believe that by accrediting degrees, students and employers will be better placed to identify quality courses that provide depth of study in their discipline and strong practical skills. In future, we are confident students who graduate from these courses will have the opportunity to find rewarding work in the life sciences sector or can go on to undertake further research as a postgraduate."

Stephen Whitehead | CEO | Association of the British Pharmaceutical Industry

"To deliver the next generation of life changing medicines we need to recruit talented young scientists who combine a passion for drug discovery with strong fundamental science knowledge. All our applicants undergo a thorough assessment process designed to test their scientific and technical knowledge, ensuring that our new recruits can be confident and effective in a laboratory environment from day one. This is why at AstraZeneca we support degree Accreditation by the Royal Society of Biology and actively encourage applications from graduates with accredited degrees – it really can help individuals stand out from the crowd."

Donna Watkin | Global Graduate Programme Manager AstraZeneca, Research & Development | Innovative Medicines

"MedImmune recognises that strong scientific knowledge is integral to much of its success. And when we, as potential employers, are looking out at the outside world, we need a way to understand and evaluate the research that has been undertaken by applicants. That's why the Royal Society of Biology's Degree Accreditation Programme is so valuable. It provides a very visible signal of the quality of a degree and the high standard of academic rigour which students on those degree courses achieve. This naturally translates into an assurance of employability for those students who complete those courses."

Jacqui Hall | Vice President; Learning, Standards and Skills | MedImmune

Process of Accreditation assessment

This process is relevant to all routes of International Accreditation The only difference is the criteria that will be applied to your application.

The Accreditation assessment process is normally achieved in three stages and will generally take a period of six to twelve months. This is outlined in Figure 1, with further information on the method of submission in **Appendix A**.

Applications will be considered as soon as possible following receipt of the submission. If the application appears to meet the requirements of stage one, as described below, then the site visit will be arranged by mutual convenience of the Society and the University. Please note that students and recent graduates (if applicable) need to be present during the site visit. The assessment reports produced by the Accreditation Assessment Panel will not be made publicly available. However, the Society may share reports produced by the Panel with any sponsors of the programme(s); this will be declared at the start of the application process.

01

Stage One

Universities are required to submit, electronically, evidence to the Society in support of their application. Full details are listed in **Appendix A**. This process, designed to be brief and not to replicate existing paperwork or to be unduly bureaucratic, outlines how the institution believes that it achieves the intended learning outcomes as stipulated in the Accreditation criteria.

The application will be assessed by an Accreditation Assessment Panel (the "Panel"), which will produce a Stage One Report summarising the assessment. This will be sent to the University for fact checking and will act as a guideline for questions likely to arise at stage two. Universities will have the opportunity to submit additional evidence following receipt of this report.

If the programme is deemed suitable, the Panel will recommend that the application progresses to assessment stage two. However, in some cases, the Panel may feel that the programme is not appropriate for further assessment and recommend it is not accredited. In this case, advice will be provided.

02

Stage Two

The Panel will carry out a **site visit** to evaluate the university's facilities, speak to students about their learning experience, and hold face-to-face discussions with the programme team. Key staff with direct responsibility for resources should attend the meeting and/or be available throughout the day. A provisional recommendation on Accreditation will be provided during the site visit where appropriate. Outcomes of stage two will be summarised in a Stage Two Report and sent to the University for fact checking.

The Panel will make a recommendation to the Accreditation Committee to award or withhold Accreditation. Universities will be kept informed of likely timescales involved for ratification to occur.

03

Stage Three

The Accreditation Committee will make a decision that:
1. The programme should be accredited
2. The programme should be accredited subject to conditions
3. The programme should not be accredited

A Stage Three Report will be sent to the University where actions relating to conditions and/or recommendations should be evidenced. The University will have a period of six weeks to complete the Stage Three Report and provide any supporting documentation. Accreditation is not formally awarded until the completed Stage Three Report has been approved by the Society.

Accreditation awarded

Following a successful assessment, International Accreditation will normally be awarded for a period of five years. The RSB will list accredited degree programme titles and universities on its website, and provide a link to the universities' web pages. Universities are required to provide graduate destination data for all accredited programmes on an annual basis.

Graduates from accredited programmes will receive one year of free membership of the RSB at Associate level (AMRSB).

For more information on publicity guidelines following Accreditation, please see **Appendix F**.

Accreditation subject to conditions

The University will receive a Stage Three Report listing any conditions, and details of the actions taken by the university to address the highlighted areas will be required. The university will have a period of six weeks to complete the Stage Three Report and provide any supporting documentation. Accreditation is not formally awarded until the Stage Three Report has been completed and approved by the Society.

If internal university approval is required for the amendments, then it would normally be expected within the six weeks, however, extensions can be granted on a case-by-case basis, and this can be discussed at the visit.

Accreditation withheld

If the programme does not meet the Accreditation criteria, guidance will be provided by the RSB on how the programme could meet the criteria. Usually the programme will not be reconsidered for Accreditation until a period of 12 months has elapsed from the date the Stage Two Report is received by the University. For reconsideration, a full report will be required from the programme organisers explaining and documenting changes made to address each of the points made by the Accreditation Assessment Panel. If internal approval is required for the amendments, it would normally be expected that approval has been given before the programme is reconsidered. The Accreditation Committee shall decide whether a further full panel site visit, light touch visit, or no visit, is required.

The RSB maintains an appeals procedure for universities that wish to challenge specific decisions, where they feel that an assessment was not conducted as it should have been and in a fair and transparent manner. Universities cannot appeal against a judgement, only aspects of the process.

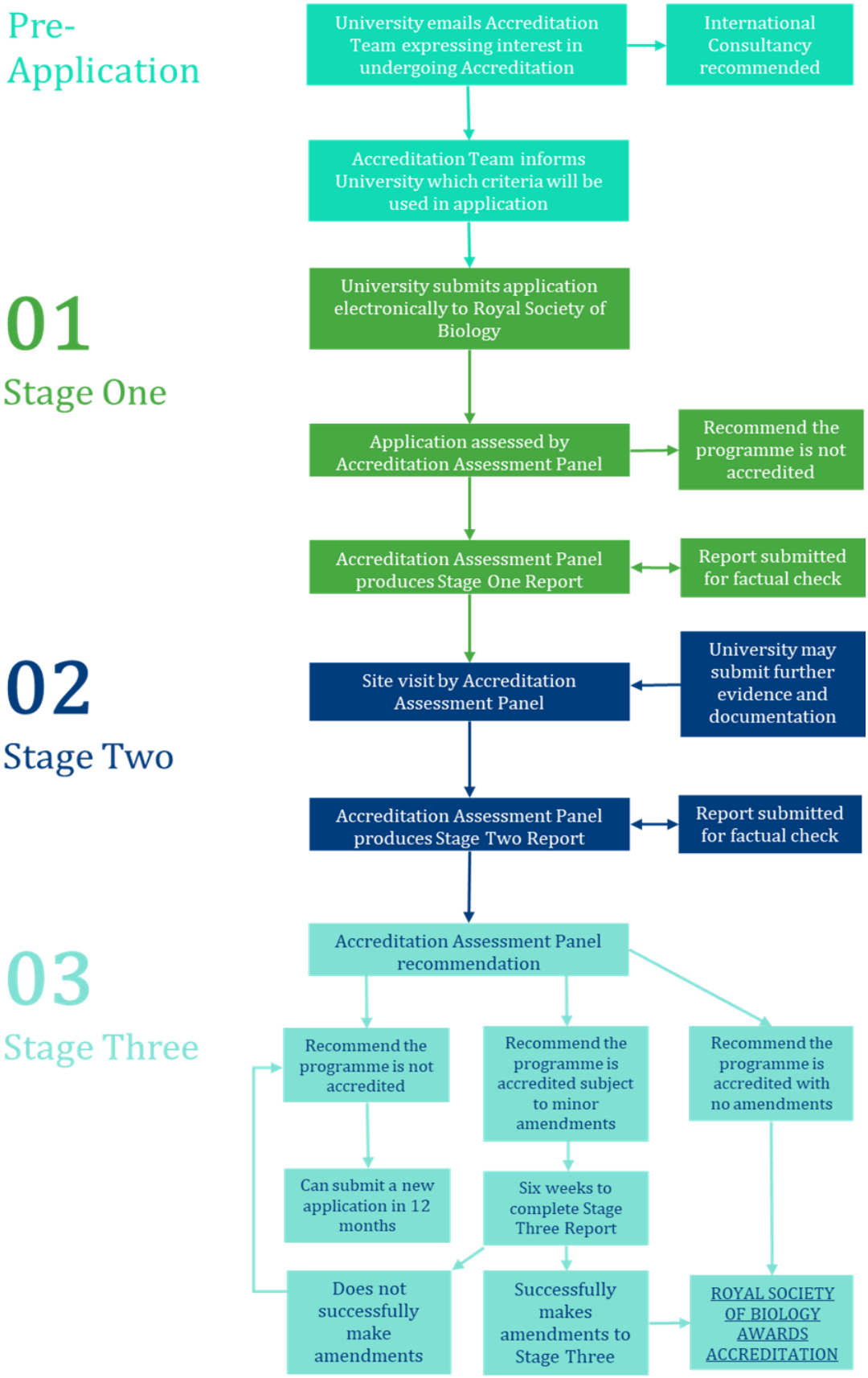
Appeals should be made to the Accreditation Committee in the first instance. If the University feels that an unfair decision has been reached by the Accreditation Committee, a follow-up appeal can be made to RSB Council, whose decision will be final. Further details about the appeals process are available on request.

Interim Accreditation

Interim Accreditation is available to universities for recently validated programmes where there have been no graduate awards. See **Appendix G**.

The International Accreditation process will be conducted in accordance with English Law and the RSB's code of practice.

Detailed Process of International



Accreditation Subject specific criteria

The Royal Society of Biology recognises the general areas outlined in the UK QAA Biosciences Benchmark Statement and the specific guidance in the Biomedical Sciences Benchmark (available at **www.qaa.ac.uk/quality-code/subject-benchmark-statements#**). Accredited programmes will be expected to adhere to the guidance for the Typical Standard of the current Biosciences Benchmark and/or Biomedical Sciences Benchmark as appropriate. Accredited programmes should also adhere to any subject specific guidance developed by the appropriate Learned Society written specifically for Accreditation by the RSB (please see **Appendix B**). The subject specific criteria provided in the Benchmark Statements are not repeated here, but the assessment panel may refer to the Benchmarks when arriving at a recommendation.

Accreditation spans three broad areas of biology, and applications must be made to one or more specific streams chosen by the University. This allows the Society to appoint the most suitable Panel members. The areas are:

- Molecular Aspects of Biology
- Whole Organism Biology
- Ecological and Environmental Sciences

Some degree programmes may meet the criteria for Accreditation only if a specific combination of units or modules is selected. Where this is the case it is only possible to award Accreditation if the route or pathway that meets the criteria is formally identifiable in the graduation certificate.

Degree regulations

The Society's Accreditation criteria must be evident in programme learning outcomes (LOs). Unless otherwise indicated, it will be assumed that all programme LOs must be achieved by a student in order to graduate with the award. Generic regulations, and where necessary programme-specific regulations, must ensure that all students graduating with an accredited degree have achieved these outcomes. Compensation, where permitted within the regulations of the University, must only be applied if, and when, the relevant LOs are achieved in an alternative, passed module(s) covering the same LO(s). Compensation cannot be applied if a programme LO is identified specifically and uniquely with a single module and consequently assessed only once. For example, compensation cannot be applied to the capstone experience in BSc Honours degrees.

The Society expects universities to have policies and procedures in place that support and enable students with mitigating and/or extenuating circumstances to meet the LOs of a programme.

The University must make the assessment regulations available to Accreditation panels, and inform the Society annually of any changes to regulations during the period of Accreditation.

Articulation agreements

If the University applying for Accreditation has a formally approved articulation agreement with a Partner Organisation (PO) in the home country or overseas it must be indicated in the Letter of Intent. An articulation agreement is defined as a formal arrangement whereby PO students may transfer to the University's programme and graduate from the University. For the assessment of Accreditation, the Panel will wish to assure itself that key learning outcomes normally achieved in the part of the programme prior to the students' transfer (the articulation) are met.

Where universities have agreements with POs, either to franchise programmes, or to deliver equivalent programmes in other locations, these programmes will be treated as separate from the parent programme. Accreditation may look at all courses within the same application, but each version of the programme will be individually assessed for Accreditation.

Costs of Accreditation

Universities applying for International Accreditation will be charged a fee to cover the Society's administrative costs, including any likely costs occurred in relation to the Accreditation site visit (travel, subsistence and honorariums). Universities will be required to book accommodation, including breakfast, for the panel members in a suitable nearby hotel for the duration of the site visit. Where universities are seeking Accreditation of multiple programmes, the Society will determine the most appropriate fee, based on the level of similarity between programmes.

For more information, please email **accreditation@rsb.org.uk.**

Changes made before Re-Accreditation

Programmes of study evolve to reflect the latest developments in the subject and to meet the needs of students, external influences, such as professional and statutory bodies, and policy changes. Variations in human and physical resources may also bring about programme changes.

The University must inform the RSB immediately of any significant planned changes to the accredited programme(s), which occur during the period of Accreditation, as well as providing a clear rationale for the change. Universities are required to complete and submit a short annual report (a form and guidance will be provided) highlighting any changes that may have been made. The rationale behind any changes impacting the Accreditation criteria must be explained. There may be a charge for assessing accredited programmes if significant changes have been made. The RSB reserves the right to remove Accreditation from a programme if significant changes are made to the programme that deviate from the learning outcomes defined by the Society.

Re-Accreditation processes

Universities that have an accredited degree programme will be contacted by the RSB towards the end of the period of Accreditation to invite them to submit their programme for re-Accreditation. Where there are significant changes to a programme within the Accreditation period, the University may be asked to re-submit earlier.

Re-Accreditation will follow the three-stage process of Accreditation and will involve a full review of all programmes submitted.

If a university chooses not to apply for re-Accreditation, the following withdrawal of Accreditation guidance will apply.

Removal of Accreditation

Reasons for the Society to consider the withdrawal of Accreditation from a previously accredited course:

1. Failure of the University to pay the continuing cost of Accreditation.
2. Failure of the University to notify the Society of changes made to the accredited programme structure or changes that affect the delivery of the programme.
3. Changes made to the programme specification so that some of the learning outcomes are not being met.
4. Changes made to the programme specification that alter the learning outcomes so that some Accreditation criteria cannot be met.
5. Any changes made to the University that result in a failure to deliver the learning outcomes of the programme which result in a departure from the Society's Accreditation criteria.

The withdrawal of Accreditation from a course will not be done without consultation with the University. The degree awarding University should notify the Society of change(s) made to the programme structure or its delivery, with a clear rationale for the change(s). The Society will review the changes and appoint a review panel for a site visit, if necessary. If it is found that the change(s) lead(s) to a failure to deliver a learning outcome(s) that covers Accreditation criteria/criterion, then conditions will be set. If these conditions are not met within the academic year of the assessment, the Accreditation status may be withdrawn.

If Accreditation is removed, all reference to the RSB Accreditation must be removed from websites and public documents. While the RSB understands that course guides may be published many months in advance of a new cohort starting, information on websites can, and should be, removed as soon as the Accreditation is rescinded. Because loss of Accreditation means that the RSB can no longer comment on the quality, even of degree cohorts already at the University, only cohorts who have graduated during the Accreditation period can claim benefit of an accredited degree. The RSB will remove the University programmes from the list of accredited programmes maintained on the RSB website. Information relevant to the Accreditation will be kept for the five years following a lapse in Accreditation, in case of questions by graduates of the programmes.

International Accreditation

There are four routes to gain International Accreditation, each with a slightly different set of criteria. Please see below for the four sets of criteria and contact the Accreditation Team to discuss which best suits your programme.

International Accreditation by the RSB follows an independent and rigorous assessment of degree programmes which contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers. The Accreditation criteria require evidence that graduates from accredited programmes meet defined sets of learning outcomes, including subject knowledge, technical ability and transferable skills.

The development and experience of laboratory and/or field skills are important components of bioscience programmes. Problem solving, innovation and creativity are also important characteristics of how biological subjects are understood and applied. Evidence of the assessment of these skills, knowledge, and the ability to make interpretations based on experimental approaches is required to achieve Accreditation. To that end, a central principle of Accreditation is that the intended learning outcomes of a programme are linked to assessment.

Graduates from accredited programmes will have the specialised knowledge of their chosen discipline plus core knowledge of the biosciences, including cell biology, an appreciation of biodiversity[2] and the concepts and application of the theory of evolution. Their knowledge of biology will be underpinned by appropriate competence in chemistry, physics and mathematics, including statistics.

All documents linked to Accreditation can be found at **www.rsb.org.uk/education/Accreditation/Degree-Accreditation-Important-Documents**

International Accreditation: Route One Criteria

These criteria are designed for undergraduate programmes at FHEQ level 5 (e.g. Higher Diplomas) that are an "end qualification" in their own right and a period of include a significant portion of work-based learning.

1. **Development of work-based learning that demonstrates relevant industry skills at an appropriate level**

i. A substantial focus on work-based learning relevant to the programme

ii. Underpinned by a range of relevant sources demonstrating appropriate recognition of health, safety and ethical considerations and professional best practice

iii. Contextualised, showing critical reflective practice and development

2. **Demonstration of the acquisition of professional skills and familiarity with the practical environment, in a work related context**

i. Students learn in a hands-on, practical environment, and are trained in the professional skills appropriate to their main subject interest

ii. Skill acquisition is a progressive process

iii. There is a list of the core, assessed and professional skills used in the laboratory, workplace and/or field which are fully integrated into the programme

iv. There is evidence of competency in the core professional skills for all students on the programme

3. **The development and use of transferable graduate skills**

i. Graduates will have the basic skills of word processing, use of spreadsheets, and presentation software

ii. The assessment strategy will include opportunities for the students to find, cite, evaluate and use information

iii. There will be clear evidence that students are given the opportunity to consider and approach problems critically, confidently and independently

iv. The assessment strategy will include opportunities for the students to demonstrate academic communication through both oral and written approaches and to a range of audiences

v. There will be an approach to the development of teams, including leadership

vi. There will be evidence of acquisition of general management skills including task management

vii. Ethical and regulatory issues are addressed where appropriate

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

i. The coverage of chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context[2]

ii. The knowledge and appreciation of mathematical principles must be sufficient to support the understanding and application of key biological concepts and underpin problem solving at the theoretical and practical levels

iii. Graduates will be equipped with the mathematical knowledge and skills needed to handle variation in data analysis at different levels

5. Specific skills and knowledge appropriate to the foundation degree title

i. Bioscience graduates will have some general knowledge of the basic fundamentals of biology, including: an overview of biodiversity, the cell, basic genetics, the concept of evolution, biochemistry, molecular biology, and organismal biology

ii. Programmes will adhere to the relevant recommendations within the QAA Subject Benchmark for Biosciences (with reference to other Benchmarks if appropriate) appropriate to level 5 (8 in Scotland)

iii. Institutions will have engaged with relevant Learned Societies to inform the curriculum

6. Development of creativity and innovation relevant to the work place

i. The programme incorporates the development of creativity and innovation in undergraduates and is an implicit part of the student experience

ii. Students are given the opportunity and encouragement to apply original or unconventional ideas, to be imaginative, and to tackle problem solving using techniques designed to develop individual and group creativity

iii. The Royal Society of Biology recognises the importance of creating environments that support and promote the development of creativity and innovation. At the same time, the Society recognises that these aspects of education are at a developmental stage in many programmes and this will be acknowledged in the application of the criteria.

2 The extent to which these subjects are studied in depth will vary by programme (e.g. a foundation degree in biotechnology will have a greater emphasis on the physical sciences, than a foundation degree in environmental biology, which will include more detail on biodiversity etc.).

Notes on the Route One Criteria

The Royal Society of Biology takes a learning outcomes based approach to accrediting degrees. Intended learning outcomes of a programme identify important learning requirements. They are understandable to students, achievable, and assessed. The Society recognises that a distinction can be made between "assessment" and "grading". The Society does not necessarily expect every assessment to be graded, and indeed encourages Institutions to consider whether grading is necessary in all cases (e.g. in the assessment of a technical skill). Advice on learning outcomes and assessment can be obtained from the Higher Education Academy **www.heacademy.ac.uk**.

The Route One criteria are designed for programmes such as Higher Diplomas or Foundation Degrees that are designed as an end qualification in their own right, and recruit students accordingly. As such they are designed to prepare students for employment and will include a period of work-based learning.

1. Development of work-based learning that demonstrates relevant industry skills at an appropriate level

Work-based learning is an integral part of "Route One" degrees. Well-designed degrees should consider the wide range of provisions and purposes associated with work-based learning appropriate to the degree programme. This will allow the student to apply the knowledge and learning acquired during their degree programme in the workplace while gaining relevant industry skills and experience. The Society makes a distinction between work-based learning, work-related learning and work experience (see Appendix G).

For accreditation, evidence of achieving the learning outcomes should be clearly documented against the appropriate student outputs.

Guidelines

A. The work placement should be contextualised and relevant to the degree discipline
The work placement needs to be put in to context through reference to the larger disciplinary and real-world contexts to which the student is contributing.

B. The work placement will include an element of reflective commentary by the student and employer feedback
This may be evidenced by reference to the student handbook for the work placement or equivalent and is most easily confirmed through the provision of student outputs at the site visit.

C. The work placement should inculcate an appropriate understanding of health and safety, professional best practice, an appreciation of ethical issues, and demonstrate an understanding of scientific integrity
The Society recognises that responsibility for health and safety, risk analysis and ethical approval lies with the institution and/or employer. However, the student should have been involved in these processes as they apply to their work placement (e.g. by preparing a draft risk assessment or ethics application that can be submitted as assessed coursework or included in the work placement report or equivalent).

D. The work placement should be underpinned by a range of relevant sources
Sources that inform work-based learning include textbooks, journal articles, surveys, interviews, experiments, original data, secondary data, websites, blogs, tweets, wikis, practice reports and direct personal experience. What is appropriate depends on the type of work placement and the purpose that the source is being used for. It should be recognised that all sources have strengths and limitations, and reflection on the limitations and validity of the sources used is part of the process.

2. Demonstration of the acquisition of professional skills and familiarity with the practical environment, in a work-related context

Students benefit from the involvement and collaboration between the employer and higher education provider. The Royal Society of Biology recognises the diversity of ways in which such close collaboration may be evident in the programme. The Society seeks to ensure all students can demonstrate the progressive development of industry relevant skills through a work experience or equivalent work-informed simulated experience.

Guidelines

A. The institution should have, and provide, a list of the core technical skills used in the laboratory and/or field, which form the foundation for the degree subject, and what would be deemed appropriate as a level of competency

A bespoke list may not be necessary if it is already present, for example in validation documentation or student handbooks. The Society will need to feel confident that the institution is explicit about which technical skills are being acquired by its students and where they are assessed. If a bespoke summary for the submission is required, then please follow the format of the table provided below. The table ideally should evidence a progressive approach, where basic techniques and skills are built on during the course of the programme.

Skill	Year 1	Year 2
Aseptic technique	Introduced in module BIO40001	Developed in module BIO50001
Etc.		

B. A description of how the technical skills are assessed

This can be briefly summarised in the submitted matrix. For example, “technical skills of individuals are assessed on a pass/fail basis by laboratory demonstrators during the series of practical classes in modules BIO40001, BIO40002”, or any other appropriate approach. Institution as may wish to discuss their approach with the Society who provide training courses for Society members on teaching, learning and assessment in the biosciences, and generate and share examples of good practice.

C. Evidence is provided of a basic competency in the core technical skills for all students on the programme

There must be evidence that students are trained and tested in the basic competencies, and achieve a threshold standard set by the institution, and deemed appropriate say by employers.

D. The Society is specifically seeking evidence for the development of the appropriate technical skills in relation to the subject, whether in the field, the laboratory or the workplace

A system for recording the development of skills and experience of the practical environment should be present within the programme. There is no defined core list of competencies which must be achieved due to the fact that any significant list would be rapidly out-of-date. However, the very basic operations (sample and specimen handling, pipetting, manipulation of solutions, measurement, use of basic equipment, and the different forms of error) would be expected. Different subject areas will have different requirements, perhaps informed by the work of the relevant Learned Societies, which could be used as a basis for submission.

3. The development, use and recording of transferable professional skills. As well as the basic skills of word processing, use of spreadsheets and presentation software, graduates should:

There should be clear evidence that students are given opportunities to develop and recognise a range of skills that enable them to consider/approach problems critically, confidently and independently.

Communication skills are considered both in terms of communicating science to a range of audiences, and through both oral and written approaches.

The Society will seek evidence of an approach for the development of teams and different roles within teams (including leadership), and general management skills, including task management.

The Society will seek evidence that ethical and regulatory issues are appropriately addressed. While for many students this may be built on through the capstone experience, the underlying issues will need to be addressed for everyone.

Guidelines

Existing institution documentation may show where graduate skills outcomes are taught and assessed. If this is not available, or felt by the applicant to be insufficiently clear for the purposes of accreditation, the submission should include a skills table as described in the guidance to criterion 2A above.

A. There is a system for the development of basic skills such as word processing, spreadsheets and presentation software
There should be clear evidence that students have acquired these essential basic skills.

B. Students should be able to demonstrate how to find and distinguish/evaluate/cite appropriately valid sources of scientific and other information online and offline
There should be evidence that students:

- are able to collect, sort and protect/backup personal and professional online resources, including issues of intellectual property
- demonstrate competence in the use of reference management systems
- understand and avoid plagiarism and the importance of personal integrity and its relationship to professional conduct
- make the most of social media opportunities for networking responsibly

C. Students are given the opportunity to develop, and recognise a range of skills that enable them to consider/approach problems critically, confidently and independently
The curriculum should show evidence of integration and reinforcement of problem solving skills throughout the programme. Institutions should provide evidence that there are opportunities for the development of these skills at both levels so that students graduate as creative and effective problem solvers.
Students should be encouraged (wherever appropriate) to:
rephrase problems in their own words and be clear about what is being asked; divide a complex problem into smaller, more manageable steps
reformulate a problem, allowing for the identification of more than one solution
ensure the answers/solutions to problems make sense/are feasible

Students should also be given the opportunity to solve open-ended problems where more than one solution is apparent from the outset (see criterion six for further consideration of creative approaches to problem solving).

Problem solving frameworks that can help define and clarify the nature of a problem, and identify a solution, may also be considered. These could include the 5Ws and 1H (Who, What, Where, When, Why, How) tool and the Osborn-Parnes Creative Problem Solving Process. Institutions may wish to make use of these frameworks when developing students' problem solving skills.

D. Communication skills are considered in terms of communicating science to a range of audiences, and through both oral and written approaches

Institutions should provide evidence that they enable students to communicate effectively through oral and written presentations. This could be formally in the programme and less formally through outreach or presentations to (for instance) student-led societies.

E. There is evidence of an approach to the development of teams and different team members (including leadership)

Teamwork can be particularly valuable with diverse teams, where each member may have a different background and therefore a distinct perspective on problems to be solved. Providing a curriculum framework in which teamwork and leadership skills are developed is a vital recognition of their importance.

F. Ethical and regulatory issues are appropriately addressed

Student exposure to and understanding of ethical issues regarding experimentation and its regulation, provides the necessary appreciation needed for certain types of research, particularly those dealing with animals and humans. The study of ethics helps students to develop widely applicable skills in communication, reasoning and reflection, as well as an introduction to codes of conduct and work as a professional scientist. As stated in criterion one, institutionss need to be clear about the difference between the institution's responsibilities in securing ethical approval and meeting legal requirements around health and safety and the learning, teaching and assessment of students' knowledge of these aspects within a programme.

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

At a basic level, all bioscience foundation degrees should integrate mathematics, statistics, chemistry and physics. Knowledge and understanding of science principles governing current techniques and concepts should be embedded within the curriculum. The knowledge and understanding of mathematical principles that support the application of key biological concepts must be sufficient to promote problem solving at the theoretical and practical levels. Students should be equipped with the mathematics needed to handle variation at different levels, especially with regard to the greatly increased amount of data being generated by modern laboratory and computing techniques. Students should understand the statistical aspects of experimental procedures, encompassing the analysis of collected data, the design and analysis of studies, the development of calibration and analysis techniques, and the robustness of data.

Guidelines

A. The coverage of mathematics, statistics, chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context
Contextual understanding should be demonstrated through the integration of these physical sciences with the biological curriculum, as appropriate. It is to be expected that this coverage will vary within the biological disciplines. The curriculum should highlight, via learning outcomes, where interdisciplinary science knowledge and understanding is fundamental to future developments within specific fields.

B. Knowledge and understanding of science principles governing current techniques and concepts, and their evolution, are embedded within the curriculum
The biological sciences sit on a foundation of physical and mathematical sciences. It is appropriate that the integration of mathematics, chemistry and physics be taught within a biological context. In this way, these subjects can be embedded within the curriculum as part of the learning developmental cycle that is relevant to specific bioscience disciplines. The use of molecular techniques in all areas of biology necessitates the need for chemistry to be included in the curriculum of all bioscience foundation degrees. The extent to which this is covered will depend upon the discipline. However, a bioscience graduate should be able to prepare solutions at known concentrations, understand the concepts of molar, molarity and molality, and manipulate solutions, as well as understand the nature and application of buffers. Different specialisms may vary in the underpinning of mathematics, statistics, chemistry and physics at the technical and analytic skills levels. For instance, the treatment of descriptive and analytical statistics may vary between the molecular and the ecological and environmental sciences streams. A greater underpinning of physics might be deemed necessary for disciplines within the molecular stream where the biological applications of synchrotron radiation, x-ray crystallography or other physical science techniques are covered.

C. The knowledge and understanding of mathematical principles that support the application of key biological concepts are sufficient to promote problem solving at the theoretical and practical levels
Provide an overview. This section is primarily concerned with mathematical problems rather than logistical problems, see 3C.

D. Students should be equipped with the mathematics needed to handle variation at different levels
Provide an overview of the statistics learning outcomes and where they are acquired.

E. Students should understand the statistical aspects of experimental procedures, encompassing the analysis of collected data, the design and analysis of studies, the development of calibration and analysis techniques, and the robustness of data
Show how students apply statistics in experimental situations. Section D above is concerned with how students learn the mathematical principles, this section, E, is about how that knowledge is applied in experimental situations.

5. Specific skills and knowledge appropriate to the award title.

While degrees accredited by the Royal Society of Biology may involve a great deal of specialisation, they should have some underpinning general knowledge of the basic fundamentals in biology, including: an overview of biodiversity, the cell, basic genetics, the concept of evolution, biochemistry and molecular biology, and organismal biology. Institutionss, in their documentation will provide details of the specialist curriculum. Reference will be made to Learned Societies where relevant.

Guidelines

A. All bioscience graduates in any area should have some basic knowledge of genetics, evolution, biochemistry, molecular biology, and organismal biology
The Society feels that it is essential that graduates from an accredited degree not only have an overview that helps them understand their chosen field of study but that they can "hold their own" in terms of basic biological knowledge in the context of overall public awareness. The topics forming the fundamentals of biology provide the underpinning context to the specialisation. The Society accepts that they may be explored to a greater or lesser extent according to specialisation of the degree and it may be appropriate that some of the core topics be mainly taught at FHEQ Level 4.

B. There has been consultation with the appropriate Learned Society for the specific skills and knowledge that may be required for a specific programme name
Institutionss should consult with the appropriate Learned Societies for the specific skills and knowledge that may be required for a specific programme name.

C. The programme adheres to the guidance of the Biosciences Benchmark
The Society recognises general areas (e.g. Molecular Aspects of Biology, Whole Organism Biology, Ecological and Environmental Sciences). The key topics within these degrees are outlined in the Quality Assurance Agency Biosciences Benchmark Statement and are not repeated here. Accredited programmes will be expected to refer to the guidance in the Biosciences Benchmark Statement (but within the context of the level of award; note the "typical standard" in the Benchmarks refers to honours degrees). (**www.qaa.ac.uk/quality-code/subject-benchmark-statements#**) and the QAA Foundation Degree Characteristics Statement (**https://www.qaa.ac.uk/docs/qaa/quality-code/foundation-degree-characteristics-15.pdf?sfvrsn=ea05f781_10**).

6. Development of creativity and innovation relevant to the work place

Developing creativity and innovation in graduates should be an implicit part of the student experience. These characteristics will serve graduates well, wherever they plan to make their careers.

Institutions should provide evidence that they encourage students to be creative by thinking differently and they should describe the steps they have taken towards providing an environment that promotes creativity and innovation. Institutions should also make it clear how they promote problem solving using techniques designed to develop individual and group creativity.

Guidelines

The development of creativity and innovation within the curriculum for an accredited degree programme could contain some or all of the following elements.

A. Institutions should provide evidence that they encourage students to be creative by 'thinking differently'
Institutions should provide evidence that they promote a creative mind set in students by encouraging them to think differently. Students should be encouraged to:

- be inquisitive and open-minded
- welcome the unexpected
- challenge assumptions and (from time-to-time) defy convention
- think beyond their own discipline and make interdisciplinary connections
- consider problems from the perspective of non-biologists

B. Institutions should describe steps that they have taken towards providing an environment that promotes creativity and innovation
There should be evidence that institutions provide the time and space for students to think creatively. This should involve the creation of a culture, ideally at all levels of degree programmes, in which creativity is stimulated and innovation thrives. Important elements of this culture include:

- the encouragement of 'off the wall' ideas, that may lead to genuinely creative solutions to problems
- the building of confidence in students so they have the courage and conviction to pursue their ideas to fruition

C. Engagement of students with techniques that can promote individual and group creativity
Institutions should make it clear how they promote creativity and creative problem solving, using techniques designed to develop individual and group creativity. For group sessions there should be evidence that institutions offer structured, constructive and inclusive approaches to creative problem solving. Where these activities are assessed, emphasis should be placed on students demonstrating how they have engaged with techniques designed to promote creativity in individuals, and the extent of their participation in group sessions. As an example for the former, students could be asked how they have utilised a specific technique during creative problem solving. Students should not be awarded marks solely on the basis of coming up with novel ideas, as this is frequently an unrealistic expectation.

International Accreditation: Route Two Criteria

This route to International Accreditation is specifically for undergraduate programmes that do not have a final year research component of at least 25% of the final year. Programmes with a significant final year research component, of at least 25% of the graduating year, with awards sometimes referred to as a 'BSc with Honours', are not considered here (see Route Three criteria)

To achieve Accreditation for a programme, Universities will need to provide robust evidence in support of their application, which will be judged by peer review against the standard metrics listed below. The evidence should show how the intended learning outcomes are being achieved through appropriate assessment strategies.

1. An integrative experience which includes analysis, synthesis and critical evaluation

i. The integrative experience will bring together and develop the skills and knowledge gained in earlier years; bring reflection and focus to the whole of the degree experience; and provide students with the opportunity to demonstrate and apply the understanding and skills that they have developed. It can be thought of as providing the student with a sense of being a professional scientist, or of "graduateness". The learning hours or credits are not specified in the criteria. The integrative experience does not need to be provided in a single module or unit.

ii. The integrative experience will be:

   a. Underpinned by a range of relevant sources, and will show recognition of health and safety, environmental and ethical considerations

   b. Based on the processes of critical thinking, synthesis, reflection and evaluation

2. Demonstration of the acquisition of technical skills and familiarity with the practical environment

i. Students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest

ii. Skill acquisition is demonstrably a progressive process

iii. There is a list of the core, assessed, technical skills used in the laboratory, field or other setting which form the foundation for the degree(s)

iv. There is evidence of competency in the core technical skills for all students on the programme

v. Training in research study design and the principles of data management, such as Good Laboratory Practice

vi. Students will appreciate the concept of 'Big Data' and its importance in understanding the living world

3. The development and use of transferable graduate skills

i. Graduates will have the basic skills of word processing, use of spreadsheets, and presentation software

ii. Graduates will be able to find, cite and use information

iii. There will be evidence that students will consider and approach a wide range of problems and problem types critically, confidently and independently

iv. Students will communicate through both oral and written approaches and to a range of audiences

v. Graduates will be experienced in teamwork approaches, including the concepts of leadership; the recognition of individual contributions; and the significance of group dynamics to effective team working

vi. There will be evidence of acquisition of general management skills including project management

vii. Regulatory and ethical issues, including environmental and social aspects, are considered and addressed by students at appropriate times throughout their programme of study

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

At a basic level, all bioscience degrees should integrate mathematics, statistics, chemistry and physics to the extent that knowledge and understanding of science principles governing current techniques and concepts should be embedded within the curriculum.

i. The coverage of chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context

ii. The knowledge and appreciation of mathematical principles must be sufficient to support the understanding and application of key biological concepts, and underpin problem solving at the theoretical and practical levels

iii. Graduates will be equipped with the appropriate knowledge and skills needed to handle variation in data at different levels of complexity

5. Specific skills and knowledge appropriate to the degree title

i. Bioscience graduates will have knowledge of the fundamentals of biology, including: an overview of biodiversity and the biological environment; molecular, cell and whole organism biology; biochemistry, genetics, and the concept of evolution

ii. Degrees will adhere to the relevant recommendations within the QAA Subject Benchmark Statements for Biosciences and/or Biomedical Sciences, with reference to other Benchmark Statements as appropriate

iii. Specialist degrees will meet the subject-specific requirements of the relevant Learned Societies as listed in the Appendix B

6. Developing creativity and innovation

The RSB recognises the importance of creating environments that support and promote the development of creativity, enterprise and entrepreneurship with our primary focus being on the experiential creative and innovative side, as being of key value to all graduates in their future employment. Creativity requires the development of approaches to solving problems, for thinking 'outside the box' – more usually recognised through contributions in the arts, it is also a skill required to research and solve scientific problems, and should be taught in that context, providing key transferable employability skills.

i. Students are taught to apply and evaluate original or unconventional ideas, and to tackle problem solving using techniques designed to develop individual and group creativity, evidenced through assessment approaches which recognise and reward such thinking

ii. Graduates are expected to have an understanding, embedded in the teaching of their subject(s), of:

   a. A contextualised learning experience using real-world scenarios to gain better alignment with expected key employability skills
   b. The notion and value of intellectual property
   c. The importance of evaluating feasibility and impact through a reflective approach
   d. The interdisciplinary nature of enterprise
   e. Financial literacy in the context of developing commercial awareness

Notes on the Route Two Criteria

The Royal Society of Biology takes a learning outcomes based approach to accrediting degrees. Intended learning outcomes of a programme identify important learning requirements. They are understandable to students, achievable, and assessed. The Society recognises that a distinction can be made between "assessment" and "grading". The Society does not necessarily expect every assessment to be graded, and indeed encourages universities to consider whether grading is necessary in all cases (e.g. in the assessment of a technical skill). Advice on learning outcomes and assessment can be obtained from the Higher Education Academy **www.heacademy.ac.uk**.

1. An integrative experience which includes the analysis and critical evaluation of data	
Attributes	**Notes**
i. The integrative experience for a BSc will bring reflection and focus to the whole of the degree experience; and provide students with the opportunity to demonstrate and apply the understanding and skills that they have developed	The integrative experience should be the pinnacle of the course, drawing on and extending the students' learning at previous levels. It need not be in a single unit or module, but collectively demonstrates understanding of the scientific process. Typically, the experience will include some appreciation of research methods (hypothesis testing and relevant statistics). It may be a "mini-project" (individual or in groups) where students have some input into the experimental design and/or research question. There will be some application of research ethics, health and safety (drawing on previous experience within the programme) and effective ("professional") communication appropriate to the level of a final year undergraduate.
ii. The integrative experience will be:	
a. Underpinned by a range of relevant sources, and will show recognition of health and safety, environmental and ethical considerations	Sources that inform integrative experiences include textbooks, journal articles, surveys, interviews, experiments, original data, secondary data, websites, blogs, tweets, wikis, practice reports and direct personal experience. What is appropriate depends on the type of experience and the purpose that the source is being used for. It should be recognised that all sources have strengths and limitations, and reflection on the limitations and validity of the sources used is part of the process. The Society recognises that responsibility for health and safety, risk analysis and appropriate environmental and ethical approval lies with the institution. However, the student should have been involved in the application process (e.g. by preparing a draft risk assessment or ethics application, rather than just reading a pre-prepared one). Group approaches are to be encouraged: team working does not mean that every member of a team does exactly the same tasks. On the contrary, team working (as emphasised by employers) involves individuals with their own areas of expertise combining on a group-based task with the individuals' contributions clear.

	If a group's integrative experience leads to the production of a single report, then it must be clear what the individual contributions are, supported by additional evidence of the individual students' input and understanding (e.g. a viva or individual oral presentation, and/or supplementary written evidence). Students must be able to demonstrate their unique contribution.
b. Based on the processes of critical thinking, synthesis, reflection and evaluation	During the final year of the programme, students must be aware of how research is framed within the context of existing knowledge, critically analyse data, communicate findings with reference to information sources and be aware of the potential avenues for further exploration.

2. Demonstration of the acquisition of technical skills and familiarity with the practical environment

Attributes	**Notes**
i. Students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest	The biosciences are a collection of subjects which require significant technical and practical training to demonstrate the key principles and develop problem solving approaches which use an experimental approach. Different subjects have their own requirements: while recognising this diversity, the RSB seeks to ensure that all students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest. Competency requires repeated learning and assessment of individual students' skills, whether working in a group or alone.
ii. Skill acquisition is demonstrably a progressive process	Students are expected to evidence increasing competency and familiarity with the skills they are acquiring over the period of their programme. The Society is specifically seeking evidence for the development of the **appropriate technical skills in relation to the subject**, whether in the field, the laboratory or the workplace. A system for recording the development of skills and experience of the practical environment should be present within the programme, to demonstrate the progressive nature of the learning.
iii. There is a list of the core, assessed, technical skills used in the laboratory, field or other setting which form the foundation for the degree(s)	There is no defined core list of competencies which must be achieved by all students: any such list would be rapidly out-of-date. However, the very basic operations (*sample and specimen handling, pipetting, manipulation of solutions, measurement, use of basic equipment, and the different forms of error*) would be expected. Different subject areas will have different requirements - please check the requirements under criterion five, which gives links to subject-

	specific material. The Society will need to feel confident that the university is **explicit** about which technical skills are being acquired by its students and where they are assessed. The university should have, and provide, **a list of the core technical skills used in the laboratory and/or field, which form the foundation for the degree subject,** and what would be deemed appropriate as a level of competency. A bespoke list may not be necessary if it is already present, for example in validation documentation or student handbooks. If a bespoke summary for the submission is required then please follow the format of the table given in Annex 2. The table ideally should evidence a progressive approach (see 2ii), where basic techniques and skills are built on during the course of the programme.
iv. There is evidence of competency in the core technical skills for all students on the programme	There should be description of how the technical skills are assessed. This can be briefly summarised in the submitted matrix (Annex 2). For example, "*technical skills of individuals are assessed on a pass/fail basis by laboratory demonstrators during the series of practical classes in modules BIO40001, BIO40002*", or any other appropriate approach. Assessments that test knowledge and understanding (e.g. written reports or theory examinations) cannot, on their own, be used to assess technical skill. Universities may wish to discuss their approach with the Society, who provide training courses for Society members on teaching, learning and assessment in the biosciences, and generate and share examples of good practice. If technical skill is being acquired and assessed in a module, we would normally expect it to be reflected in the module learning outcomes. Evidence should be provided of a basic competency in the core technical skills for all students on the programme. For example, through a record of the individual achievement of skills, or identification of compulsory learning outcomes. There must be evidence that students are trained and tested in the basic competencies, and achieve a threshold standard set by the university, and which would be deemed appropriate, for example, by employers. However, there is no requirement for all students to achieve a high level of competency in every technical skill. The Society is accrediting life science programmes, not professional training programmes.
v. Training in research study design and the principles of data management, such as Good Laboratory Practice	Obtaining and managing data is critical for successful evidence-based approaches, be they in the laboratory or in wider employment. Data management in particular is critical for ensuring that evidence gathered is verifiable; and for Quality Management, embodied in the wide range of Good Practice (GxP) approaches, such as the principles of Good Laboratory Practice (GLP), Good Manufacturing Practice (GMP) and other similar approaches. GLP and GMP are internationally recognised for the development and manufacture of drugs. While using a full GLP approach in a learning and teaching environment is not usually feasible, students should be introduced to the concepts embodied by GLP and Quality Management, including an awareness of the regulatory environment, and the role of Quality Control and

	Quality Assurance, and should be able to discuss and defend the approaches implicit in this approach.
vi. Students will appreciate the concept of 'Big Data' and its importance in understanding the living world	"Big Data" is the name given to extremely large data sets that are now generated both in biological research and in the wider business and industrial world. In particular, for the biosciences, the development of large data sets to address questions from the molecular level to the population, be it genomics or environmental level analyses, poses challenges in understanding the scale, advantages and drawbacks of such datasets. Students should understand the nature and difficulties of working with large data sets, including their strengths and limitations.
3. The development and use of transferable graduate skills	
Attributes	**Notes**
i. Graduates will have the basic skills of word processing, use of spreadsheets, and presentation software	There should be clear evidence that students have acquired these essential basic skills. As a general point, we would normally expect to see transferable skills in the learning outcomes of a module if the skill (as opposed to knowledge and understanding) is both acquired and assessed. But given the widespread use of IT in assignments we do not expect it to appear in the LOs of all modules, only those where it represents a significant feature (e.g. where students are first introduced to spreadsheets etc.).
ii. Graduates will be able to find, cite and use appropriate information	There should be evidence that students: - are able to collect, sort and protect/backup personal online resources and to take into consideration issues relating to intellectual property - demonstrate competence in the use of reference management systems - understand and avoid plagiarism and the importance of personal integrity - critically evaluate sources of information - make the most of social media opportunities for networking ethically and responsibly.
iii. There will be evidence that students will consider and approach a wide range of problems and problem types critically, confidently and independently	The criterion includes two broad categories of problem: mathematical and logistical (e.g. in research, manufacture, health care or environmental management). Students should be exposed to both during the programme. The curriculum should show evidence of integration and reinforcement of problem solving skills throughout a degree programme.

	Institutions should provide evidence that there are opportunities for the development of these skills at all levels of degree programmes so that students graduate as creative and effective problem solvers. *Students should be encouraged (wherever appropriate) to:* - *rephrase problems in their own words and be clear about what is being asked; divide a complex problem into smaller, more manageable steps* - *reformulate a problem, allowing for the identification of more than one solution* - *ensure the answers/solutions to problems make sense/are feasible.* Students should also be given the opportunity to solve open-ended problems where more than one solution is apparent from the outset (see criterion six for further consideration of creative approaches to problem solving). Problem solving frameworks that can help define and clarify the nature of a problem, and identify a solution, may also be considered. These could include the 5Ws and 1H (Who, What, Where, When, Why, How) tool and the Osborn-Parnes Creative Problem Solving Process. Institutions may wish to make use of these frameworks when developing students' problem solving skills, as well as formally teaching null hypothesis synthesis and validation.
iv. Students will communicate through both oral and written approaches, and to a range of audiences	Institutions should provide evidence that they develop students to communicate effectively through oral and written presentations. This could be formally in the programme and less formally through outreach or presentations to (for instance) student-led societies.
v. Graduates will be experienced in teamwork approaches, including the concepts of leadership; the recognition of individual contributions; and the significance of group dynamics to effective teamworking	Teamwork can be particularly valuable with diverse teams, where each member may have a different background and therefore a distinct perspective on problems to be solved. Providing a curriculum framework in which teamwork and leadership skills are developed is a vital recognition of their importance. **Universities must show where they teach the principles of teamwork, and how they implement those principles**: it is not enough to say that 'students work in pairs/groups', if those students have no understanding of the benefits and challenges of working as part of a team. Teamwork should also address the question of interdisciplinarity, where teams with different skills and knowledge come together to solve a problem (see criterion six).
vi. There will be evidence of acquisition of general management skills including project management	There should be reference to these skills in learning outcomes of specified modules where it is a significant feature (e.g. where students plan and/or cost a piece of work). This framework should include the development of time management, organisation and interpersonal skills, including the use of milestones. *This may be cross-referred to the learning points in criterion six*.

vii. Regulatory and ethical issues, including environmental and social aspects, are considered and addressed by students at appropriate times throughout their programme of study	Student exposure to and understanding of ethical issues regarding experimentation and its regulation, including adherence to the General Data Protection Regulation (GDPR), provides the necessary appreciation needed for certain types of research, particularly those dealing with animals, humans and the wider environment. The study of ethics helps students to develop widely applicable skills in communication, reasoning and reflection, as well as an introduction to codes of conduct and work as a professional scientist. As stated in criterion one, Universities need to be clear about the difference between the institution's responsibilities in securing ethical approval and meeting legal requirements around health and safety and the learning, teaching and assessment of students' knowledge of these aspects within a programme.

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

At a basic level, all bioscience degrees should integrate mathematics, statistics, chemistry and physics to the extent that knowledge and understanding of science principles governing current techniques and concepts should be embedded within the curriculum.

Attributes	**Notes**
i. The coverage of chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context	The biological sciences sit on a foundation of physical and mathematical sciences. It is appropriate that the integration of mathematics, chemistry and physics be taught within a biological context. In this way, these subjects can be embedded within the curriculum as part of the learning developmental cycle that is relevant to specific bioscience disciplines. The use of molecular techniques in all areas of biology necessitates the need for chemistry to be included in the curriculum of all bioscience degrees. Contextual understanding should be demonstrated through the integration of these physical sciences with the biological curriculum, as appropriate. It is to be expected that this coverage will vary within the biological disciplines. The curriculum should highlight, via learning outcomes, where interdisciplinary science knowledge and understanding is fundamental to future developments within specific fields. The extent to which this is covered will depend upon the discipline. However, a bioscience graduate should be able to prepare solutions at known concentrations, understand the concepts of molar, molarity and molality, and manipulate solutions, as well as understand the nature and application of buffers.
ii. The knowledge and appreciation of mathematical principles must be sufficient to support the understanding and application of key biological concepts, and underpin problem solving at the theoretical and practical levels	Different specialisms may vary in the underpinning of mathematics, statistics, chemistry and physics at the technical and analytic skills levels. For instance, the treatment of descriptive and analytical statistics may vary between the molecular and the ecological and environmental sciences streams.

	A greater underpinning of physics might be deemed necessary for disciplines within the molecular stream where the biological applications of synchrotron radiation, x-ray crystallography or other physical science techniques are covered. We would expect all students to have at least some basic knowledge of the science principles behind the technical equipment they use.
iii. Graduates will be equipped with the appropriate knowledge and skills needed to handle variation in data at different levels of complexity	Students should be equipped with the knowledge of mathematics and statistical approaches needed to handle variation at different levels, especially with regard to the greatly increased amount of data being generated by modern laboratory and computing techniques. Students should understand the statistical aspects of experimental procedures, encompassing the analysis of collected data, the design and analysis of studies, the development of calibration and analysis techniques, and the robustness of data.

5. Specific skills and knowledge appropriate to the degree title

Attributes	**Notes**
i. Bioscience graduates will have knowledge of the fundamentals of biology, including: an overview of biodiversity and the biological environment; molecular, cell and whole organism biology; biochemistry, genetics, and the concept of evolution	It is essential that graduates from an accredited degree not only have an overview that helps them understand their chosen field of study but that they can "hold their own" in terms of basic biological knowledge in the context of overall public awareness. The topics forming the fundamentals of biology provide the underpinning context to the specialisation. The Society accepts that they may be explored to a greater or lesser extent according to specialisation of the degree and it may be appropriate that some of the core topics be mainly taught at FHEQ Level 4 (or SHEQ Levels 7 or 8 in Scotland or NZQF level 5 etc.).
ii. Degrees will adhere to the relevant recommendations within the QAA Subject Benchmark Statements for Biosciences and/or Biomedical Sciences, with reference to other Benchmark Statements as appropriate	The Society recognises general areas (e.g. Molecular Aspects of Biology, Whole Organism Biology, Ecological and Environmental Sciences). The key topics within these degrees are outlined in the Quality Assurance Agency Biosciences Benchmark Statement and/or the Biomedical Sciences Benchmark Statement and are not repeated here. Accredited programmes will be expected to adhere to the guidance for the typical standard of the most current Benchmark Statements (available at **www.qaa.ac.uk/quality-code/subject-benchmark-statements#**). Note: although these are UK documents, they provide helpful guidance for all degree programmes.

iii. Specialist degrees will meet the subject-specific requirements of the relevant Learned Societies as listed in Appendix B	Many degrees are awarded in subjects that have relevant Learned Societies. Universities should consult with the appropriate Learned Societies for the specific skills and knowledge that may be required for a specific programme name. Some subject areas have defined additional Learning Outcomes (see Appendix B) which should be considered as conditions for Accreditation of degrees with relevant titles or foci. If the application is from a country that has subject specific learning outcomes or a core curriculum from its own national Learned Society, this must be indicated on the Accreditation Matrix.

6. Developing creativity and enterprise

The RSB recognises the importance of creating environments that support and promote the development of creativity, enterprise and entrepreneurship with our primary focus being on the experiential creative and innovative side, as being of key value to all graduates in their future employment. Creativity requires the development of approaches to solving problems, for thinking 'outside the box' – more usually recognised through contributions in the arts, it is also a skill required to research and solve scientific problems, and should be taught in that context, providing key transferable employability skills.

Attributes	**Notes**
i. Students are taught to apply and evaluate original or unconventional ideas, and to tackle problem solving using techniques designed to develop individual and group creativity, evidenced through assessment approaches which recognise and reward such thinking	Institutions should make it clear how they promote creativity and creative problem solving in the students' programme of study, using techniques designed to develop individual and group creativity. For group sessions, there should be evidence that **students experience structured, constructive and inclusive approaches to creative problem solving**. When these activities are assessed, emphasis should be placed on students demonstrating how they have engaged with techniques designed to promote creativity in individuals, and the extent of their participation in group sessions. As an example for the former, students could be asked how they have utilised a specific technique during creative problem solving. Students should not be awarded marks solely on the basis of coming up with novel ideas, as this is frequently an unrealistic expectation.
ii. Graduates are expected to have an understanding, embedded in the teaching of their subject(s), of the following concepts (a-e):	As well as an environment which promotes enterprise and entrepreneurship, there are some key learning points which students should be exposed to in order to aid their understanding of the post-degree work environment. This learning **should not solely be in addition to current curricula**, which would lead to student overload, but should look at current curricula and approaches to see how they can be adapted to address the skills and knowledge cited.
b. The notion and value of intellectual property	Intellectual Property drives the economic engines of innovation - students should understand how IP rights work locally and more widely outside the UK, why IP is important for development, and how to exploit it, protect it, and be aware of the potential for infringement.

Universities will recognise that these three areas (c, d and e) are intrinsic to scientific research and the use of that research. While detailed learning in these areas is dependent on the particular degrees being studied, all students should at least have an awareness of these different concepts as they relate to the successful translation of research to public benefit, be it commercial exploitation or social and environmental improvement.

c. The importance of evaluating feasibility and impact through a reflective approach	Students should be able to place their work in the wider social and commercial context, and understand the value and importance of it, relative to the wider world. 'Feasibility' can include concepts such as 'Technology Readiness Levels (TRL, see **https://publications.parliament.uk/pa/cm201011/cmselect/cmsctech/619/61913.htm**) as well as financial and public benefit aspects.
d. The interdisciplinary nature of enterprise	As well as scientific interdisciplinarity, students should be made aware of the different types of business culture and company sizes that exist, and their different attributes – a good example framework might be the supply chain in drug manufacture and its role and importance in delivering translational research. Enterprise is not just about business, and students should also be made aware of the "application of enterprise behaviours, attributes and competencies into the creation of cultural, social or economic value; Green entrepreneurship is where environmental problems are explored to result in a net positive impact on the natural environment using sustainable processes".[3]
e. Financial literacy in the context of developing commercial awareness	'Financial literacy' is about understanding the wider value chain in business, and links strongly to feasibility (see 6iic above), relevant to commercial, social and green enterprises.

International Accreditation: Route Three Criteria

This route to International Accreditation is specifically for Undergraduate programmes which involve a significant final year research component (referred to as a capstone experience), making up at least 25% of the graduating year. For awards that do not include this component, please refer to the Route Two criteria.

To achieve Accreditation for a programme, Universities will need to provide robust evidence in support of their application, which will be judged by peer review against the standard metrics listed below. The evidence should show how the intended learning outcomes are being achieved through appropriate assessment strategies.

1. A graduating level capstone experience which includes analysis, synthesis and critical evaluation, resulting in a defined output

i. The capstone experience will integrate and develop the skills and knowledge gained in earlier years; bring reflection and focus to the whole of the degree experience; and provide students with the opportunity to demonstrate and apply the understanding and skills that they have developed

ii. The capstone experience will be:
   a. An extended piece of enquiry-based work, relevant to the degree, with a justified approach that effectively communicates its outcomes
   b. Underpinned by a range of relevant sources, and will show recognition of health and safety, environmental and ethical considerations
   c. Contextualised, and show recognition of the provisional nature of knowledge, building to an appropriate conclusion
   d. Based on the processes of critical thinking, synthesis, reflection and evaluation

2. Demonstration of the acquisition of technical skills and familiarity with the practical environment

i. Students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest
ii. Skill acquisition is demonstrably a progressive process
iii. There is a list of the core, assessed, technical skills used in the laboratory, field or other setting which form the foundation for the degree(s)
iv. There is evidence of competency in the core technical skills for all students on the programme
v. Training in research study design and the principles of data management, such as Good Laboratory Practice
vi. Students will appreciate the concept of 'Big Data' and its importance in understanding the living world

3. The development and use of transferable graduate skills

i. Graduates will have the basic skills of word processing, use of spreadsheets, and presentation software

ii. Graduates will be able to find, cite and use information

iii. There will be evidence that students will consider and approach a wide range of problems and problem types critically, confidently and independently

iv. Students will communicate through both oral and written approaches and to a range of audiences

v. Graduates will be experienced in teamwork approaches, including the concepts of leadership; the recognition of individual contributions; and the significance of group dynamics to effective teamworking

vi. There will be evidence of acquisition of general management skills including project management

vii. Regulatory and ethical issues, including environmental and social aspects, are considered and addressed by students at appropriate times throughout their programme of study

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

At a basic level, all bioscience degrees should integrate mathematics, statistics, chemistry and physics to the extent that knowledge and understanding of science principles governing current techniques and concepts should be embedded within the curriculum.

i. The coverage of chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context

ii. The knowledge and appreciation of mathematical principles must be sufficient to support the understanding and application of key biological concepts, and underpin problem solving at the theoretical and practical levels

iii. Graduates will be equipped with the appropriate knowledge and skills needed to handle variation in data at different levels of complexity

5. Specific skills and knowledge appropriate to the degree title

i. Bioscience graduates will have knowledge of the fundamentals of biology, including: an overview of biodiversity and the biological environment; molecular, cell and whole organism biology; biochemistry, genetics, and the concept of evolution

ii. Degrees will adhere to the relevant recommendations within the QAA Subject Benchmark Statements for Biosciences and/or Biomedical Sciences, with reference to other Benchmark Statements as appropriate

iii. Specialist degrees will meet the subject-specific requirements of the relevant Learned Societies as listed in the Appendix B

6. Developing creativity and innovation

The RSB recognises the importance of creating environments that support and promote the development of creativity, enterprise and entrepreneurship with our primary focus being on the experiential creative and innovative side, as being of key value to all graduates in their future employment. Creativity requires the development of approaches to solving problems, for thinking 'outside the box' – more usually recognised through contributions in the arts, it is also a skill required to research and solve scientific problems, and should be taught in that context, providing key transferable employability skills.

i. Students are taught to apply and evaluate original or unconventional ideas, and to tackle problem solving using techniques designed to develop individual and group creativity, evidenced through assessment approaches which recognise and reward such thinking

ii. Graduates are expected to have an understanding, embedded in the teaching of their subject(s), of:

   a. A contextualised learning experience using real-world scenarios to gain better alignment with expected key employability skills
   b. The notion and value of intellectual property
   c. The importance of evaluating feasibility and impact through a reflective approach
   d. The interdisciplinary nature of enterprise
   e. Financial literacy in the context of developing commercial awareness

Notes on the Route Three Criteria

The Royal Society of Biology takes a learning outcomes based approach to accrediting degrees. Intended learning outcomes of a programme identify important learning requirements. They are understandable to students, achievable, and assessed. The Society recognises that a distinction can be made between "assessment" and "grading". The Society does not necessarily expect every assessment to be graded, and indeed encourages universities to consider whether grading is necessary in all cases (e.g. in the assessment of a technical skill). Advice on learning outcomes and assessment can be obtained from the Higher Education Academy **www.heacademy.ac.uk**.

1. A graduating level capstone experience which includes analysis, synthesis and critical evaluation, resulting in a defined output	
Attributes	**Notes**
i. The capstone experience will integrate and develop the skills and knowledge gained in earlier years; bring reflection and focus to the whole of the degree experience; and provide students with the opportunity to demonstrate and apply the understanding and skills that they have developed	The capstone experience tackles a central scientific question or issue in depth, which the students take ownership of. All sections of the capstone experience should relate to the same issue rather than being a collection of unrelated essays. The capstone experience must be the pinnacle of the course, drawing on and extending the students' learning at previous levels. It should be a first-hand experience of performing science. The Society accepts that research is a collaborative process (e.g. between student and supervisor) but the contribution of individual students must be identifiable and assessable.
ii. The capstone experience will be:	*Further notes can be found in Annex 1.*
a. An extended piece of enquiry-based work, relevant to the degree, with a justified approach that effectively communicates its outcomes	There are a variety of approaches to research, but central to these is a desire to find out something, and relate it to a hypothesis. The research can be qualitative, quantitative, laboratory/field or design-based, or utilise other scholarly approaches. Many types of experiences can be devised that can fulfil the criterion for a capstone experience *(e.g. laboratory or field-based, pedagogic, computer-based, socio-biological and biogeographical research*). There may also be different approaches such as a biotechnology-business study, and group approaches. **The important factor in deciding whether these represent a capstone experience is the presence of independently sourced information that is critically analysed.** There should be no discrimination based on previous achievements: all types of capstone experiences should be available for each student. Capstone experiences should be based on systematic and rigorous methods, with a clear explanation of how these methods are applied, to achieve the purpose and goals of the capstone experience. The capstone experience is expected to be an "extensive" piece of work, and the Society interprets this to mean that it should be equivalent to **at least 25% of final year full-time study**. The capstone experience

	need not be limited to one module, as long as the links between modules are clear. Commonly, for instance, the Research Methods aspect is taught separately from the research experience itself, such that two or more modules together make up at least 25% of the time in the final year. Group approaches are to be encouraged: team working does not mean that every member of a team does exactly the same tasks. On the contrary, team working (as emphasised by employers) involves individuals with their own areas of expertise combining on a group-based task with the individuals' contributions clear. If a group's capstone experience leads to the production of a single report, then it must be clear what the individual contributions are, supported by additional evidence of the individual students' input and understanding (e.g. a viva or individual oral presentation, and/or supplementary written evidence). Students must be able to demonstrate their unique contribution.
b. Underpinned by a range of relevant sources, and will show recognition of health and safety, environmental and ethical considerations	Sources that inform capstone experiences include textbooks, journal articles, surveys, interviews, experiments, original data, secondary data, websites, blogs, tweets, wikis, practice reports and direct personal experience. What is appropriate depends on the type of capstone experience and the purpose that the source is being used for. It should be recognised that all sources have strengths and limitations, and reflection on the limitations and validity of the sources used is part of the process. The Society recognises that responsibility for health and safety, risk analysis and appropriate environmental and ethical approval lies with the institution. However, the student should have been involved in these processes as they apply to their capstone experience (*e.g. by preparing a draft risk assessment or ethics application that can be submitted as assessed coursework or included in the capstone experience report*).
c. Contextualised, and show recognition of the provisional nature of knowledge, building to an appropriate conclusion	Students must (1) frame their research within the context of existing knowledge, recognising that it may be provisional; (2) develop and test ideas or hypotheses to explain observations, connections and relevance of links; (3) execute and manage objectives; (4) critically analyse data and (5) communicate the results of their study with reference to information sources and potential avenues for further exploration.
d. Based on the processes of critical thinking, synthesis, reflection and evaluation	See above 1c.

2. Demonstration of the acquisition of technical skills and familiarity with the practical environment	
Attributes	**Notes**
i. Students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest	The biosciences are a collection of subjects which require significant technical and practical training to demonstrate the key principles and develop problem solving approaches which use an experimental approach. Different subjects have their own requirements: while recognising this diversity, the RSB seeks to ensure that all students learn in a hands-on, practical environment, and are trained in the technical skills appropriate to their main subject interest. Competency requires repeated learning and assessment of individual students' skills, whether working in a group or alone.
ii. Skill acquisition is demonstrably a progressive process	Students are expected to evidence increasing competency and familiarity with the skills they are acquiring over the period of their programme. The Society is specifically seeking evidence for the development of the **appropriate technical skills in relation to the subject**, whether in the field, the laboratory or the workplace. A system for recording the development of skills and experience of the practical environment should be present within the programme, to demonstrate the progressive nature of the learning.
iii. There is a list of the core, assessed, technical skills used in the laboratory, field or other setting which form the foundation for the degree(s)	There is no defined core list of competencies which must be achieved by all students: any such list would be rapidly out-of-date. However, the very basic operations (*sample and specimen handling, pipetting, manipulation of solutions, measurement, use of basic equipment, and the different forms of error*) would be expected. Different subject areas will have different requirements - please check the requirements under criterion five, which gives links to subject-specific material. The Society will need to feel confident that the university is **explicit** about which technical skills are being acquired by its students and where they are assessed. The university should have, and provide, **a list of the core technical skills used in the laboratory and/or field, which form the foundation for the degree subject,** and what would be deemed appropriate as a level of competency. A bespoke list may not be necessary if it is already present, for example in validation documentation or student handbooks. If a bespoke summary for the submission is required then please follow the format of the table given in Annex 2. The table ideally should evidence a progressive approach (see 2ii), where basic techniques and skills are built on during the course of the programme.
iv. There is evidence of competency in the core technical skills for all students on the programme	There should be description of how the technical skills are assessed. This can be briefly summarised in the submitted matrix (Annex 2). For example, "*technical skills of individuals are assessed on a pass/fail*

	basis by laboratory demonstrators during the series of practical classes in modules BIO40001, BIO40002", or any other appropriate approach. Assessments that test knowledge and understanding (e.g. written reports or theory examinations) cannot, on their own, be used to assess technical skill. Universities may wish to discuss their approach with the Society, who provide training courses for Society members on teaching, learning and assessment in the biosciences, and generate and share examples of good practice. If technical skill is being acquired and assessed in a module, we would normally expect it to be reflected in the module learning outcomes. Evidence should be provided of a basic competency in the core technical skills for all students on the programme. For example, through a record of the individual achievement of skills, or identification of compulsory learning outcomes. There must be evidence that students are trained and tested in the basic competencies, and achieve a threshold standard set by the university, and which would be deemed appropriate, for example, by employers. However, there is no requirement for all students to achieve a high level of competency in every technical skill. The Society is accrediting life science programmes, not professional training programmes.
v. Training in research study design and the principles of data management, such as Good Laboratory Practice	Obtaining and managing data is critical for successful evidence-based approaches, be they in the laboratory or in wider employment. Data management in particular is critical for ensuring that evidence gathered is verifiable; and for Quality Management, embodied in the wide range of Good Practice (GxP) approaches, such as the principles of Good Laboratory Practice (GLP), Good Manufacturing Practice (GMP) and other similar approaches. GLP and GMP are internationally recognised for the development and manufacture of drugs. While using a full GLP approach in a learning and teaching environment is not usually feasible, students should be introduced to the concepts embodied by GLP and Quality Management, including an awareness of the regulatory environment, and the role of Quality Control and Quality Assurance, and should be able to discuss and defend the approaches implicit in this approach.
vi. Students will appreciate the concept of 'Big Data' and its importance in understanding the living world	"Big Data" is the name given to extremely large data sets that are now generated both in biological research and in the wider business and industrial world. In particular, for the biosciences, the development of large data sets to address questions from the molecular level to the population, be it genomics or environmental level analyses, poses challenges in understanding the scale, advantages and drawbacks of such datasets. Students should understand the nature and difficulties of working with large data sets, including their strengths and limitations.

3. The development and use of transferable graduate skills	
Attributes	**Notes**
i. Graduates will have the basic skills of word processing, use of spreadsheets, and presentation software	There should be clear evidence that students have acquired these essential basic skills. As a general point, we would normally expect to see transferable skills in the learning outcomes of a module if the skill (as opposed to knowledge and understanding) is both acquired and assessed. But given the widespread use of IT in assignments we do not expect it to appear in the LOs of all modules, only those where it represents a significant feature (e.g. where students are first introduced to spreadsheets etc.).
ii. Graduates will be able to find, cite and use appropriate information	There should be evidence that students: - are able to collect, sort and protect/backup personal online resources and to take into consideration issues relating to intellectual property - demonstrate competence in the use of reference management systems - understand and avoid plagiarism and the importance of personal integrity - critically evaluate sources of information - make the most of social media opportunities for networking ethically and responsibly.
iii. There will be evidence that students will consider and approach a wide range of problems and problem types critically, confidently and independently	The criterion includes two broad categories of problem: mathematical and logistical (e.g. in research, manufacture, health care or environmental management). Students should be exposed to both during the programme. The curriculum should show evidence of integration and reinforcement of problem solving skills throughout a degree programme. Institutions should provide evidence that there are opportunities for the development of these skills at all levels of degree programmes so that students graduate as creative and effective problem solvers. *Students should be encouraged (wherever appropriate) to:* - *rephrase problems in their own words and be clear about what is being asked; divide a complex problem into smaller, more manageable steps* - *reformulate a problem, allowing for the identification of more than one solution* - *ensure the answers/solutions to problems make sense/are feasible.* Students should also be given the opportunity to solve open-ended problems where more than one solution is apparent from the outset (see criterion six for further consideration of creative approaches to problem solving).

	Problem solving frameworks that can help define and clarify the nature of a problem, and identify a solution, may also be considered. These could include the 5Ws and 1H (Who, What, Where, When, Why, How) tool and the Osborn-Parnes Creative Problem Solving Process. Institutions may wish to make use of these frameworks when developing students' problem solving skills, as well as formally teaching null hypothesis synthesis and validation.
iv. Students will communicate through both oral and written approaches, and to a range of audiences	Institutions should provide evidence that they develop students to communicate effectively through oral and written presentations. This could be formally in the programme and less formally through outreach or presentations to (for instance) student-led societies.
v. Graduates will be experienced in teamwork approaches, including the concepts of leadership; the recognition of individual contributions; and the significance of group dynamics to effective teamworking	Teamwork can be particularly valuable with diverse teams, where each member may have a different background and therefore a distinct perspective on problems to be solved. Providing a curriculum framework in which teamwork and leadership skills are developed is a vital recognition of their importance. **Universities must show where they teach the principles of teamwork, and how they implement those principles**: it is not enough to say that 'students work in pairs/groups', if those students have no understanding of the benefits and challenges of working as part of a team. Teamwork should also address the question of interdisciplinarity, where teams with different skills and knowledge come together to solve a problem (see criterion six).
vi. There will be evidence of acquisition of general management skills including project management	There should be reference to these skills in learning outcomes of specified modules where it is a significant feature (e.g. where students plan and/or cost a piece of work). This framework should include the development of time management, organisation and interpersonal skills, including the use of milestones. *This may be cross-referred to the learning points in criterion six*.
vii. Regulatory and ethical issues, including environmental and social aspects, are considered and addressed by students at appropriate times throughout their programme of study	Student exposure to and understanding of ethical issues regarding experimentation and its regulation, including adherence to the General Data Protection Regulation (GDPR), provides the necessary appreciation needed for certain types of research, particularly those dealing with animals, humans and the wider environment. The study of ethics helps students to develop widely applicable skills in communication, reasoning and reflection, as well as an introduction to codes of conduct and work as a professional scientist. As stated in criterion one, Universities need to be clear about the difference between the institution's responsibilities in securing ethical approval and meeting legal requirements around health and safety and the learning, teaching and assessment of students' knowledge of these aspects within a programme.

4. A foundation in mathematics, statistics, chemistry and physics within a biological context appropriate to the discipline

At a basic level, all bioscience degrees should integrate mathematics, statistics, chemistry and physics to the extent that knowledge and understanding of science principles governing current techniques and concepts should be embedded within the curriculum.

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i. The coverage of chemistry and physics should be of sufficient depth and breadth to provide the necessary knowledge and understanding for students to appreciate and apply these subjects within a biological context	The biological sciences sit on a foundation of physical and mathematical sciences. It is appropriate that the integration of mathematics, chemistry and physics be taught within a biological context. In this way, these subjects can be embedded within the curriculum as part of the learning developmental cycle that is relevant to specific bioscience disciplines. The use of molecular techniques in all areas of biology necessitates the need for chemistry to be included in the curriculum of all bioscience degrees. Contextual understanding should be demonstrated through the integration of these physical sciences with the biological curriculum, as appropriate. It is to be expected that this coverage will vary within the biological disciplines. The curriculum should highlight, via learning outcomes, where interdisciplinary science knowledge and understanding is fundamental to future developments within specific fields. The extent to which this is covered will depend upon the discipline. However, a bioscience graduate should be able to prepare solutions at known concentrations, understand the concepts of molar, molarity and molality, and manipulate solutions, as well as understand the nature and application of buffers.
ii. The knowledge and appreciation of mathematical principles must be sufficient to support the understanding and application of key biological concepts, and underpin problem solving at the theoretical and practical levels	Different specialisms may vary in the underpinning of mathematics, statistics, chemistry and physics at the technical and analytic skills levels. For instance, the treatment of descriptive and analytical statistics may vary between the molecular and the ecological and environmental sciences streams. A greater underpinning of physics might be deemed necessary for disciplines within the molecular stream where the biological applications of synchrotron radiation, x-ray crystallography or other physical science techniques are covered. We would expect all students to have at least some basic knowledge of the science principles behind the technical equipment they use.
iii. Graduates will be equipped with the appropriate knowledge and skills needed to handle variation in data at different levels of complexity	Students should be equipped with the knowledge of mathematics and statistical approaches needed to handle variation at different levels, especially with regard to the greatly increased amount of data being generated by modern laboratory and computing techniques. Students should understand the statistical aspects of experimental procedures, encompassing the analysis of collected data, the design and analysis of studies, the development of calibration and analysis techniques, and the robustness of data.

5. Specific skills and knowledge appropriate to the degree title	
Attributes	**Notes**
i. Bioscience graduates will have knowledge of the fundamentals of biology, including: an overview of biodiversity and the biological environment; molecular, cell and whole organism biology; biochemistry, genetics, and the concept of evolution	It is essential that graduates from an accredited degree not only have an overview that helps them understand their chosen field of study but that they can "hold their own" in terms of basic biological knowledge in the context of overall public awareness. The topics forming the fundamentals of biology provide the underpinning context to the specialisation. The Society accepts that they may be explored to a greater or lesser extent according to specialisation of the degree and it may be appropriate that some of the core topics be mainly taught at FHEQ Level 4 (or SHEQ Levels 7 or 8 in Scotland or NZQF level 5 etc.).
ii. Degrees will adhere to the relevant recommendations within the QAA Subject Benchmark Statements for Biosciences and/or Biomedical Sciences, with reference to other Benchmark Statements as appropriate	The Society recognises general areas (e.g. Molecular Aspects of Biology, Whole Organism Biology, Ecological and Environmental Sciences). The key topics within these degrees are outlined in the Quality Assurance Agency Biosciences Benchmark Statement and/or the Biomedical Sciences Benchmark Statement and are not repeated here. Accredited programmes will be expected to adhere to the guidance for the typical standard of the most current Benchmark Statements (available at **www.qaa.ac.uk/quality-code/subject-benchmark-statements#**).
iii. Specialist degrees will meet the subject-specific requirements of the relevant Learned Societies as listed in Appendix B	Many honours degrees are awarded in subjects that have relevant Learned Societies. Universities should consult with the appropriate Learned Societies for the specific skills and knowledge that may be required for a specific programme name. Some subject areas have defined additional Learning Outcomes (see Appendix B) which should be considered as conditions for Accreditation of degrees with relevant titles or foci. If the application is from a country that has subject specific learning outcomes or a core curriculum from its own national Learned Society, this must be indicated on the Accreditation Matrix.

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The RSB recognises the importance of creating environments that support and promote the development of creativity, enterprise and entrepreneurship with our primary focus being on the experiential creative and innovative side, as being of key value to all graduates in their future employment. Creativity requires the development of approaches to solving problems, for thinking 'outside the box' – more usually recognised through contributions in the arts, it is also a skill required to research and solve scientific problems, and should be taught in that context, providing key transferable employability skills.

Attributes	Notes
i. Students are taught to apply and evaluate original or unconventional ideas, and to tackle problem solving using techniques designed to develop individual and group creativity, evidenced through assessment approaches which recognise and reward such thinking	Institutions should make it clear how they promote creativity and creative problem solving, in the students' programme of study, using techniques designed to develop individual and group creativity. For group sessions there should be evidence that **students experience structured, constructive and inclusive approaches to creative problem solving**. When these activities are assessed, emphasis should be placed on students demonstrating how they have engaged with techniques designed to promote creativity in individuals, and the extent of their participation in group sessions. As an example for the former, students could be asked how they have utilised a specific technique during creative problem solving. Students should not be awarded marks solely on the basis of coming up with novel ideas, as this is frequently an unrealistic expectation.
ii. Graduates are expected to have an understanding, embedded in the teaching of their subject(s), of the following concepts (a-e):	As well as an environment which promotes enterprise and entrepreneurship, there are some key learning points which students should be exposed to in order to aid their understanding of the post-degree work environment. This learning **should not solely be in addition to current curricula**, which would lead to student overload, but should look at current curricula and approaches to see how they can be adapted to address the skills and knowledge cited.
a. A contextualised learning experience using real-world scenarios to gain better alignment with expected key employability skills	Students learn through application and practice: there are many areas of the life sciences where principles can be taught by reference to "real-world" examples. This can often be done by inviting external specialist and employers to show how the basic science relates to their industry, for instances using Enterprise Masterclasses. Employers seek an awareness of the wider context and how to develop graduates' skills for that wider context, and Universities are charged with preparing their students for that world.
b. The notion and value of intellectual property	Intellectual Property drives the economic engines of innovation - students should understand how IP rights work locally and more widely outside the UK, why IP is important for development, and how to exploit it, protect it, and be aware of the potential for infringement.

Universities will recognise that these three areas (c, d and e) are intrinsic to scientific research and the use of that research. While detailed learning in these areas is dependent on the particular degrees being studied, all students should at least have an awareness of these different concepts as they relate to the successful translation of research to public benefit, be it commercial exploitation or social and environmental improvement.	
c. The importance of evaluating feasibility and impact through a reflective approach	Students should be able to place their work in the wider social and commercial context, and understand the value and importance of it, relative to the wider world. 'Feasibility' can include concepts such as 'Technology Readiness Levels (TRL, see **https://publications.parliament.uk/pa/cm201011/cmselect/cmsctech/619/61913.htm**) as well as financial and public benefit aspects.
d. The interdisciplinary nature of enterprise	As well as scientific interdisciplinarity, students should be made aware of the different types of business culture and company sizes that exist, and their different attributes – a good example framework might be the supply chain in drug manufacture and its role and importance in delivering translational research. Enterprise is not just about business, and students should also be made aware of the "application of enterprise behaviours, attributes and competencies into the creation of cultural, social or economic value; Green entrepreneurship is where environmental problems are explored to result in a net positive impact on the natural environment using sustainable processes".[5]
a. Financial literacy in the context of developing commercial awareness	'Financial literacy' is about understanding the wider value chain in business, and links strongly to feasibility (see 6iic above), relevant to commercial, social and green enterprises.

Annex for Route Two and Three

Annex 1 (For Route Three only) – Further notes for the capstone experience

The type of capstone experience

Many types of EQF level 6 (SCQF level 10) capstone experiences can be devised that can fulfil the criterion for a capstone experience (e.g. laboratory or field-based, pedagogic, computer-based, socio-biological and biogeographical research). There may also be different approaches such as a biotechnology-business study. The important factor in deciding whether these represent a capstone experience is the presence of independently sourced information that is critically analysed. For guidance, some examples other than traditional laboratory or field capstone experiences include the following:

1) Informatics capstone experiences. These may use computer-held, information databases that are ecological, molecular, physiological or taxonomical in nature, which can be investigated using software to identify trends or relationships or processes. In this type of capstone experience the data already exists in one form but it has to be found, manipulated and analysed so that conclusions may be reached.

2) Science education capstone experiences. These may create new ways of imparting knowledge and will include analysis of the reaction to, or success of, a particular pedagogic approach or method.

3) Questionnaire-based capstone experiences. These may find out what is known or not known, acted on, or understood about a process or treatment. They may test an idea by asking and analysing the answer to questions. A hypothesis is required, with ethical or other matters considered and response data generated and analysed.

4) Business development projects, where the focus is on project selection and analysis of business potential for commercial exploitation and translation of biological innovations. These are frequently in collaboration with colleagues in Business Schools, and/or involving 'real world' entrepreneurs in their research.

5) A substantial period of work experience in a professional environment (e.g. bio-tech company, clinical research unit, research laboratory or field station), relevant to the degree, that allows the student to apply the theoretical knowledge and skills acquired during the degree programme while carrying out their own supervised research in an appropriately resourced environment. There will be a significant personal activity element where the student can independently generate and analyse data. The work will be underpinned by a range of relevant sources and include recognition of health, safety and ethical considerations and professional best practice. The learning outcomes and method of assessment will, as a minimum, be the same as those for in-house capstone experiences. Where students are working as part of a team, the following guidance note on group capstone experiences applies. Throughout the period of work experience, the interaction of the student with the supervisors (from the HEI and employer) must be documented allowing the support and progress to be clearly monitored.

This note is cautious about use of the word "dissertation" as it is used differently across Universities. It may for example be a term used to describe the submitted written report following a period of laboratory/field research or it could be used to describe a literature review. Panel members will need to be confident about how an applicant uses the term and may need to specifically seek clarification when considering an application.

Literature-based reviews of a topic do not qualify as a capstone experience if critical analysis of data is absent. Although students are expected to write literature reviews of subjects, this activity alone is not

considered sufficient for the student to demonstrate the attributes needed to perform a capstone experience. Accordingly, literature-based capstone experiences should include data mining, analysis and hypothesis testing in addition to a literature review.

An example of a literature-based capstone experience that meets the Society's criteria are meta-analyses. These use statistical techniques to combine results from independent researchers; they are frequently applied for example when investigating multiple studies on the clinical effectiveness of a healthcare intervention. It is important to distinguish meta-analysis from a critical analysis of a series of research papers, where there is no manipulation or analysis of data, as expected from a literature review. If students are being offered meta-analysis capstone experiences, it is likely that they will have received appropriate education in the statistical methods appropriate.

Individual or group capstone experiences

Independent work is an important aspect of the capstone experience. Independence is demonstrated easily when a capstone experience is performed individually, but this does not necessarily mean that capstone experiences performed in a group setting fail to meet this criterion. It is possible for a number of students to follow the same line of enquiry, or be using the same methods, or be co-supervised, or perform a group environmental study, but they each generate and analyse data independently so that unique reports are produced. In which case, the capstone experiences meet the Accreditation criterion.

It is important to understand that team working does not mean that every member of a team does exactly the same tasks. On the contrary, team working (as emphasised by employers) involves individuals with their own areas of expertise combining on a group-based task with the individuals' contributions clear. One helpful approach is to assign clear roles and responsibilities to each member of the team, and assessing them individually against those roles and responsibilities

Examples of capstone experiences that are "individual" and ***do*** meet the criteria, but have a team ethos, are where students:

- investigate the same receptor but each student studying a different antagonist
- study an enzyme but under different conditions
- use a DNA database but investigate different mutations
- work on the same medicine but from different angles such as research and development, health and safety, or patient information
- investigate the same environment but from different perspectives
- make contributions that are clearly identified as individual and assessable
- work in a multi-disciplinary environment where their personal biological input is discernible and assessable

If a group's capstone experience leads to the production of one report, then it must be clear what the individual contributions are, supported by additional evidence of the individual students' input and understanding (e.g. a viva or individual oral presentation, and/or supplementary written evidence). Students must be able to demonstrate their unique contribution. The use of rubrics can be particularly valuable in ensuring fair and objective assessment.

Capstone experiences that would ***not*** meet the criteria are those where students all work together generating just one set of data, submitted as one written report, with no identification of the individuals' efforts and all students receive the same mark.

Range and choice

It is likely that an institution will provide a range of capstone experience types for their students. It is a requirement for Accreditation that all capstone experiences offered to students meet the Accreditation criteria. This ensures that all students can demonstrate the threshold levels for the learning outcomes associated with the capstone experience. The process for the allocation of capstone experiences should be clearly stated, matching the career aspirations of the students and their ability. Where a choice of capstone experience type is available, this process should ideally ensure that all students who wish to undertake a laboratory or field-based capstone experience should be able to do so, with no discrimination based on

previous achievements: all capstone experiences should be available for each student. This position can be achieved by an institution by ensuring that the range of capstone experiences offered have equal status, and are equally relevant to the students and the programme.

Annex 2 (For Route Two and Three) – Technical skills table

If a bespoke technical skills table is required, then please follow the format of the table below. The table ideally should evidence a progressive approach, where basic techniques and skills are built on during the course of the programme. There should be description of how the technical skills are assessed. This can be briefly summarised in the table. For example, "technical skills of individuals are assessed on a pass/fail basis by laboratory demonstrators during the series of practical classes in modules BIO40001, BIO40002", or any other appropriate approach.

Skill	First year	Second year	Third year
Aseptic Technique	Introduced in module BIO40001	Developed in module BIO50001	Applied in microbiology capstone experience, module BIO60008
Etc.			

International Accreditation: Route Four Criteria

Route Four Accreditation is for any postgraduate programme in the Biosciences. The Route Four Accreditation criteria require institutions to provide evidence that their graduates meet defined sets of learning outcomes, including gaining substantial research experience.

Universities will reflect on the needs of their learners in preparing them for key research positions within the biosciences. International Accreditation via Route Four will also enable the sharing of good practice across the sector, thus driving up the standard of graduates in the specific biological and life sciences.

It seeks to identify and recognise programmes that deliver the research and development leaders and innovators of the future.

Degree programmes recognised for International Accreditation via Route Four by the RSB are likely to be those that:

Enhance leadership and reward innovation

Successful degree programmes will equip students with the skills to become leaders and innovators in research and development. For this reason, the research environment in which this learning takes place is a key consideration of the Accreditation process, as is the learning and teaching environment.

Develop independent research skills

Degree programmes gaining International Accredited status will bestow independent research capabilities upon their graduates. A period of practice will allow the student to apply the knowledge and learning gained in their academic training, while carrying out their own supervised research in an active research environment. The research will be related to, and draw on, the theoretical knowledge and skills already acquired. During this period, students will become fully integrated into the research environment and become more independent thinkers.

Deliver excellence

Route Four degree programmes will be highly regarded within the learning and teaching community, the research community, and by employers. Such programmes will be delivered by subject experts and produce graduates with the potential to excel in a career in their chosen field.

International Accreditation via Route Four recognises three facets of a particular programme:

1. A base of knowledge, understanding, skills and excellence as defined by the RSB, which provides the framework and standards for Accreditation
2. Specific knowledge, understanding and skills for routes identified by the intended learning outcomes, and defined in partnership between the RSB, relevant Learned Societies, and other partners
3. A sizeable research element, which provides the opportunity to develop skills in a range of research techniques and experience of planning and undertaking at least one substantial research project

Universities will need to provide robust evidence of excellence in support of their application, which will be judged by peer review against the standard metrics listed below. The evidence for (A) and (D) should show how the appropriate intended learning outcomes are being achieved through appropriate assessment strategies.

1. Does the documentation indicate that the programme incorporates academic excellence within the teaching programme supporting a structured learning opportunity? Does documentation provide evidence of academic excellence:

i. Knowledge and understanding of the specialist subject informed by current scholarship and research
ii. Proven practical expertise in the laboratory, field and elsewhere appropriate for the main research project
iii. Knowledge and understanding of research methodology
iv. A critical awareness of current issues and developments in the subject area
v. Completion of an extended research project in the subject area, including a clear demonstration of critical analysis
vi. Communication of the research outcomes appropriately and effectively
vii. Appropriate and clear assessment criteria, mapped to the learning outcomes
viii. Specialisation in a subject area that supports the development of specific skills

2. Research-active environment, as evidenced by:

i. An appropriate breadth in the area being offered for Accreditation
ii. Research excellence, as defined by appropriate national and international criteria
iii. Appropriate training in research methodology and techniques and assessment
iv. The provision of projects in research-active environments, where the effort required by the student for the research component of this work would normally be the equivalent of at least 1/3 of the total credits.

3. Does the documentation provide evidence of an infrastructure supporting the incorporation of excellence within the teaching programme? This will include:

i. Access to, and standards of, library and information and communications technology
ii. Learning and teaching environments and research laboratories and facilities
iii. Experience and expertise of teaching team
iv. Processes to support monitoring achievement throughout, including process of approving progression to higher levels
v. A track record of success for the programme's graduates in research in industry or higher education
vi. Provision of necessary and appropriate research facilities and equipment
vii. There is an approach to general management skills, including project management
viii. Ethical, health and safety and regulatory issues are appropriately addressed

4. Does the documentation provide evidence of generic and specific skill acquisition appropriate to the degree title? This will include:

i. Appropriate levels of knowledge and understanding in physics, chemistry and mathematics necessary to apply advanced bioscience techniques related to the subject area
ii. The ability to study independently
iii. Experience of using a range of techniques and research methods in a safe and responsible manner
iv. An analytical, problem-solving approach to their work and the ability to critically evaluate evidence
v. An understanding of research design
vi. Effective communication through a variety of media, to non-specialist audiences
vii. An appreciation for the significance of ethical, social and legal issues and critical awareness of current developments in the subject
viii. Prepare the student for a future career
ix. There is evidence of an approach to the development of teams and different team members (including leadership)
x. Students should understand the statistical aspects of experimental procedures, encompassing the analysis of collected data, the design and analysis of studies, the development of calibration and analysis techniques, and the robustness of data
xi. Awareness of data banks and analysis of large data sets
xii. Health and safety training in the laboratory/field

5. The period of practice is that part of the course concerned with a research project completed in a work environment – it is where the student experiences the practice of science. The nature of the research may be experimental, where it is performed in a laboratory, or computational linked to bioinformatics, or it may be more related to bio-enterprise. It is expected that the research will generate information that can be critically evaluated. The work environment may be a research laboratory within an academic institute or at an industrial or commercial company, or in a designated research area such as a specific field location or aboard a research ship. For Accreditation, when the student is working away from the home institution, it is important that the mechanisms for monitoring student progress be clearly described.

i. A period of practice will allow the student to apply the knowledge and learning gained in their academic training while carrying out their own supervised research in an active research environment
ii. The research will be related to, and draw on, the theoretical knowledge and skills already acquired during the degree programme
iii. The student effort should be substantial (equivalent to 1/3 of total credits or more for a research-based course, see glossary), and evidence of achieving the learning outcomes should be clearly documented against the produced written work
iv. Throughout the period of practice, the interaction of the student with the supervisor should be documented allowing progress to be clearly monitored
v. The period of practice should be passed for the award of the degree

Introduction to International Consultancy

RSB International Consultancy involves a review of the curriculum structure, delivery and student experience using the criteria for Accreditation as a template. Accreditation is not an immediate outcome of Consultancy. Instead, it is a point in time review which gives advice on how to develop the academic curriculum and set strategies for the ongoing enhancement of the student experience. We offer (depending on the package chosen) ongoing support over a fixed period, in the form of review and advice, as well as identifying aspects of good practice which can be built on.

International Consultancy is provided to support bioscience departments when a full application for Accreditation of programmes is premature or not possible for other reasons. We take into account the local context and environment. The focus of our Consultancy programme is the student experience and educational attainment (i.e. the learning outcomes) within a course. The specific criteria used for Consultancy will depend on the level of course in question so please refer to the most appropriate criteria for your programmes (see table here).

The Society accepts applications for International Accreditation if, from a brief review of the programme documentation, it appears that all the fundamental elements of the relevant criteria are present. Where universities teach programmes which do not currently meet our criteria, we offer the Consultancy service. This may lead to an application for Accreditation at a later date. The Consultancy process often brings to light recommendations that are applicable to other programmes (e.g. audit of academic quality, teaching and learning and assessment)

As a professional body we are interested in what students learn and achieve, not just in subject knowledge and understanding but also subject-specific and transferable skills. To assess this, we need to see clearly articulated learning outcomes (see Glossary). We also need to see a clear teaching, learning and assessment strategy. In some cases, the links between programme learning outcomes, module learning outcomes and student assessment is unclear. The Consultancy process highlights these connections and provides a stimulus for a team approach to teaching.

Our aim is to help you produce programmes of international repute.

Types of International Consultancy

The society offers two types of Consultancy service: Light Touch and Full Programme Review. Both aim to improve the educational standards of degrees being assessed but the level of support varies.

Light Touch Review is a moment in time assessment of the programme which includes a written report and a teleconference with the review panel.

Full Programme Review is more in depth, with two intermediate reports and a final report; multiple teleconferences; and ongoing support for 12 months following submission. These processes are explained in more detail below.

For more information or to discuss which option is best for your course please contact **accreditation@rsb.org.uk**

Process of Light Touch International Consultancy

The light touch process is usually achieved in a period of two to three months. This process is outlined below, with further information on the method of submission detailed in Appendix A. The preferred method of videoconference will be Zoom; though other methods may be possible on request.

01

Stage One

Institutions are required to electronically submit evidence to the Society in support of their application. Full details are listed in Appendix A. This process, designed to be brief and not to replicate existing paperwork or to be unduly bureaucratic, outlines how the institution believes that it achieves the intended learning outcomes as stipulated in the criteria, and how it delivers and monitors the research experiences of its students.

The application will be assessed by a Review Panel, which will produce an initial report summarising the assessment.

02

Stage Two

A teleconference will be held with key members of the programme team and the Review Panel. The initial report will be discussed in detail and the Panel will be able to answer questions on any of the issues raised.

03

Stage Three

Following the teleconference, the Review Panel will produce a Final Report, summarising the discussions and finalising the recommendations made. The Programme team will have the chance, one month from the initial videoconference, to organise a further call to clarify the points raised in the Final Report.

Process of Full Programme Review International Consultancy

The programme review process is usually achieved in four stages and will normally take a period of twelve months. This is outlined below, with further information on the method of submission detailed in Appendix A.

The visit to the UK for the review meetings will be arranged by mutual convenience of the Society and the HEI. Please note that students and recent graduates (if applicable) need to be available for video conference during the review visit (see Appendix E). There is also an option to undergo Full Programme Review with a site visit where the Review Panel visit the university in country. This option takes into account the UK Foreign & Commonwealth Office advice on travel to the country and would follow the plan used in Accreditation site visits, as outlined in Appendix D.

The assessment reports produced by the Programme Review Panel (the Panel) will not be made publicly available. However, the Society will share reports produced by the Panel with any sponsors of the programme(s); please see the formal expression of interest form for more information.

01

Stage One

Institutions are required to electronically submit evidence to the Society. Full details are listed in Appendix A.

The evidence will be assessed by a Programme Review Panel, which will produce a Stage One Report summarising the assessment. This will be sent to the institution for fact checking and will act as a guideline for questions likely to arise at stage two. Institutions will have the opportunity to submit additional evidence following this report and prior to entering the next step of the process.

02

Stage Two

Key members of staff from the applying institution are required to travel to the UK to hold face-to-face discussions with the Panel or, at the discretion of the Society, the applying institution can request a site visit by the Panel to the university. The Panel will also carry out an evaluation of the institute's facilities and speak to students (via video conference for a UK visit).

Informal feedback may be given to the programme team at the end of the visit, although this is at the discretion of The Panel.

A Stage Two Report will be produced by The Panel and submitted for ratification. Universities will be kept informed of likely timescales involved for ratification to occur.

03

Stage Three

The Programme Review Panel will produce a recommendation letter highlighting areas of good practice and recommending areas for improvement. Examples and advice will be given on how these improvements can be achieved within the local context.

04

Stage Four

Ongoing support will be available, with up to four videoconferences possible within the following 12 months. After the final video conference, the Panel will produce a concluding report which will detail the actions already taken by the institution and any recommended future actions. This report will also advise whether an application to Accreditation is recommended though it is at the institution's discretion whether this is to be undertaken.

Video conferencing requirements

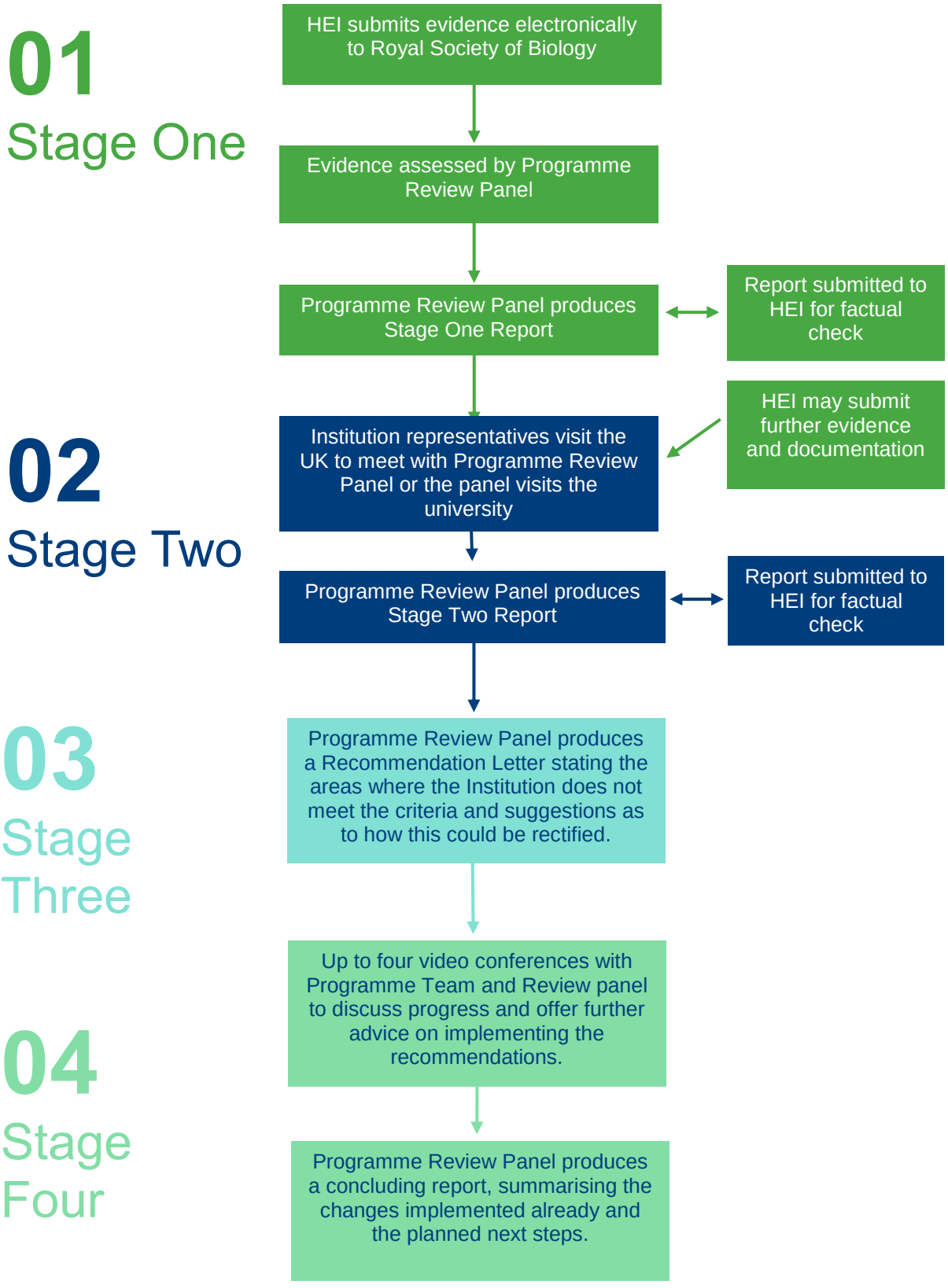
The RSB will require details of the video conferencing software that will be used to communicate with the students. The RSB has a preference for Zoom, however alternative video conferencing software will be considered on a case by case basis. The RSB will request a practice run through of the software at least one week prior to the UK visit.

The virtual tour of the facilities can be pre-recorded, however the video footage should be recent and representative of the actual learning environment.

Travel Documentation

The RSB recognises that some HEIs will require visas for travel to the UK. If you require additional documents such as an invitation letter from the Society to support your visa application, please notify the Society once you have submitted your formal expression of interest form. Please note that supporting visa letters will only be provided to delegates from the applying HEI who will be attending the UK visit and once all relevant details have been satisfactorily provided.

Detailed Process of Full Programme Review



Cost of International Consultancy

Institutions applying for International Consultancy will be charged a fee to cover the Society's administrative costs, including any likely costs incurred through the review process. For full programme review, universities will be required to pay the travel costs associated with representatives from the programme team visiting the UK to meet with the Programme Review Panel or vice versa.

Similar to our International Accreditation, the cost of Consultancy will be decided on a case by case basis and will take into account various factors, including the number of courses put forward. It will also depend on the type of Consultancy that has been chosen. The RSB will offer a discount to any university that undergoes an Accreditation application having first completed a full programme review.

For more information, please email **accreditation@rsb.org.uk**

Review Panel Membership and Role

A Panel will include a panel Chair with experience of chairing, approvals, and quality assurance, and up to three panel members with a variety of backgrounds but could include members from academia, industry and other relevant sectors. Panel members are selected based on their experience and subject area expertise. Panel members are experts in the current practices, methodologies, and advancements in their area of expertise. Panellists will also have an understanding of the scientific content of degree programmes. The RSB provides administrative support and a panel secretary for the meetings.

The size and composition of a Panel will depend on the type of programme(s) being reviewed. All panel members will provide insight into the practical value of the skills taught by each degree programme. Panellists from industry will give clearer context to the significance of the learning outcomes from the point of view of the employer.

Members of the Review Panel have:

- Completed a comprehensive training course
- Read all initial documentation submitted by the applying HEI and worked with the Chair to complete the Stage One Report
- Taken part in all meetings and assisted in producing reports necessary for the completion of the Consultancy process

Further information on the guidelines for panel Chairs and members can be found in Appendix C.

Appendix A – Process of applying for Accreditation or Consultancy

Universities should first indicate their interest in seeking Accreditation/Consultancy by contacting the Accreditation Team at **accreditation@rsb.org.uk**. Following initial conversations, the University will be required to complete and submit a formal expression of interest form, which can be downloaded from our website: **www.rsb.org.uk/education/Accreditation/International-Degree-Accreditation-Important-Documents**.

Once a site visit or conference call date has been agreed, a suitable document submission date shall be arranged (usually 8 weeks before). Documentation for the stage one review should be submitted to the Accreditation Team by 17:00 on the specified date. For guidance, please contact the Accreditation Team by emailing **accreditation@rsb.org.uk**.

The following documents should be submitted electronically to the Royal Society of Biology:

1. Letter of intent

   This should summarise how the programme meets the criteria for Accreditation and characteristics of an accredited programme (see advice below). Only one letter of intent is required per application, and must refer to all programmes seeking Accreditation/Consultancy.

   The letter of intent must include:

   - a list of the degree titles for which Accreditation/Consultancy is sought
   - a brief summary of the structure of the degrees and any options
   - a declaration of any articulation agreements if appropriate
   - the numbers of students enrolled on each degree programme
   - date of the last periodic review
   - paragraphs summarising how the programme(s) meet each of the criteria
   - a brief explanation of how the submitted evidence is organised (e.g. a list of folders and their contents, this can be provided as a separate paper attached to the letter of intent if desired)

2. Completed evidence matrix

3. Table of technical skills

4. Programme specifications

5. Programme details, including:
   - programme structure including optional routes (where only a specific route or pathway within the core degree programme will meet the Accreditation criteria, the University should ensure that this is made clear)
   - knowledge and skills learning outcomes
   - list of acronyms and definitions used by the University
   - the learning, teaching and assessment strategy
   - student handbook(s)

International applications should include a general description of the structure of degrees for their institution, i.e. if using credit hours, how many hours do the different forms of teaching equate to; how many credits are prescribed as general or specialist; any other requirements for graduation.

6. Module (or unit) descriptors and handbooks

7. Resource documents:
   - an overview of the facilities available at the University relating to the programme
   - brief résumés (or equivalent) for the programme leader(s) and key academic staff involved in the programme

8. Appropriate internal and/or external reviews and reports

9. Details of procedures and processes adopted within the University, for consideration and approval of ethical issues and Home Office Licences (or equivalent), as relevant to the programme submitted for Accreditation. Evidence of student exposure to and understanding of these processes

10. Destination data for recent graduates of the programme

11. Most recent summative assessments (e.g. examination papers, etc.); coursework assessments may be listed and/or described in student handbooks (item 5) or module descriptors (item 6), if so they need not be sent as a separate file

Where internal programme reviews contain the required information (i.e. items 4 to 11), it is perfectly acceptable to submit these.

Wherever possible, online access to the University's e-learning facilities should be made available to the Assessment Panel.

Evidence Matrix

All applying Universities must complete at least one evidence matrix. For a complex and broad set of programmes the University may consider it easier to present a matrix for each set of related awards, however, this should be discussed with the Accreditation Team in the first instance. If existing documentation does not summarise where skills are taught and assessed additional tables as appendices to the matrix should be supplied.

For ease of reference, the matrix is based on the criteria and closely follows the template for the Stage One Report used by assessors.

A template for the matrix can be found at **www.rsb.org.uk/education/Accreditation/International-Degree-Accreditation-Important-Documents**.

Appendix B – Subject specific learning outcomes

In addition to the core learning outcomes specified for each Accreditation type, specific outcomes have been developed by Learned Societies across the key areas of the biosciences for specific skills and knowledge, appropriate to specific degree titles.

Degrees using 'Biochemistry' in their title

The Biochemical Society suggests that the graduates of a biochemistry degree programme should be able to:

- demonstrate an understanding of the chemistry, structure and function of biological molecules
- explain biological mechanisms, such as the processes and control of bioenergetics and metabolism, as chemical reactions
- explain the biochemical processes that underlie the relationship between genotype and phenotype
- demonstrate an understanding of the structure and function of both prokaryotic and eukaryotic cells (including the molecular basis and role of subcellular compartmentalisation)
- apply laboratory-orientated numerical calculations (e.g. inter-conversion of masses, moles, and molarity, preparation of solutions and accurate dilutions)
- be capable in data visualization and analysis, including the application of data transformations (e.g. logarithmic, exponential)
- demonstrate an understanding of the principles, and have practical experience of, a wide range of biochemical techniques (e.g. basic molecular biology, cell biology and microbiology methods, spectrophotometry, the use of standards for quantification, enzyme kinetics; macromolecular purification, chromatography and electrophoresis)
- analyse biochemical data (e.g. in enzyme kinetics, molecular structure analysis and biological databases)
- Biochemistry degrees require a higher level of chemistry content than many/most other biological science degrees:
  'A solid foundation in chemistry is essential for any Biochemistry degree programme. Relevant aspects of chemistry beyond that included in A-level courses should be taught, ideally early on within the degree programme, so that these principles can be related to key biochemical concepts. More advanced biological chemistry topics might also require the inclusion of chemistry material later on within the biochemistry degree, once the fundamentals have been covered.'
- The aim of the core material in chemistry is to provide the student with sufficient knowledge of the basics of chemistry (physical, analytical, bioinorganic and organic) to be able to study and understand the subject of biochemistry. The content should include a sensible grounding in the following topics, not necessarily all embedded within chemistry specific modules/courses:
  - Atomic and molecular structure (including bonding and stereochemistry); non-covalent interactions
  - Thermodynamics, particularly of solutions, including electrochemistry
  - Organic mechanisms and functional-group organic chemistry
  - Chemical reaction kinetics
  - Analytical methods e.g., UV-Vis., IR spectroscopy, NMR, MS
  - Bio-inorganic chemistry (i.e. the importance of metals in biology)
  - Practical experience of analytical approaches, including different types of spectroscopy

Degrees using 'Ecology' in their title

The British Ecological Society suggests that the graduates of an ecology degree programme should be able to:

- demonstrate practical fieldwork skills (e.g. ecological survey techniques, species identification and ecological impact assessments)
- demonstrate an understanding of key ecological interactions and processes: the distribution and abundance of organisms, the interactions among organisms, the interaction between organisms and their environment, and the structure and function of ecosystems
- explain scales and patterns in ecology and biodiversity (e.g. individual to biosphere, landscape ecology, geographic and global ecology)
- appreciate the relationships between ecology and society (e.g. science into policy, conservation ecology, biodiversity conservation, natural resource capital, ecosystem services)

Degrees using 'Microbiology' in their title

The Society for Applied Microbiology suggests that the graduates of a microbiology degree programme should be able to:

- analyse and manipulate microorganisms under appropriate containment conditions
- apply aseptic technique for isolation, culture, enumeration and safe disposal of microorganisms
- characterise and identify microorganisms using a wide variety of systematic techniques (including those based on physiology, biochemistry, chemosystematics and molecular biology)
- analyse the interaction of microbes with their environment, including other microflora
- explain the application of microbiology, and its contribution to solving global challenges facing humanity (including infection control, food security, energy supply and climate change)

Degrees using 'Pharmacology' in their title

The British Pharmacological Society suggests that the graduates of a pharmacology degree programme should be able to:

- construct and analyse drug concentration/dose-response relationships using living tissues or model systems with knowledge of the pharmacologist's role in developing in vitro and in vivo models in which drug action can be tested
- evaluate the action of drugs in whole organisms, living tissues, and/or model systems using a variety of pharmacological techniques (e.g. bioassays, receptor binding, receptor cloning, recombinant proteins for therapy, animal models of disease, genetic manipulation of cells and animals and their uses)
- apply principles of pharmacokinetics using living tissues, model systems or simulations (e.g. pharmacokinetic modelling software) and demonstrate numeracy in pharmacological calculations (e.g. drug concentration, loading dose, therapeutic index)
- explain how advances in pharmacology (e.g. small molecular inhibitors, antisense therapy, biopharmaceuticals, pharmacogenomics, novel drug delivery systems) can contribute to improving human and animal health including the development of personalised therapies

These learning outcomes could be achieved through the following:
www.bps.ac.uk/education-engagement/teaching-pharmacology/core-curricula/undergraduate-pharmacology-core-curriculum

For Pharmacology degrees where students are taught about, carry out research, analyse literature or use data generated from studies involving research animals, please also refer to the additional guidance in the 'Research animal sciences' section.

Degrees using 'Physiology' in their title

The Physiological Society suggests that the graduates of a physiology degree programme should possess the following subject specific skills and knowledge:

- describe and explain the relationship between the molecular, cellular and tissue structure of each body system and relate this to their different functions and physiological roles in health and disease
- explain the concept and importance of maintaining physiological homeostasis at the cellular, system and organismal level, and the consequences of homeostatic imbalance in disease
- describe how cells communicate with each other, the concepts of positive and negative feedback between cells, and the importance of these processes in the maintenance of physiological homeostasis
- explain the principles of collecting physiological data, and apply practical skills in either human or animal models both in vivo (e.g. ECG, spirometry, nerve conduction) and ex vivo (e.g. isolated tissue experiments, cell culture, haemolysis assays, molecular biology techniques)
- analyse physiological data (e.g. electrophysiological signals, fluorescence images) using appropriate data handling and statistical methods, and demonstrate an awareness of the ethical and legal issues that relate to collecting physiological data from human and animal subjects

For Physiology degrees where students are taught about, carry out research, analyse literature or use data generated from studies involving research animals, please also refer to the additional guidance in the 'Research animal sciences' section below.

Research animal sciences specific learning outcomes

Degrees where students are taught about, carry out research, analyse literature or use data generated from studies involving research animals.

The British Pharmacological Society, in discussion with a range of stakeholders[6], define "Studies involving research animals" as studies where the involvement of animals is subject to legislation, regulation, or national standard, for example, in the United Kingdom, studies regulated by the Animals (Scientific Procedures) Act 1986. They suggest that graduates of such degree programmes or courses should be able to:

- demonstrate knowledge and understanding of the scientific use of research animals
- demonstrate knowledge and understanding of the regulatory, ethical & welfare issues surrounding the use of research animals
- analyse and critique literature and/or data that has been generated from studies involving research animals

These learning outcomes could be achieved through the following: **https://www.bps.ac.uk/education-engagement/research-animals/curriculum-for-the-use-of-research-animals**

Further Guidance

Unlike many of the subject-specific skills and knowledge criteria, it is unlikely that entire degree programmes are devoted to this topic, rather students will acquire knowledge, skills and understanding of the discipline in specific modules or courses (or elements of these) encompassing, but not limited to: animal welfare; ethics; law; animal physiology and pathophysiology; the use of research animals to better understand physiology, disease processes, in drug development, to fulfil regulatory obligations, and in translational studies; experimental design; data analysis and interpretation; experimental procedures and techniques involving research animals. This knowledge, skills and understanding could also be acquired in capstone research projects or experiences.

The modules or courses could form part of many different undergraduate and taught master's degree programmes including (but not limited to): Animal Physiology and Nutrition; Animal Sciences; Behavioural Sciences; Biology; Degree programmes in the Biomedical, Medical or Life Sciences; Psychology; Toxicology; Zoology.

[6] The British Pharmacological Society, British Association of Psychopharmacology, British Toxicology Society, Chinese National Pharmacological Society, International Union of Basic and Clinical Pharmacology, Laboratory Animal Science Association, Physiological Society and the Safety Pharmacology Society, among others.

Appendix C - Assessment panel membership and guidelines

The Assessment Panel considers the evidence submitted by universities through an initial application and site visit. If Accreditation is sought, the Panel will provide a recommendation to the Accreditation Review Panel (a subcommittee of the Accreditation Committee). The decision approval process for Accreditation is shown in Figure 2 below. The assessment is not simply a tick-box exercise and requires academic judgement.

Figure – Decision Approval Process for Accreditation

A Panel will include a panel Chair with experience of chairing, approvals, and quality assurance, and at least one other panel member. Panel members are selected based on their experience and subject area expertise. The RSB provides training for panel members, administrative support, and a panel secretary for the site visit.

The size and composition of a Panel may depend on the type of programme(s) under review. Members of the Panel are expected to be up to date with current practice in higher education with a focus on quality assurance, programme design and content.

Members of the Assessment Panel are expected to:

- Complete a comprehensive online distance training course
- Read all initial documentation submitted by the applying University and work with the Chair to complete the Stage One Report
- Take part in a pre-meeting with other panel members
- Attend a stage two site visit to the applying University
- Work with the Panel Chair to draft a Stage Two Report for submission to the Accreditation Review Panel

Members of the Assessment Panel must abide by the Royal Society of Biology Code of Conduct and declare, prior to the start of the process, any potential conflicts of interest with the degree programme under review.

Conflicts of interest

Members of the Panel must not have worked for, or acted as an external examiner for, the University being assessed in the last five years. Members of the Panel are expected to (and will be given the opportunity to) declare any previous working relationships with the University that would prevent them from assessing a particular application.

Code of Conduct

In the course of conducting assessments for the RSB, the Panel may come in contact with individually identifiable, commercially sensitive and/or confidential information. Panel members must treat all information received or obtained while performing any duties on behalf of the RSB as confidential and not divulge such information to any other person or organisation unless authorised to do so. This responsibility continues after the assessment has concluded.

In order to ensure that universities, the scientific community, and the wider public may have confidence in the effectiveness and impartiality of the RSB's Degree Accreditation Programme, members of the Panel must undertake to:

- Inform the RSB of any potential conflicts of interest as soon as possible
- Not use their position as a member of the Panel to promote their personal, professional or business interests
- Respect the confidentiality of information acquired to them solely by virtue of their position as a member of the Panel and not discuss any specific aspects of an ongoing application with anyone working/studying at, or associated with, the University being accredited or any other unauthorised person
- Attend all meetings at which their presence is required
- Prepare for meetings by reading all papers issued beforehand
- Direct relevant questions about an Accreditation event to the RSB
- Be fair, open-minded, unbiased and non-prejudicial on grounds of gender, race, disability, lifestyle, culture, beliefs, sexuality, age or any other irrelevant ground and not use any language that could be deemed offensive or discriminatory
- Not request or accept any inducement, gift, commission, discount or any other profit from the University being assessed or from any other interested person

Adhering to this Code of Conduct is a minimum expectation of all members of the Royal Society of Biology Assessment Panel. The RSB reserves the right to revoke membership of the Panel if any panel member does not abide by this Code of Conduct.

The Panel will be covered by public liability and/or indemnity insurance for committee members held by the Society whilst carrying out assessments.

Appendix D – Guidance for International Accreditation Site Visit

Before the site visit

The University will book accommodation including breakfast for the Panel members in a suitable nearby hotel. If necessary, the University should also arrange transport for the Panel to the venue for 09:00 on the mornings of the visit.

Days of site visit

The example agenda and guidance provided below are flexible and subject to change, depending on individual circumstances. All times given are approximate. A conference room, large enough for all meetings, with tea, coffee and water, set out in boardroom style should be provided. Student project reports and any additional documentation requested should be made available for viewing.

Day 1

09:00 – 09:30 **Arrival of Assessment Panel**

09:30 – 10:30 **Introductions and presentation by Programme Team**

The University should prepare a presentation of no longer than 30 minutes' duration on the degree programme(s) being submitted for Accreditation, preferably given by the programme leader. This should describe any unique or particularly valuable features of the programme(s) and provide details of any optional pathways. The presentation should not attempt to answer any of the questions arising from the Stage One report.

10:30 – 12:30 **Meeting with Programme Team**

The Panel will meet with up to 10 key individuals from the Programme Team. The Panel may request particular individuals to be present, and the programme leader, placement co-ordinator and assessment officer (or equivalent) should all be present. The University should provide name boards including job titles for all attendees of this meeting.

The Panel will discuss aspects arising from the Stage One Report. Normally this report will set the agenda for the meeting; however, it is possible that topics may arise from the presentation or any documentation submitted after receipt of the Stage One Report. The programme team will have the opportunity to respond and provide further evidence. The programme team may wish to explain how they have addressed, or plan to address, any issues or to query the Panel's interpretation of the evidence provided.

12:30 – 13:30 **Lunch with Programme Team**

The University should provide a light lunch for the Panel and the programme team in a suitable venue.

13:30 – 15:00 **Tour of facilities**

A tour should be arranged to give the Panel a chance to see laboratories and other facilities available to students on the programme(s) being considered. This should concentrate on facilities integral to learning and teaching for students on the programme(s) being assessed.

The Panel may request to see particular laboratories or facilities and advance notice will be given if this is the case. Where visits to particular facilities that may have restricted access are required, the University is kindly asked to arrange this in advance. The timing of this stage of the visit is flexible to ensure that the labs will be in use during the tour of the facilities. Please alert the RSB if this is not a suitable time for the tour.

15:00 **End of day 1**

Day 2

09:00 – 11:00 **Private meeting of Panel**

A private meeting room should be provided. The Panel may require that additional documentation is made available during this meeting. Therefore, the contact details of a member of staff, who will be available to assist, should be provided.

11:00 – 12:00 **Meeting with students**

The University should issue an invitation to students and recent graduates to speak to the Panel about their learning experiences. The Panel ask that a selection of 10-20 student representatives across all years of the programme should attend, including, if possible, recent graduates.

12:00 – 13:00 **Lunch with students**

The University should provide a light lunch for the Panel and the students in a suitable venue.

13:00 – 15:00 **Private meeting of Panel**

A private meeting room should be provided. The Panel may require that additional documentation is made available during this meeting. Therefore, the contact details of a member of staff, who will be available to assist, should be provided.

15:00 – 16:00 **Feedback to the Programme Team**

The timing of the feedback session is flexible depending on the private meeting of the Panel. The Chair will deliver feedback to the programme team including the provisional outcome of the process where possible (final decisions are made by the RSB's Accreditation Committee).

16:00 **End of visit**

Appendix E – Guidance for International Consultancy (full programme review) meeting in the UK

Key representatives from the programme team of the applying institution are expected to visit the UK in order to meet with the Review Panel. The Panel shall make it known in advance, who they would like to attend the meetings in the UK, but at a minimum, the representatives should be knowledgeable about the programmes being reviewed. The Society shall be responsible for organising a venue for the two days of the visit. It is likely that this venue shall be at, or close to, the offices of the Royal Society of Biology in London, but this shall be confirmed during the application. Please note that there is an option for the visit to take place at the university if desired. In this case, the visit will follow a similar process as that in Appendix D.

Day 1

09:00 – 11:00 **Private meeting of Review Panel**

11:00 – 13:00 **Introductions and presentation by Programme Team representatives**

The visiting representative(s) from the Programme Team should prepare a presentation of no longer than 30 minutes' duration on the degree programme(s) being submitted for review. This should describe any unique or particularly valuable features of the programme(s) and highlight the links between research and teaching on the programme. This will be followed by a discussion of the programmes with the assessors.

13:00 – 13:30 **Lunch**

The Society shall provide a light lunch for the visiting programme team representatives and the Panel.

13:30 – 15:00 **Meeting with students**

The HEI should issue an invitation to students and recent graduates to speak to the Panel about their learning experiences via a video conference. The Panel ask that a selection of 10-20 student representatives across all years of the programme should be available, including, if possible, recent graduates and students currently undertaking placements. The timing of this stage of the visit is flexible in order to take account of, and facilitate, any time difference.

15:00 – 17:00 **Virtual Tour of facilities**

A tour *via* live video conference or pre-recorded video should be arranged to give the Panel a chance to see laboratories and other facilities available to students on the programme(s) being considered. This should concentrate on facilities integral to learning and teaching for students on the programme(s) being assessed.

The Panel may request to see particular laboratories or facilities and advance notice will be given if this is the case. The timing of this stage of the visit is flexible in order to take account of, and facilitate, any time difference. Please alert the RSB if this is not a suitable time for the tour.

17:00 – 17:30 **Private meeting of Review Panel**

17:30 **End of Day 1**

Day 2

09:00 – 10:30 **Private meeting of Review Panel**

10:30 – 12:00 **Meeting with Programme Team**

The Panel will meet with the visiting representatives from the Programme Team. If appropriate, the rest of the Programme Team may be included *via* video conference.

The Panel will discuss aspects arising from the Stage One Report. Normally this report will set the agenda for the meeting; however, it is possible that topics may arise from the presentation or any documentation submitted after receipt of the Stage One Report. The programme team will have the opportunity to respond and provide further evidence. The programme team may wish to explain how they have addressed, or plan to address, any issues or to query the Panel's interpretation of the evidence provided.

12:00 – 13:00 **Lunch with Programme Team**

The Society shall provide a light lunch for the visiting programme team representatives and the Panel.

13:00 – 15:00 **Private meeting of Panel**

The Panel may require that additional information is made available during this meeting.

15:00 – 16:00 (approx.) **Feedback to the Programme Team**

The timing of the feedback session is flexible depending on the private meeting of the Panel. The Chair will deliver feedback to the visiting programme team representatives including the provisional outcome of the process where possible (final decisions are made by the RSB's Accreditation Committee). If appropriate, the rest of the Programme Team may be included via video conference.

16:00 **End of Day 2**

Appendix F - Guidelines for publicity following successful Accreditation

Programmes undertaking the Accreditation process will not be publicly announced until they have successfully completed the Accreditation process and we ask that the University keep their participation confidential.

Further tailored publicity guidance (dependent on the type of Accreditation awarded) will be sent once the University is successfully awarded Accreditation.

Upon completion, successfully accredited degree programmes will be entitled to:

- Receive a certificate of Accreditation from the Royal Society of Biology
- Promote the accredited degree programme(s) and the benefits of studying and graduating from an accredited programme in marketing materials
- Use the Royal Society of Biology's name and logo on all materials relating to an accredited degree programme(s)
- Use the Royal Society of Biology's name and logo on the University's website in relation to the accredited degree programme(s)
- Use the Royal Society of Biology's name and logo on other marketing materials relating to the accredited degree programme(s), following permission from the Royal Society of Biology
- Use the following statement on the University's website in relation to the accredited degree programme(s):

  This programme has been accredited by the Royal Society of Biology following an independent and rigorous assessment. Accredited degree programmes contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers. The Accreditation criteria require evidence that graduates from accredited programmes meet defined sets of learning outcomes, including subject knowledge, technical ability and transferable skills.

Participating universities must not imply that other establishments, yet to achieve Accreditation, are not offering relevant, high-quality programmes when referring to the Accreditation Programme in external literature.

The Royal Society of Biology maintains the right to request the removal of its name and all of its trademarks, including its logo, from printed or electronic material or publications at any time.

Appendix G - Guidance for interim Accreditation

The Royal Society of Biology encourages universities with new programmes, where students have yet to graduate, to apply for Accreditation. Under these circumstances, the Accreditation process is likely to include a review of the programme documentation and a site visit before the first cohort of students graduate. The Society may grant interim Accreditation pending first cohort graduation, with full Accreditation status awarded afterwards, if appropriate. Universities with relevant programmes should contact the Accreditation Team in advance of their application.

The decision process for interim Accreditation is likely to involve the following steps:

- Submission of all relevant stage one documentation, as detailed in Appendix A
- Review of documentation by the Accreditation Assessment Panel, and completion of an interim Accreditation Stage One Report:

  If assessors feel there is a substantial gap between the proposed outcomes for the programme and those required for Accreditation, this will be communicated to the University. At this point, the University may choose to implement any suggested changes and resubmit for interim Accreditation; or apply for full Accreditation following the graduation of the first cohort of students; or withdraw their application. Any reapplication will incur additional costs for assessors' time and effort, but consideration will be given to the initial review.

- If assessors feel the course demonstrates the potential to meet the required outcomes, a site visit will be scheduled, as detailed in Appendix D
- Following the site visit, the Panel will complete an interim Accreditation Stage Two Report, highlighting the final steps for the programme in question:

  If the site visit highlights aspects of the programme that do not achieve the outcomes for Accreditation, these will be communicated to the University. At this point, the University may choose to implement any suggested changes and resubmit for interim Accreditation; or apply for full Accreditation following the graduation of the first cohort of students; or withdraw their application. Any reapplication will incur additional costs for assessors' time and effort, but consideration will be given to the initial review.

  If the Panel is satisfied that the required outcomes for Accreditation will be achieved, they can recommend to the RSB Accreditation Committee that the programme should be awarded interim Accreditation. An interim Accreditation Stage Three Report will be sent to the University where actions relating to conditions or recommendations should be evidenced. The University will have a period of six weeks to complete the Stage Three Report and provide any supporting documentation. Interim Accreditation is not formally awarded until the Stage Three Report has been completed.

- Following the award of interim Accreditation, the University must complete an annual report declaring any changes implemented since the initial stage one review

Interim to Full Accreditation

In order to gain full Accreditation, documentation should be provided to assure the assessors that the graduate learning outcomes are being achieved, and that any recommendations made by the Panel for improving the programme are being acted upon. Once the first cohort of students has graduated, and if the Panel is satisfied that the programme meets the requirements for Accreditation, it can recommend to the RSB Accreditation Committee that full Accreditation status should be awarded.

Should the Panel conclude that there is insufficient evidence to award full Accreditation, the programme will continue with the status of interim Accreditation, until sufficient evidence is submitted.

Interim Accreditation will be awarded for a period of five years; if there is insufficient evidence that the programme meets the requirements for full Accreditation at the end of that period, interim Accreditation status will be withdrawn.

Programmes will be awarded full accredited status for the remainder of the initial five-year period, unless a site visit is required. If a site visit is required, full accredited status will be awarded for a period of five years from the date of ratification.

Guidelines for publicity following award of interim Accreditation

Following the achievement of interim Accreditation, the University will be entitled to:

- Use the Royal Society of Biology's name and logo on all printed and digital materials, including the University's website, relating to programmes awarded with interim Accreditation
- Use the Society's name and logo on all other marketing materials relating to the interim accredited programme(s), following permission from the Royal Society of Biology
- Use the following statement on the University's website in relation to the interim accredited programme(s):

  This programme has been interim accredited by the Royal Society of Biology following an independent and rigorous assessment. Accredited degree programmes contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers. The Accreditation criteria require evidence that graduates from accredited programmes meet defined sets of learning outcomes, including subject knowledge, technical ability and transferable skills. Following a successful demonstration to the Society that these graduate attributes have been attained, and the first cohort of students from the programme have graduated, the programme may be awarded full Accreditation.

Further tailored publicity guidance will be sent once the University is successfully awarded interim Accreditation, depending on the type of Accreditation awarded.

Universities must not imply that full Accreditation of any programme is guaranteed following receipt of interim Accreditation.

Participating universities must not imply that other establishments, yet to achieve Accreditation or interim Accreditation, are not offering relevant, high-quality programmes when referring to the Degree Accreditation Programme in external literature.

The Royal Society of Biology maintains the right to request the removal of its name and all of its trademarks, including its logo, from printed or electronic material or publications at any time.

Appendix H – Glossary

Credit	In the UK, one credit is notionally ten hours of student effort and one academic year (two semesters) is 120 credits, with a full calendar year being 180 credits. The European Credit Transfer and Accumulation System (ECTS) credits are similar but have twice the value (i.e. one academic year is 60 ECTS credits). Some countries (e.g. the USA) use 30 credits to represent an academic year. In summary, 1 US credit = 2 ECTS = 4 UK credits.
Interim Accreditation	Acknowledgement by the Royal Society of Biology that a degree programme with no current graduates demonstrates the potential to meet the prescribed criteria for Accreditation. Full Accreditation may be granted following further assessment, and a sufficient number of students have graduated to demonstrate the learning outcomes are being achieved.
Learning outcomes	Statements that specify what a graduate will know, understand, or be capable of doing as a result of obtaining a qualification. Learning outcomes are expressed knowledge, understanding, skills, and attributes, and will have been assessed in the degree programme.
Levels	Qualification levels indicate the relative academic demand, complexity of understanding, depth of learning and degree of autonomy expected of the learner. A number of different qualifications frameworks are used throughout the world. Many countries teach a four year BSc with four levels (e.g. in the USA from “freshman” to “senior”). The UK uses a system that is described as a Framework for Higher Education Qualification (FHEQ) available for reference here: **www.qaa.ac.uk/docs/qaa/quality-code/bologna-process-in-he.pdf?sfvrsn=e04cf981_14** and **https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf**
Outcomes-based procedures	The methods our Accreditation Assessment Panel use to judge applications for Accreditation. Graduates of these courses meet our learning outcomes within the specified criteria upon graduation.
Period of practice	A planned period of learning which is designed to support the student’s attainment of a defined set of learning outcomes relating to supervised practice in the particular subject area. It includes those circumstances where students have arranged their own learning opportunity with a provider, with the approval of the University. In all cases, programme providers are responsible for monitoring the quality of the learning experience and its ongoing capacity to meet students’ needs.
Programme	A coherent learning experience followed by an individual, the successful completion of which results in the conferment of a named higher education award.

Programme specification	A concise description of the intended learning outcomes of a University programme, and the means by which the outcomes are achieved and demonstrated. Programme specifications may have other names, such as “Definitive Programme Document”, depending on the university and/or country.
Programme structure	Content of the programme, including mandatory and optional modules, rules for combining units and any specified pathways.
QAA	The Quality Assurance Agency for higher education responsible for maintaining standards across UK universities (**www.qaa.ac.uk**).
Quality assurance	A range of review procedures designed to safeguard academic standards and promote learning opportunities for students of acceptable quality.
Subject Benchmark Statement (UK)	This is overseen by QAA in England, and provides a reference point against which outcomes can be measured. Subject Benchmark Statements provide a means for the academic community to describe the nature and characteristics of programmes in a specific subject. They also represent general expectations about the standards for the award of qualifications at a given level and articulate the attributes and capabilities that those possessing such qualifications should be able to demonstrate.

Becoming a Member of the Royal Society of Biology

The Royal Society of Biology is the leading professional body for the life sciences in the UK. Our vision is to represent all who are committed to biology in academia, industry, education and research; facilitate the promotion and translation of advances in biological science for national and international benefit; and engage and encourage public interest in the life sciences.

The Society represents more than 18,000 individual members, including professionals from industry, academia and education; practising scientists; students; and interested non-professionals.

As a member, you will receive a wide range of benefits, all designed to support you as a biologist, which include:

- **Access to Professional Registers and Continuing Professional Development programme:** Chartered Scientist (CSci), Chartered Biologist (CBiol), Chartered Science Teacher (CSciTeach), Registered Scientist (RSci) and Registered Science Technician (RSciTech)
- **Discounted training courses:** members save up to 50% when attending courses from our newly-expanded training programme
- **Networking events**: members are invited to attend nationally and locally organised events throughout the year, where they can meet peers, other biologists and senior Society staff
- **The Biologist magazine:** all members receive a subscription to our award-winning magazine, published six times a year
- **Opportunities to proactively support the future of biology:** input to our science and education policy work, and support our public engagement regional activities
- **Post-nominal letters:** Associates, Members and Fellows of the Society can use the appropriate post-nominal letters (AMRSB, MRSB or FRSB) to signify their status as a professional biologist

To find out more about degree Accreditation visit **www.rsb.org.uk/education/accreditation** or contact the Accreditation Team at **accreditation@rsb.org.uk**

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