



# UNIVERSITY OF LINCOLN

## Programme Specification

Title:

### Biochemistry

Final Award: **Master of Biosciences (MBio)**

With Exit Awards at:

**Certificate of Higher Education (CertHE)**

**Diploma of Higher Education (DipHE)**

**Bachelor of Science with Honours (BSc (Hons))**

**Master of Biosciences (MBio)**

To be delivered from: 1 Sep 2015

<b>Level</b>	<b>Date</b>
Level 1 or Certificate of Higher Education (CertHE)	2019-20
Level 2 or Diploma of Higher Education (DipHE)	2020-21
Level 3 or Bachelor of Science with Honours (BSc (Hons))	2021-22
Level 4 or Master of Biosciences (MBio)	2022-23

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## **1. Introduction**

This document describes one of the University of Lincoln's programmes using the protocols required by the UK National Qualifications Framework as defined in the publication *QAA guidelines for preparing programme specifications*.

This programme operates under the policy and regulatory frameworks of the University of Lincoln.

## 2. Basic Programme Data

<b>Final Award:</b>	Master of Biosciences (MBio)
<b>Programme Title:</b>	Biochemistry
<b>Exit Awards and Titles</b>	Certificate of Higher Education (CertHE) Diploma of Higher Education (DipHE) Bachelor of Science with Honours (BSc (Hons)) Master of Biosciences (MBio)
<b>Subject(s)</b>	
<b>Mode(s) of delivery</b>	Full Time
<b>Is there a Placement or Exchange?</b>	
<b>UCAS code</b>	C701
<b>Awarding Body</b>	University of Lincoln
<b>Campus(es)</b>	Lincoln Campus
<b>School(s)</b>	School of Life Sciences
<b>Programme Leader</b>	Paul Squires (PSquires)
<b>Relevant Subject Benchmark Statements</b>	
<b>Professional, Statutory or Regulatory Body Accreditation</b>	
<b>Programme Start Date</b>	2019-20

## 3. Programme Description

### 3.1 Overview

This BSc (Hons) Biochemistry degree is designed to meet the needs of students who want to gain knowledge and understanding of the breadth of modern biology within an academically challenging yet supportive research-led environment.

On graduating, students are expected, in line with the QAA bench marks for Biosciences and the FHEQ descriptors for Honours degrees to:

- Have a detailed integrative knowledge of biochemistry with a clear coherent view of current principles
- Be able to critically evaluate complex information from a range of sources e.g. scientific literature, review articles and original research and communicate this information orally or in writing.
- Have experience in a range of practical techniques allied to good laboratory practise, molecular biology and biochemistry.
- Gain experience in computing and information technology.
- Plan, deliver and present an independent piece of work in the final year of study. This will include developing skills in time management, problem solving and providing evidence of independence as well as data interpretation, and critical awareness.

To achieve this, students will gain a foundation in biology and biochemistry at the cellular and molecular level. Building on these general biological foundations, students will then have the opportunity to develop a subject specific overview by taking core biochemistry modules in the second and third years. Course progression, is achieved throughout the programme with modules becoming more focused towards biochemistry specific disciplines such as in the 2nd year modules, Molecular Biology, Biological Analysis and Biomolecules, and in the 3rd year Independent Research Project, Biotechnology, Microbial Biochemistry, and Topics in Biochemistry modules. Assessment strategies will also reflect the curriculum progression from general laboratory reports in the first year to computational techniques in the 2nd and 3rd year of study. This degree is distinct from current degree provisions at the University of Lincoln due to the applied and translational nature of biochemistry as a subject and its interdisciplinary nature that bridges biology, and chemistry. Optional modules have been incorporated to promote fluidity and to allow students greater choice in the types of topics they may wish to study. This approach will likely expose students to a greater range of subjects allied to biochemistry whilst creating opportunities for students to study disciplines linked to genetics, pharmacology and biomedical sciences. It is envisaged that this approach will also provide students with greater exposure to the skills of a wider number of academic staff and therefore their awareness of new techniques/technologies/theories aligned with biochemistry. By allowing students more fluidity in their programme it is hoped that this will also promote enquiry-based learning and self-directed learning within student cohorts. Ultimately progression through the degree programme is designed so that the teaching of fundamental principles during the first year of study can support more applied topics in years two and three. For example, the teaching of Integrative Biochemistry and Integrative Biochemistry 2 in the first year provides a generic platform to support more applied modules like Biomolecules, Biological Analysis, Molecular Biology, Biotechnology, Microbial Biochemistry and Topics in Biochemistry. Such modules allowing students to progress and develop an integrative and translational picture of biochemistry and its role in life processes.

The overarching aims of this programme are to produce graduates with knowledge and key skill sets that are allied to biochemistry and the molecular sciences. Key skills in this context being defined as a working knowledge of biologically important molecules and the techniques required to study and

work with these. Indeed, by the third year students will hopefully have the taught knowledge and skills that can be used to address important fields of biochemical research for example, the biochemical explanations for diseases, genetics, and metabolism. The inclusion of the Biotechnology module is utilised to highlight the translational nature of biochemistry and the importance of this subject in the commercialisation of scientific knowledge, entrepreneurship and the development of new industries. The degree will also attempt to foster confident, knowledgeable and questioning graduates with the skills and experience needed to seek careers in biochemistry, academia, industry, the public sector or one of an entrepreneurial nature. The employability of our graduates is the central aim of this programme. Students are encouraged to integrate information and concepts from the breadth of these subjects, and they are typically given opportunities to develop more specialist interests in their final year. Teaching and learning methods will include conventional lectures and practical classes, which cover the core subject materials and technical skills, supported by tutorials, workshops and seminars which allow students to develop, analyse and present their own findings. Practical classes in laboratory and in the field will allow students to practise project management and data gathering, handling and interpretation skills. Assessments are designed to encourage and test the development of student skills and knowledge that will be needed in their future careers. Students will be supported throughout their degree by a strong personal tutoring system and associated support centres such as the employability specialists.

### **3.2 Aims and Objectives**

This programme aims to equip students with skills, knowledge and the confidence necessary to pursue graduate careers in the biosciences or other related disciplines that requires graduates with strong analytical, communication and enquiry skills. This will be achieved by providing students with an educational framework in which they can develop their knowledge and understanding of the fundamental principles of biochemistry in a context where skills development is encouraged and supported as an integral part of the academic experience. Students will be encouraged to learn independently and to pursue areas they find particularly interesting in an enquiry-based approach.

The biochemistry degree programme is distinctive in several ways:

- Teaching staff within the department of Life Sciences are research active and work in a number of fields related to biochemistry including physiology, biotechnology, molecular biology, protein science, analytical chemistry, pharmacology and biomedical science. Consequently teaching covers both the established fundamentals and important modern developments. A strong research led teaching approach will encourage students to adopt an enquiring, research-orientated approach to their studies and an interdisciplinary outlook, supported throughout by a strong academic tutoring system and library facilities.
- The University of Lincoln provides a unique learning environment in which students are at the forefront of their learning. The ability to control and pursue their own learning is crucial for 21st century scientist within a rapidly changing world. For example, all students will carry out an original independent project which allows them to use their knowledge in the pursuit of their own academic interests. These projects may result in students authoring peer-reviewed scientific papers.
- Students will be encouraged to focus on career progression, with each student developing a personal career development plan, developed with their academic tutor. These skills are embedded into several core modules taken by Biochemistry students as in Topics in Biochemistry.

### **3.3 Variations to Standard Regulations and Guidance**

None

## 4. Programme Outcomes

Programme-level learning outcomes are identified below.

Refer to *Appendix I – Curriculum Map* for details of how outcomes are deployed across the programme.

### 4.1 Knowledge and Understanding

On successful completion of this programme a student will have knowledge and understanding of:

- 1 Molecular Biology: describe the basic reactions of life and major molecules of life especially DNA, RNA and key proteins and understand the relevance of this information to every aspect of biochemistry/biology
- 2 Cell Biology: Demonstrate an understanding of the structure and function of various types of cells in unicellular and multicellular organisms, the structure and function of cell membranes and the molecular basis of cell signalling.
- 3 Metabolism: Understanding of key metabolic (anabolic and catabolic) reactions of plants and animals, and their regulation
- 4 Genetics: underpinning the importance of genetics to the understanding of modern biochemistry including the potential for genomics and other 'omics' technologies to advance our knowledge and provide solutions to problems.
- 5 Biomolecules: understand the fundamental principles associated with biomolecule structure and function and why and understanding of biological chemistry allows us to understand life processes
- 6 Biotechnology: Integrated and translational overview of biochemistry in relation to biotechnology. Provide an interdisciplinary overview of metabolic pathways in the context of biological interactions, as sources of pharmaceutical drugs and high value biotechnological products
- 7 Health and Disease: understand the fundamental process of health and disease
- 8 Demonstrate a thorough and critical knowledge of the primary literature and cutting-edge research questions in several areas of specialism as presented in final year modules.
- 9 Biochemistry is interdisciplinary and ever-changing – hypotheses can only ever be refined – and knowledge is rarely fixed
- 10 Change and scale – the world is changing and always has been – but scale and pace of anthropogenic scale is novel and has the potential to fundamentally change the biology of the planet.

### 4.2 Subject Specific Intellectual Skills

On successful completion of this programme a student will be able to:

- 11 Design, manage, monitor, present and analyse critical research project work.
- 12 Formulate hypotheses and design appropriate experiments and projects to test them
- 13 Demonstrate an understanding of key ethical issues relating to modern biochemistry/biology.



- 14 Acquire, evaluate, process, interpret and criticise information, conclusions and opinions from scientific publications and press and other media reports
- 15 Demonstrate the capacity to communicate complex concepts and arguments clearly and effectively to various audiences in an appropriate manner
- 16 Demonstrate the ability to think independently

### **4.3 Subject Specific Practical Skills**

On successful completion of this programme a student will be able to:

- 17 Work safely and effectively in the field, and in laboratories
- 18 Demonstrate competence in practical work
- 19 Demonstrate competence in handling and statistical analysis of data gained from practical work.
- 27 Develop knowledge of research planning, logistics and constraints
- 28 Demonstrate a breadth of advanced laboratory, field and analytical skills

### **4.4 Transferable Skills and Attributes**

On successful completion of this programme a student will be able to:

- 20 Clear oral and written communication of scientific information to audiences with different levels of background knowledge.
- 21 Numeracy and ability to apply numeracy skills to a wide range of situations, including abstract application of simple mathematical models.
- 22 Competence in relevant information technology as needed for career path and confident about own ability to learn new IT skills within a rapidly changing environment.
- 23 Problem solving and critical analysis of own work, with effective personal time management.
- 24 Team-work and working with others on projects, including demonstrating leadership as appropriate.
- 25 Positive and effective strategies to support life-long learning.
- 26 Confidence and self-awareness and ability to evaluate own strengths and weaknesses in the context of particular career choices.
- 29 Enhance employability skills for a variety of professional and research sectors

For details of each module contributing to the programme, please consult the module specification document.

## 5. Learning, Teaching and Assessment Strategies

### 5.1. Learning and Teaching Strategy

The overarching strategy for learning and teaching at the University of Lincoln is for students to be supported and encouraged to see themselves as producers of knowledge and collaborators in their learning experience. The teaching ethos covers the principles of; Discovery, Technology in Teaching, Space and spatiality, Assessment and Feedback, Research and Evaluation, Student Voice, Support for research, and creating the future. These principles are embedded into the teaching curriculum. For example, student practical classes are designed to develop research skills via problem and enquiry based learning strategies. Moreover, the final year research project uses a research based approaches to bolster learning and development in students. The use of electronically delivered module support and assessment is also an additional tool that is utilised to develop the student learning experience. Indeed, freeware electronic software is utilised by students to explore principles allied to biochemistry for example, structural aspects biomolecules relating to their function. Lecturers and students are also encouraged to engage in the use of web-based system to disseminate knowledge and to encourage debate such as POD casts, YouTube, and PeerWise systems. These principles should be experienced throughout the degree programme have been embedded into a number of key modules including Integrative Biochemistry, Integrative Biochemistry 2, Biomolecules, associated Analytical chemistry modules, Topics in Biochemistry, Biotechnology and the independent Life Science research project.

Lectures introduce key topics in the subject areas and serve to guide students' independent study and enquiry skills. Practicals are designed to allow students to develop good laboratory skills and their experience in surveying, data handling, interpretation and processing of data. These skills being linked to key principles introduced in our research-engaged teaching sessions covered by lectures, seminars and workshops. Students are also encouraged to develop their own interests through self-guided research practises, by conducting library and web-based study and project work. These activities being disseminated via in-class (posters and talks) and web-based technologies (blogs and PeerWise systems). Seminars and small group tutorials will be used to facilitate class discussion and to encourage the student voice. Reference will be made to the practical application of taught principles and the development of graduate skills covered in subject specific modules. Students on the biochemistry programme will be allocated to a personal academic tutor who will support them throughout their studies. The tutor and tutorial system will guide students during their timetabled tutorials in the first and second year module Research Methods for Life Scientists, and Research Methods for Life Scientists 2 to ensure the development of sound study skills and techniques like scientific writing, presentations skills and statistical analysis. Academic tutors will be available for advice (including pastoral advice) and guidance at all key academic decision points during the degree and to help students to develop a career plan based on the skills and attributes they have acquired during their degree.

### 5.2. Assessment Strategy

The assessment strategy adopted in the current programme derives from a need to satisfy the following aspects:

- Performance criteria – the student will be aware of the requirements for assessment;
- Validity of assessment – the assessment will be specific to the stated learning outcomes in the definitive document;
- Reliability of assessment – the assessment should achieve the standards for the given level (e.g. analysis, reasoning, synthesis and interpretation);

- Time implications.

Assessment is viewed as a component of the teaching and learning process and also as a way in which the student is able to demonstrate their grasp of the learning outcomes. It is seen, therefore, as having two functions, 1) as well as contributing to summative grading, and 2) the assessment is seen as having a formative value in providing feedback between students and tutor. Other formative assessment is carried out through the seminar programmes (problem solving) and practical classes (laboratory skills). Group work and practical classes are typically used to encourage active learning. Students are given a choice of topics or case studies to explore either individually or in groups. They are linked to assessment using individual and group oral presentations, poster presentations, case reports, and wiki's to present their findings. In addition, lab reports, case study reports and project reports are used to assess research skills, critical thinking, data interpretation and presentation and written communication skills.

It is intended in future to make use of self and peer-assessment at level 1 and 2 to encourage students to critically evaluate the assessment criteria and share their findings with each other. Development of research skills will be supported by teaching on the research methods modules and by project supervisors, but students will also be encouraged to make use of support available in the library. Assessments are varied to allow for the development and testing of all the skills listed as programme outcomes as well as the relevant knowledge and will include unseen examinations and coursework. Coursework will include laboratory exercises or reports, case studies, problem solving exercises, essays, poster or oral group presentations, short answer and structured questions and project reports.

All assessment will have a formative element as well as a summative element and feedback will be prompt and designed to enhance student skills. Assessment criteria will be made clear to students when the assignment is allocated at the start of the term in which the module is taught. The use of technology is embedded within the learning process via our Virtual Learning Environment, Blackboard. Student electronic communities are used to facilitate communication and wikis are used to encourage students to develop their own shared learning resources i.e. the use of PeerWise systems to create model exam questions for fellow students. It is intended that the assessments at each level of the programme reflect change in demands upon the student over the three years as they grow in knowledge and skill. Assessments aim at informing the teaching staff on the student progress, acquired academic knowledge and understanding, subject specific and transferable skills and attributes. In level one, modules are assessed by essay, assignment, group presentation or laboratory reports and unseen examination. In level two, modules are assessed by presentation, assignments, laboratory reports, unseen examination, essay or case study report. In level three, modules are assessed by essay or assignment and examination or case study report. The biochemical research project is assessed by a presentation and report.

An additional requirement of student transition through the degree is the need to demonstrate effective group work. A diverse array of strategies are utilised to ensure students gain valuable experience of group work with this including group practical session across all years, group presentations in years one and two, through to small group PBL sessions that are specifically embedded into modules. In some instances group work will form the basis of a core assessment. For example, students working collectively to create slides given in a group presentation.

Assessment tasks provide:

- A means of judging the performance of the student in achieving the learning outcomes of each module.

- Feedback to the student on performance

The assessment of each module is monitored by the course team to ensure the following:

- Appropriate performance criteria.
- Reasonable time required for the assessment task
- Reliable and valid assessment marking through internal moderation

In addition to summative assessments, formative assessment will be included to inform students about their progress during the course of the delivery of modules. This includes practical report writing, seminar presentations, class tests and on-line assessments. The membership and terms of the Board of Examiners and the responsibilities of the external examiners are set out in the University Taught Undergraduate Awards: Principles and Regulations. The progress panel normally convenes in February, and the subject board of examiners convenes in June and September of each year to facilitate progression of students and the confirmation of awards.

## 6. Programme Structure

The total number of credit points required for the achievement of Certificate of Higher Education (CertHE) is 120.

The total number of credit points required for the achievement of Diploma of Higher Education (DipHE) is 240.

The total number of credit points required for the achievement of Bachelor of Science with Honours (BSc (Hons)) is 360.

The total number of credit points required for the achievement of Master of Biosciences (MBio) is 480.

### Level 1

<b>Title</b>	<b>Credit Rating</b>	<b>Core / Optional</b>
Cell Biology 2019-20	15	Core
Research Methods for Life Scientists 1 2019-20	15	Core
Integrative Biochemistry 2019-20	15	Core
Genetics 2019-20	15	Core
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20	15	Core
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20	15	Core
Analytical Chemistry 1: Molecular Techniques 2019-20	15	Core
Integrative Biochemistry 2 2019-20	15	Core

### Level 2

<b>Title</b>	<b>Credit Rating</b>	<b>Core / Optional</b>
Research Methods for Life Scientists 2 2020-21	15	Core
Molecular Biology 2020-21	15	Core
Immunology 2020-21	15	Optional
Fundamentals of Pharmacology & Toxicology 2020-21	15	Optional
Biology of Human Disease 2020-21	15	Optional
Introduction to Clinical Biochemistry 2020-21	15	Core
Biomolecules 2020-21	15	Core
Biological Analysis 2020-21	15	Core
Analytical Chemistry 2.2: Structural Techniques 2020-21	15	Optional

### Level 3

<b>Title</b>	<b>Credit Rating</b>	<b>Core / Optional</b>
Life Sciences Research Project 2021-22	30	Core
Genetics & Bioethics 2021-22	15	Optional
Clinical Biochemistry & Immunology 2021-22	15	Optional
Overseas Field Course 2021-22	15	Optional
Biotechnology 2021-22	15	Core
Current Issues in Biochemistry 2021-22	15	Core
Toxicology 2021-22	15	Optional
Microbial Biochemistry 2021-22	15	Core
Animal Population Genetics 2021-22	15	Optional
Protein Structure and Function 2021-22	15	Core

#### Level 4

<b>Title</b>	<b>Credit Rating</b>	<b>Core / Optional</b>
MBio Research project 2022-23	60	Core
MBio Research techniques 2022-23	30	Core

#### Masters

<b>Title</b>	<b>Credit Rating</b>	<b>Core / Optional</b>
Professional and Research Skills in Biosciences A 2022-23	15	Core
Professional and Research Skills in Biosciences B 2022-23	15	Core

## Appendix I - Curriculum Map

This table indicates which modules assume responsibility for delivering and ordering particular programme learning outcomes.

**Key:**  Delivered and Assessed     Delivered     Assessed

### Level 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analytical Chemistry 1: Molecular Techniques 2019-20	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>		
Cell Biology 2019-20		<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>					
Genetics 2019-20	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
Integrative Biochemistry 2 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Integrative Biochemistry 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
Research Methods for Life Scientists 1 2019-20										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Analytical Chemistry 1: Molecular Techniques 2019-20		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Cell Biology 2019-20				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>							
Genetics 2019-20				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20					<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20					<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Integrative Biochemistry 2 2019-20				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

Integrative Biochemistry 2019-20				✓	✓	✓		✓	✓	✓		
Research Methods for Life Scientists 1 2019-20		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
								PO25	PO26	PO27	PO28	PO29
Analytical Chemistry 1: Molecular Techniques 2019-20												
Cell Biology 2019-20												
Genetics 2019-20												
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20								✓	✓			
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20								✓	✓			
Integrative Biochemistry 2 2019-20												
Integrative Biochemistry 2019-20												
Research Methods for Life Scientists 1 2019-20								✓	✓			

## Level 2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analytical Chemistry 2.2: Structural Techniques 2020-21	✓										✓	
Biological Analysis 2020-21	✓							✓		✓	✓	
Biology of Human Disease 2020-21		✓	✓	✓			✓		✓		✓	
Biomolecules 2020-21	✓		✓		✓					✓		
Fundamentals of Pharmacology & Toxicology 2020-21	✓		✓	✓								
Immunology 2020-21		✓	✓								✓	
Introduction to Clinical Biochemistry 2020-21	✓	✓	✓	✓	✓	✓						
Molecular Biology 2020-21	✓			✓						✓	✓	
Research Methods for Life Scientists 2 2020-21									✓		✓	✓

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24



Analytical Chemistry 2.2: Structural Techniques 2020-21				✓	✓	✓				✓	✓	✓
Biological Analysis 2020-21				✓	✓	✓	✓			✓	✓	✓
Biology of Human Disease 2020-21	✓			✓	✓		✓			✓	✓	
Biomolecules 2020-21		✓	✓	✓					✓	✓	✓	
Fundamentals of Pharmacology & Toxicology 2020-21								✓	✓		✓	✓
Immunology 2020-21		✓		✓	✓	✓			✓			
Introduction to Clinical Biochemistry 2020-21												
Molecular Biology 2020-21				✓	✓	✓	✓	✓				
Research Methods for Life Scientists 2 2020-21	✓	✓	✓			✓	✓	✓	✓	✓		

	PO25	PO26	PO27	PO28	PO29
Analytical Chemistry 2.2: Structural Techniques 2020-21	✓				
Biological Analysis 2020-21	✓				
Biology of Human Disease 2020-21	✓	✓			
Biomolecules 2020-21	✓				
Fundamentals of Pharmacology & Toxicology 2020-21					
Immunology 2020-21					
Introduction to Clinical Biochemistry 2020-21					
Molecular Biology 2020-21					
Research Methods for Life Scientists 2 2020-21		✓			

### Level 3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Animal Population Genetics 2021-22	✓				✓			✓				
Biotechnology 2021-22	✓			✓		✓		✓	✓	✓	✓	
Clinical Biochemistry & Immunology 2021-22							✓		✓			
Current Issues in Biochemistry 2021-22									✓	✓		

Genetics & Bioethics 2021-22	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Life Sciences Research Project 2021-22									✓	✓	✓	✓
Microbial Biochemistry 2021-22	✓	✓	✓	✓					✓	✓		
Overseas Field Course 2021-22								✓	✓	✓	✓	✓
Protein Structure and Function 2021-22	✓	✓	✓	✓	✓					✓	✓	
Toxicology 2021-22	✓	✓	✓	✓						✓		

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Animal Population Genetics 2021-22								✓				
Biotechnology 2021-22	✓			✓		✓	✓					
Clinical Biochemistry & Immunology 2021-22						✓				✓	✓	
Current Issues in Biochemistry 2021-22		✓		✓				✓				
Genetics & Bioethics 2021-22	✓		✓	✓	✓	✓				✓	✓	
Life Sciences Research Project 2021-22	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Microbial Biochemistry 2021-22		✓		✓			✓			✓	✓	
Overseas Field Course 2021-22	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Protein Structure and Function 2021-22		✓								✓		
Toxicology 2021-22		✓		✓							✓	

	PO25	PO26	PO27	PO28	PO29
Animal Population Genetics 2021-22					
Biotechnology 2021-22					
Clinical Biochemistry & Immunology 2021-22	✓	✓			
Current Issues in Biochemistry 2021-22					
Genetics & Bioethics 2021-22	✓	✓			
Life Sciences Research Project 2021-22	✓	✓			
Microbial Biochemistry 2021-22	✓	✓			
Overseas Field Course 2021-22	✓				
Protein Structure and Function 2021-22					
Toxicology 2021-22	✓	✓			

**Level 4**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MBio Research project 2022-23								✓	✓		✓	✓
MBio Research techniques 2022-23								✓				
	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
MBio Research project 2022-23		✓		✓	✓	✓	✓	✓			✓	
MBio Research techniques 2022-23								✓				
								PO25	PO26	PO27	PO28	PO29
MBio Research project 2022-23										✓		
MBio Research techniques 2022-23											✓	

**Masters**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23												
	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23												
								PO25	PO26	PO27	PO28	PO29
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23												



## Appendix II - Assessment Map

This table indicates the spread of assessment activity across the programme. Percentages indicate assessment weighting.

### Level 1

	01	02	03	04	05	06	07	08	09	10	11	12
Analytical Chemistry 1: Molecular Techniques 2019-20												
Cell Biology 2019-20									50			
Genetics 2019-20												
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20											30	
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20												
Integrative Biochemistry 2 2019-20												
Integrative Biochemistry 2019-20								50				
Research Methods for Life Scientists 1 2019-20										50		50

	13	14	15	16	17	18	19	20	21	22	23	24
Analytical Chemistry 1: Molecular Techniques 2019-20												
Cell Biology 2019-20		50										
Genetics 2019-20												50
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20				70								
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20								30				
Integrative Biochemistry 2 2019-20												
Integrative Biochemistry 2019-20		50										
Research Methods for Life Scientists 1												



													34, 35)
Analytical Chemistry 1: Molecular Techniques 2019-20													50
Cell Biology 2019-20													
Genetics 2019-20													
Human Anatomy & Physiology, with Clinical Correlations 1 2019-20													
Human Anatomy & Physiology, with Clinical Correlations 2 2019-20													50
Integrative Biochemistry 2 2019-20													50
Integrative Biochemistry 2019-20													
Research Methods for Life Scientists 1 2019-20													

## Level 2

	01	02	03	04	05	06	07	08	09	10	11	12
Analytical Chemistry 2.2: Structural Techniques 2020-21												
Biological Analysis 2020-21					50							
Biology of Human Disease 2020-21												
Biomolecules 2020-21							50					
Fundamentals of Pharmacology & Toxicology 2020-21												
Immunology 2020-21												
Introduction to Clinical Biochemistry 2020-21												
Molecular Biology 2020-21							50					
Research Methods for Life Scientists 2 2020-21										50		50

	13	14	15	16	17	18	19	20	21	22	23	24
Analytical Chemistry 2.2: Structural Techniques 2020-21												
Biological Analysis 2020-21												

Biology of Human Disease 2020-21						50						
Biomolecules 2020-21		50										
Fundamentals of Pharmacology & Toxicology 2020-21										50		
Immunology 2020-21							50					
Introduction to Clinical Biochemistry 2020-21									50			
Molecular Biology 2020-21												
Research Methods for Life Scientists 2 2020-21												

	25	26	27	28	29	30	31	32	33	34	35	36
Analytical Chemistry 2.2: Structural Techniques 2020-21				50								
Biological Analysis 2020-21												
Biology of Human Disease 2020-21												
Biomolecules 2020-21												
Fundamentals of Pharmacology & Toxicology 2020-21												
Immunology 2020-21												
Introduction to Clinical Biochemistry 2020-21												
Molecular Biology 2020-21												
Research Methods for Life Scientists 2 2020-21												

	37	38	39	40	41	42	43	44	45	46	47	48
Analytical Chemistry 2.2: Structural Techniques 2020-21												
Biological Analysis 2020-21												
Biology of Human Disease 2020-21												
Biomolecules 2020-21												
Fundamentals of Pharmacology & Toxicology 2020-21												
Immunology 2020-21												



Introduction to Clinical Biochemistry 2020-21													
Molecular Biology 2020-21													
Research Methods for Life Scientists 2 2020-21													
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)	
Analytical Chemistry 2.2: Structural Techniques 2020-21												50	
Biological Analysis 2020-21											50		
Biology of Human Disease 2020-21												50	
Biomolecules 2020-21													
Fundamentals of Pharmacology & Toxicology 2020-21												50	
Immunology 2020-21												50	
Introduction to Clinical Biochemistry 2020-21												50	
Molecular Biology 2020-21											50		
Research Methods for Life Scientists 2 2020-21													

### Level 3

	01	02	03	04	05	06	07	08	09	10	11	12
Animal Population Genetics 2021-22							20					30
Biotechnology 2021-22							40					
Clinical Biochemistry & Immunology 2021-22											50	
Current Issues in Biochemistry 2021-22												
Genetics & Bioethics 2021-22												100
Life Sciences Research Project 2021-22										100		
Microbial Biochemistry 2021-22												
Overseas Field Course 2021-22	20											

Protein Structure and Function 2021-22													
Toxicology 2021-22													
	13	14	15	16	17	18	19	20	21	22	23	24	
Animal Population Genetics 2021-22				50									
Biotechnology 2021-22	60												
Clinical Biochemistry & Immunology 2021-22													
Current Issues in Biochemistry 2021-22													
Genetics & Bioethics 2021-22													
Life Sciences Research Project 2021-22													
Microbial Biochemistry 2021-22													
Overseas Field Course 2021-22				80									
Protein Structure and Function 2021-22													
Toxicology 2021-22													
	25	26	27	28	29	30	31	32	33	34	35	36	
Animal Population Genetics 2021-22													
Biotechnology 2021-22													
Clinical Biochemistry & Immunology 2021-22													
Current Issues in Biochemistry 2021-22		100											
Genetics & Bioethics 2021-22													
Life Sciences Research Project 2021-22													
Microbial Biochemistry 2021-22		50											
Overseas Field Course 2021-22													
Protein Structure and Function 2021-22													
Toxicology 2021-22		50											
	37	38	39	40	41	42	43	44	45	46	47	48	
Animal Population Genetics 2021-22													
Biotechnology 2021-22													
Clinical Biochemistry & Immunology 2021-22													
Current Issues in Biochemistry 2021-22													
Genetics & Bioethics 2021-22													

Life Sciences Research Project 2021-22													
Microbial Biochemistry 2021-22													
Overseas Field Course 2021-22													
Protein Structure and Function 2021-22													
Toxicology 2021-22													
								49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
Animal Population Genetics 2021-22													
Biotechnology 2021-22													
Clinical Biochemistry & Immunology 2021-22													50
Current Issues in Biochemistry 2021-22													
Genetics & Bioethics 2021-22													
Life Sciences Research Project 2021-22													
Microbial Biochemistry 2021-22													50
Overseas Field Course 2021-22													
Protein Structure and Function 2021-22													
Toxicology 2021-22													50

## Level 4

	01	02	03	04	05	06	07	08	09	10	11	12
MBio Research project 2022-23								20				
MBio Research techniques 2022-23							25					
	13	14	15	16	17	18	19	20	21	22	23	24
MBio Research project 2022-23				10								20
MBio Research techniques 2022-23			25								25	

	25	26	27	28	29	30	31	32	33	34	35	36
MBio Research project 2022-23								45		5		
MBio Research techniques 2022-23							25					
	37	38	39	40	41	42	43	44	45	46	47	48
MBio Research project 2022-23												
MBio Research techniques 2022-23												
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
MBio Research project 2022-23												
MBio Research techniques 2022-23												

## Masters

	01	02	03	04	05	06	07	08	09	10	11	12
Professional and Research Skills in Biosciences A 2022-23									50			
Professional and Research Skills in Biosciences B 2022-23												
	13	14	15	16	17	18	19	20	21	22	23	24
Professional and Research Skills in Biosciences A 2022-23		50										
Professional and Research Skills in Biosciences B 2022-23										50		

	25	26	27	28	29	30	31	32	33	34	35	36
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23					50							
	37	38	39	40	41	42	43	44	45	46	47	48
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23												
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
Professional and Research Skills in Biosciences A 2022-23												
Professional and Research Skills in Biosciences B 2022-23												

## Appendix III - Benchmark Analysis

This table maps programme learning outcomes to relevant QAA subject benchmark statements or PSRB guidelines.

### Knowledge and Understanding

	BSciEcol1	BSciEcol2	BSciEcol3	BSciEcol4	BSciEcol5	BSciEcol6	BSciEcol7	BSciEcol8	BSciEcol9
PO1									
PO2									
PO3									
PO4									
PO5									
PO6									
PO7									
PO8									
PO9									
PO10									

	BSciEcol10	BSciEcol11	BSciEcol12	BSciEcol13	BSciEcol14	BSciEcol15	BSciEcol16	BSciEcol17	BSciEcol18
PO1									
PO2									
PO3									
PO4									
PO5									
PO6									
PO7									
PO8									
PO9									
PO10									

	BSciEcol19	BSciEcol20	BSciGen1	BSciGen2	BSciGen3	BSciGen4	BSciGen5	BSciGen6	BSciGen7
PO1			✓	✓	✓				

PO2			✓	✓	✓				
PO3				✓					
PO4				✓					
PO5			✓	✓					
PO6			✓	✓					
PO7				✓			✓		
PO8					✓	✓			
PO9				✓					
PO10							✓		

	BSciGen8	BSciGen9	BSciGen10	BSciGen11	BSciGen12	BSciGen13	BSciGen14	BSciGen15	BSciGen16
PO1	✓					✓			
PO2						✓			
PO3						✓			
PO4					✓	✓			
PO5	✓					✓			
PO6	✓				✓				
PO7						✓			
PO8		✓	✓						✓
PO9	✓	✓				✓		✓	✓
PO10								✓	

	BSciGen18	BSciMolec1	BSciMolec2	BSciMolec3	BSciMolec4	BSciMolec5	BSciMolec6	BSciMolec7	BSciMolec8
PO1	✓		✓	✓	✓	✓	✓		
PO2		✓				✓	✓	✓	
PO3			✓	✓		✓	✓	✓	✓
PO4					✓	✓			✓
PO5	✓	✓	✓	✓			✓		✓
PO6			✓	✓	✓	✓	✓	✓	
PO7			✓		✓	✓		✓	
PO8									
PO9	✓	✓						✓	
PO10									

	BSciMolec9	BSciMolec1 0	BSciMolec1 1	BSciMolec1 2	BSciMolec1 3	BSciMolec1 4	BSciMolec1 5	BSciMolec1 6	BSciMolec1 7
PO1	✓	✓	✓	✓		✓	✓		
PO2				✓	✓		✓	✓	
PO3	✓	✓	✓		✓	✓	✓	✓	
PO4		✓	✓	✓					
PO5	✓	✓	✓			✓		✓	
PO6		✓	✓			✓	✓		
PO7			✓	✓		✓	✓		
PO8									
PO9	✓		✓		✓		✓		✓
PO10									✓

	BSciOrg1	BSciOrg2	BSciOrg3	BSciOrg4	BSciOrg5	BSciOrg6	BSciOrg7	BSciOrg8	BSciOrg9
PO1		✓		✓					
PO2	✓	✓	✓	✓					
PO3		✓	✓						
PO4	✓			✓					
PO5			✓						
PO6									
PO7									
PO8									
PO9									
PO10				✓					

	BSciOrg10	BSciOrg11	BSciOrg12	BSciOrg13	BSciOrg14	BSciOrg15	BSciOrg16	BSciOrg17
PO1	✓							
PO2	✓							
PO3	✓							
PO4	✓	✓		✓				
PO5	✓							
PO6								



PO7	✓			✓				
PO8								
PO9								
PO10								

## Subject Specific Intellectual Skills

	BSciEcol1	BSciEcol2	BSciEcol3	BSciEcol4	BSciEcol5	BSciEcol6	BSciEcol7	BSciEcol8	BSciEcol9
PO11									
PO12									
PO13									
PO14									
PO15									
PO16									

	BSciEcol10	BSciEcol11	BSciEcol12	BSciEcol13	BSciEcol14	BSciEcol15	BSciEcol16	BSciEcol17	BSciEcol18
PO11									
PO12									
PO13									
PO14									
PO15									
PO16									

	BSciEcol19	BSciEcol20	BSciGen1	BSciGen2	BSciGen3	BSciGen4	BSciGen5	BSciGen6	BSciGen7
PO11					✓				
PO12					✓				✓
PO13								✓	✓
PO14			✓		✓	✓			✓
PO15						✓			
PO16						✓			

	BSciGen8	BSciGen9	BSciGen10	BSciGen11	BSciGen12	BSciGen13	BSciGen14	BSciGen15	BSciGen16
PO11				✓			✓		
PO12			✓	✓					
PO13		✓	✓		✓				
PO14		✓	✓					✓	✓
PO15				✓	✓			✓	
PO16				✓					✓

	BSciGen18	BSciMolec1	BSciMolec2	BSciMolec3	BSciMolec4	BSciMolec5	BSciMolec6	BSciMolec7	BSciMolec8
PO11							✓		
PO12							✓		
PO13									
PO14	✓								
PO15									
PO16									

	BSciMolec9	BSciMolec1 0	BSciMolec1 1	BSciMolec1 2	BSciMolec1 3	BSciMolec1 4	BSciMolec1 5	BSciMolec1 6	BSciMolec1 7
PO11						✓			✓
PO12						✓			
PO13									
PO14									
PO15									
PO16									

	BSciOrg1	BSciOrg2	BSciOrg3	BSciOrg4	BSciOrg5	BSciOrg6	BSciOrg7	BSciOrg8	BSciOrg9
PO11									
PO12									
PO13									
PO14									
PO15									
PO16									

	BSciOrg10	BSciOrg11	BSciOrg12	BSciOrg13	BSciOrg14	BSciOrg15	BSciOrg16	BSciOrg17
PO11								
PO12								
PO13								
PO14								
PO15								
PO16								

### Subject Specific Practical Skills

	BSciEcol1	BSciEcol2	BSciEcol3	BSciEcol4	BSciEcol5	BSciEcol6	BSciEcol7	BSciEcol8	BSciEcol9
PO17									
PO18									
PO19									
PO27									
PO28									

	BSciEcol10	BSciEcol11	BSciEcol12	BSciEcol13	BSciEcol14	BSciEcol15	BSciEcol16	BSciEcol17	BSciEcol18
PO17									
PO18									
PO19									
PO27									
PO28									

	BSciEcol19	BSciEcol20	BSciGen1	BSciGen2	BSciGen3	BSciGen4	BSciGen5	BSciGen6	BSciGen7
PO17					✓		✓	✓	
PO18					✓		✓		✓
PO19									✓
PO27									
PO28									

	BSciGen8	BSciGen9	BSciGen10	BSciGen11	BSciGen12	BSciGen13	BSciGen14	BSciGen15	BSciGen16
PO17			✓						
PO18			✓	✓					
PO19			✓	✓			✓		
PO27	✓						✓		
PO28					✓			✓	✓

	BSciGen18	BSciMolec1	BSciMolec2	BSciMolec3	BSciMolec4	BSciMolec5	BSciMolec6	BSciMolec7	BSciMolec8
PO17							✓		
PO18							✓		
PO19									
PO27	✓								
PO28									

	BSciMolec9	BSciMolec1 0	BSciMolec1 1	BSciMolec1 2	BSciMolec1 3	BSciMolec1 4	BSciMolec1 5	BSciMolec1 6	BSciMolec1 7
PO17						✓			
PO18		✓				✓			✓
PO19									✓
PO27						✓			✓
PO28									

	BSciOrg1	BSciOrg2	BSciOrg3	BSciOrg4	BSciOrg5	BSciOrg6	BSciOrg7	BSciOrg8	BSciOrg9
PO17									
PO18									
PO19									
PO27									
PO28									

	BSciOrg10	BSciOrg11	BSciOrg12	BSciOrg13	BSciOrg14	BSciOrg15	BSciOrg16	BSciOrg17
PO17								
PO18								
PO19								

PO27									
PO28									

## Transferable Skills and Attributes

	BSciEcol1	BSciEcol2	BSciEcol3	BSciEcol4	BSciEcol5	BSciEcol6	BSciEcol7	BSciEcol8	BSciEcol9
PO20									
PO21									
PO22									
PO23									
PO24									
PO25									
PO26									
PO29									

	BSciEcol10	BSciEcol11	BSciEcol12	BSciEcol13	BSciEcol14	BSciEcol15	BSciEcol16	BSciEcol17	BSciEcol18
PO20									
PO21									
PO22									
PO23									
PO24									
PO25									
PO26									
PO29									

	BSciEcol19	BSciEcol20	BSciGen1	BSciGen2	BSciGen3	BSciGen4	BSciGen5	BSciGen6	BSciGen7
PO20						✓		✓	
PO21			✓						
PO22			✓						
PO23					✓				
PO24							✓		✓

PO25									
PO26			✓		✓		✓		
PO29			✓						

	BSciGen8	BSciGen9	BSciGen10	BSciGen11	BSciGen12	BSciGen13	BSciGen14	BSciGen15	BSciGen16
PO20					✓			✓	
PO21			✓	✓			✓		
PO22	✓	✓		✓			✓		
PO23				✓					
PO24	✓							✓	
PO25					✓		✓		✓
PO26	✓		✓	✓					
PO29				✓					

	BSciGen18	BSciMolec1	BSciMolec2	BSciMolec3	BSciMolec4	BSciMolec5	BSciMolec6	BSciMolec7	BSciMolec8
PO20									
PO21									
PO22	✓								
PO23									
PO24									
PO25									
PO26									
PO29									

	BSciMolec9	BSciMolec1	BSciMolec1	BSciMolec1	BSciMolec1	BSciMolec1	BSciMolec1	BSciMolec1	BSciMolec1
		0	1	2	3	4	5	6	7
PO20									
PO21									
PO22		✓				✓			✓
PO23									
PO24									
PO25									
PO26									

PO29									
	BSciOrg1	BSciOrg2	BSciOrg3	BSciOrg4	BSciOrg5	BSciOrg6	BSciOrg7	BSciOrg8	BSciOrg9
PO20									
PO21									
PO22									
PO23									
PO24									
PO25									
PO26									
PO29									

	BSciOrg10	BSciOrg11	BSciOrg12	BSciOrg13	BSciOrg14	BSciOrg15	BSciOrg16	BSciOrg17
PO20								
PO21								
PO22								
PO23								
PO24								
PO25								
PO26								
PO29								

## **Appendix IV: Benchmark Benchmark Statement(s)**



**BSciEcol1** - *Demonstrate knowledge of biogeochemical cycles and pathways*

**BSciEcol2** - *Describe and exemplify nutrient and energy flow through individuals, populations and communities*

**BSciEcol3** - *Describe the structure, biogeography and diversity of ecosystems in relation to climate, geology, soils, palaeo-historical, taxonomic and evolutionary factors*

**BSciEcol4** - *Describe and exemplify patterns of distribution of organisms in relation to biotic and abiotic factors*

**BSciEcol5** - *Demonstrate knowledge of population genetics, dynamics and interactions, and associated theoretical models*

**BSciEcol6** - *Demonstrate knowledge of community structure, development, biodiversity, and associated theoretical models*

**BSciEcol7** - *Show awareness of human interactions with natural populations and ecosystems, including habitat modification, pollution, exploitation and conservation*

**BSciEcol8** - *Show awareness of the applied significance of species as resources and as damage-causing organisms*

**BSciEcol9** - *Carry out routine investigations as instructed, using appropriate ecological and/or molecular methodologies and data analyses*

**BSciEcol10** - *Exhibit practical fieldwork skills including but not limited to ecological survey techniques, taxonomic identification of organisms and ecological impact assessments*

**BSciEcol11** - *Demonstrate comprehension and intelligent engagement with biogeochemical cycles and pathways*

**BSciEcol12** - *Discuss and demonstrate comprehension of nutrient and energy flow through individuals, populations and communities*

**BSciEcol13** - *Understand the structure, biogeography and diversity of ecosystems in relation to climate, geology, soils, palaeo-historical, taxonomic and evolutionary factors*

**BSciEcol14** - *Discuss and critically analyse patterns of distribution of organisms in relation to biotic and abiotic factors*

**BSciEcol15** - *Demonstrate comprehension and critical analysis of population processes, dynamics and interactions, and associated models*

**BSciEcol16** - *Demonstrate comprehension and critical analysis of community structure, development, biodiversity, and associated models*

**BSciEcol17** - *Critically analyse and evaluate the effects of such human interactions on natural populations and ecosystems*

**BSciEcol18** - *Evaluate the impacts of harvesting resources, controlling pest/pathogens and different approaches to species management*

**BSciEcol19** - *Apply critical understanding of ecological methodologies and data analyses*

**BSciEcol20** - *Demonstrate an appreciation of the multidisciplinary approach required to address ecological and environmental issues*

**BSciGen1** - *Experience and competence in a broad range of appropriate practical techniques and skills relevant to the biosciences including data collection, analysis and interpretation of those data, and testing of hypotheses and the ability to place the work...*

**BSciGen2** - *The ability to explain biological phenomena at a variety of levels (from molecular to ecological systems) and how evolutionary theory is relevant to their area of study*

**BSciGen3** - *The ability to plan, execute and present a piece of hypothesis-driven work within a supported framework in which qualities such as time management, problem solving, and independence are evident*

**BSciGen4** - *The ability to access and evaluate bioscience information from a variety of sources and to communicate the principles both orally and in writing in a way that is organised and topical, and recognises the limits of current hypotheses*

**BSciGen5** - *An appreciation of ethical issues and how they underpin professional integrity and standards*

**BSciGen6** - *An appreciation of the impact on society of advances in the biosciences*

**BSciGen7** - *The ability to record data accurately, and to carry out basic manipulation of data (including qualitative data and statistical analysis, when appropriate)*

**BSciGen8** - *An understanding of the use of bioinformatics approaches in the analysis of large datasets*

**BSciGen9** - *Strategies that enable them to update their knowledge of the biosciences*

**BSciGen10** - *An awareness of professional standards, including Good Laboratory Practice<sup>12</sup> for data collection, recording and interpretation*

**BSciGen11** - *Plan, execute and present an independent piece of work, in which qualities such as time management, problem solving and independence are evident, as well as interpretation and critical awareness of the quality of evidence*

**BSciGen12** - *Construct reasoned arguments to support their position on the ethical and social impact of advances in the biosciences*

**BSciGen13** - *Demonstrate a secure and accurate understanding of the explanation of biological phenomena at a variety of levels (from molecular to ecological systems) and explain the relationship of evolutionary theory to their area of study*

**BSciGen14** - *Apply relevant advanced numerical skills to biological data*

**BSciGen15** - *Communicate science to peers and non-scientists*

**BSciGen16** - *Demonstrate well developed strategies for updating, maintaining and enhancing their knowledge of the biosciences, including cross-disciplinary awareness*

**BSciGen18** - *Access bioscience databases and use appropriate selection criteria to mine, manipulate and interpret data*

**BSciMolec1** - *Know and explain the structure and function of various types of cells in unicellular and multicellular organisms, the structure and function of cell membranes,*

**BSciMolec2** - *Express relevant biological reactions in chemical terms*

**BSciMolec3** - *Explain the chemistry and structure of the major biological macromolecules and how that determines their biological properties*

**BSciMolec4** - *Explain how the principles of genetics underlie much of the basis of molecular biology*

**BSciMolec5** - *Explain the principles of gene expression and how it is controlled*

**BSciMolec6** - *Explain a range of appropriate and relevant experimental techniques and how they are used; and be able to perform some of them*

**BSciMolec7** - *Describe cell metabolism, including the main anabolic and catabolic pathways*

**BSciMolec8** - *Describe protein structures and functions and their control mechanisms*

**BSciMolec9** - *Understand the chemistry that underlies biochemical reactions and the techniques used to investigate them*

**BSciMolec10** - *Explain the principles that determine the three-dimensional structure of biological macromolecules and give detailed examples of how structure enables function*

**BSciMolec11** - *Demonstrate a critical understanding of the molecular basis of genetics and explain some detailed examples*

**BSciMolec12** - *Demonstrate critical knowledge and understanding of gene expression, with a detailed knowledge of specific examples; the structure, arrangement, expression, and regulation of genes; and relevant experimental methods*

**BSciMolec13** - *Demonstrate knowledge of a wide range of cells (both prokaryotic and eukaryotic) and explain critically how their properties suit them for their biological function, and how they could be investigated experimentally*

**BSciMolec14** - *Devise and evaluate suitable experimental methods for the investigation of relevant areas of biochemistry and molecular biology*

**BSciMolec15** - *Demonstrate a critical understanding of essential features of cell metabolism and its control, including topics such as energy and signal transduction, respiration and photosynthesis (including knowledge and experience of some experimental...*

**BSciMolec16** - *Explain the chemical and thermodynamic principles underlying biological catalysis and the role of enzymes and other proteins in determining the function and fate of cells and organisms*

**BSciMolec17** - *Mine, manipulate and interpret data from small molecule and/or macromolecular databases*

**BSciOrg1** - *Describe the structure and diversity of the organisms studied, including their modes of reproduction, development and life history of the organisms*

**BSciOrg2** - *Describe mechanisms for the life processes and appreciate how the physiology of an organism fits it for its environment*

**BSciOrg3** - *Demonstrate an appreciation of the integration of metabolism*

**BSciOrg4** - *Demonstrate knowledge of the basic genetic principles relating to, and evolution of, the organisms studied*

**BSciOrg5** - *Describe how organisms are classified and identified*

**BSciOrg6** - *Explain the interactions of organisms with each other and the environment*

**BSciOrg7** - *Describe the place of the organisms studied in the living world*

**BSciOrg8** - *Demonstrate an appreciation of the importance of the 'behaviour' of the organisms studied*

**BSciOrg9** - *Describe and analyse the impact of external influences on growth and reproduction, and explain reproductive strategies*

**BSciOrg10** - *Demonstrate an understanding of the interactions of structure and metabolic function at cellular and organism level*

**BSciOrg11** - *Describe and critically evaluate the evidence for the mechanisms of life processes*

**BSciOrg12** - *Demonstrate an understanding of the significance of internal and external influences*

**BSciOrg13** - *Describe and analyse patterns of inheritance and complex genetic interactions relating to the lives and evolution of the organisms studied*

**BSciOrg14** - *Explain the methods and principles underlying taxonomy and classification*

**BSciOrg15** - *Describe the principles and processes governing interactions of organisms and their environment*

**BSciOrg16** - *Critically analyse the contribution of the organisms to the biosphere*

**BSciOrg17** - *Critically assess the contribution of 'behavioural patterns' to survival and success*