

BSc Biological Sciences with Industrial Experience
For students entering Part 1 in 2011/2

UCAS code: C101

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	Biosciences
Faculty:	Life Sciences Faculty
Programme length:	4 years
Date of specification:	12/May/2014
Programme Director:	Dr Amanda Callaghan
Programme Advisor:	Dr Andrew Meade
Board of Studies:	Biological Sciences
Accreditation:	Not applicable

Summary of programme aims

The Biological Sciences degree programme aims to provide students with the opportunity to study biology at scales ranging from biomolecular processes to global ecological systems. Students follow the full three-year degree programme in Biological Sciences but between years 2 and 3 will spend one year in an industrial, or institute, research or similar environment. Students are expected to gain a broad understanding of the concepts underpinning biological sciences and to demonstrate the ability to complete a detailed study during Part 3.

The programme is concerned especially with the diversity of living organisms and includes study of the biology of all types of organisms, from microorganisms to flowering plants and mammals, at levels ranging from the molecular, biochemical and cellular to the physiological, environmental and ecological. The subject matter of Part 1 is broadly based but allows increasing specialisation in Parts 2 and 3 to provide a coherent, in-depth area of study that the student may select.

Transferable skills

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills. In following this programme, students will have had the opportunity to develop such skills, in particular relating to career management, communication (both written and oral), information handling, numeracy, problem solving, team working and use of information technology and will have been encouraged to further develop and enhance the full set of skills through a variety of opportunities available outside their curriculum.

As part of this programme all students are also expected to have gained experience and show competence in the following transferable skills:

1. The ability to assess, evaluate and present scientific data.
2. The ability to design and undertake a programme of scientific investigation and to effectively communicate the aims and results of this investigation.
3. A range of laboratory-based practical skills and laboratory and field-based practical skills.

Programme content

The profile that follows states which modules must be taken (the compulsory modules), together with one or more lists of modules from which the student must make a selection (the optional modules). Students choose such additional modules as they wish, in consultation with their Programme Advisor, to make 120 credits in each Part. Students may take up to 70 credits in any one term.

Part 1 (three terms)

Compulsory modules

<i>Mod Code</i>	<i>Module Title</i>	<i>Credits</i>	<i>Level</i>
BI1BA1	The Living Cell	10	4
BI1BC2	Genes and Chromosomes	10	4

Students without AS or A2 level Chemistry or an equivalent qualification MUST take:

CH1FC1	Fundamental Concepts in Chemistry 1	10	4
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Students will choose further modules, to achieve a total of 120 credits, from either the **Biomolecular stream** or the **Bio-environmental stream**. Students may take a maximum of 70 credits (including compulsory modules) in

any one term. Subject to agreement from the Programme Adviser, alternative modules may be chosen from the School of Biological Sciences or, exceptionally, from other Schools. Timetable restrictions may apply.

Biomolecular stream

Compulsory modules for Biomolecular stream:

BI1BD1	Introductory Microbiology	10	4
BI1BG3	Practical Biochemistry	10	4

Students will select additional optional modules, to achieve a total of 120 credits. Optional modules may be selected from either list below, although students following the Biomolecular stream are encouraged to select from the list of Biomolecular options.

Biomolecular options for Biomolecular stream:

AP1A18	Digestion and Nutrition	10	4
BI1BB2	Biochemistry and Metabolism	10	4
BI1BE2	Pathology: Introduction to Human Disease	10	4
BI1EF2	Ecology: Species and their Interactions	10	4

Either

PM1PB2	Human Physiology	20	4
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or

PM1PB2A	Human Physiology	10	4
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PY11N	Introduction to Neuroscience	10	4
SS1A1	Introduction to Soil Science	10	4
LA1XX1	Institution Wide Language Programme	20	4

Bio-environmental options for Biomolecular stream:

AP1A02	Introduction to Agriculture and Food Systems	10	4
AP1A10	Countryside and the Environment	10	4
AP1A12	Introduction to Crop Production	10	4
BI1ED2	Mammals: Diversity, Behaviour and Conservation	10	4
BI1EF2	Ecology: Species and their Interactions	10	4
BI1EF3	Practical Field Ecology	10	4
BI1P11	Introductory Microbiology	10	4
ES1F2	Biogeography and Soils	10	4
GG1C	Climatology	10	4
GG1EI	Environmental Issues	10	4
LA1XX1	Institution Wide Language Programme	20	4
SS1A1	Introduction to Soil Science	10	4

Bio-environmental stream

Compulsory modules for Bio-environmental stream:

BI1EF2	Ecology: Species and their Interactions	10	4
BI1EF3	Practical Field Ecology	10	4
SS1A1	Introduction to Soil Science	10	4

Students will select additional optional modules, to achieve a total of 120 credits. Optional modules may be selected from either list below, although students following the Bio-environmental stream are encouraged to select from the list of Bio-environmental options.

Bio-environmental options for Bio-environmental stream:

BI1P11	Introductory Microbiology	10	4
AP1A02	Introduction to Agriculture and Food Systems	10	4
AP1A10	Countryside and the Environment	10	4
AP1A12	Introduction to Crop Production	10	4
BI1ED2	Mammals: Diversity, Behaviour and Conservation	10	4
ES1F2	Biogeography and Soils	10	4
GG1C	Climatology	10	4

GG1EI	Environmental Issues	10	4
LA1XX1	Institution Wide Language Programme	20	4

Biomolecular options for Bio-environmental stream:

AP1A18	Digestion and Nutrition	10	4
BI1BB2	Biochemistry and Metabolism	10	4
BI1BD1	Introductory Microbiology	10	4
BI1BE2	Pathology: Introduction to Human Disease	10	4
BI1BG3	Practical Biochemistry	10	4
BI1EF2	Ecology: Species and their Interactions	10	4

Either

PM1PB2	Human Physiology	20	4
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or

PM1PB2A	Human Physiology	10	4
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PY1IN	Introduction to Neuroscience	10	4
LA1XX1	Institution Wide Language Programme	20	4
SS1A1	Introduction to Soil Science	10	4

Part 2 (three terms)

Compulsory modules

AS2A1	Statistics for Life Sciences	10	5
BI2BG5	Animal, Plant and Microbial Development	10	5
BI2BK5	Molecular Biology of the Gene: Expression, Function and Analysis	10	5
BI2EE4	Evolutionary Biology	10	5
BI2BM34	Professional Career Development	10	5

Students will choose further modules, to achieve a total of 120 credits, from either the **Biomolecular stream** or the **Bio-environmental stream**. Students may take a maximum of 70 credits (including compulsory modules) in any one term. Subject to agreement from the Programme Adviser, alternative modules may be chosen from the School of Biological Sciences or, exceptionally, from other Schools. Timetable restrictions may apply.

Biomolecular stream

Compulsory module for Biomolecular stream:

BI2BP6	Practical Skills: Recombinant DNA Exercise	10	5
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Students will select additional optional modules, to achieve a total of 120 credits. Students whose main interests lie in the Biomolecular / Biomedical area should choose at least 40 credits from the list of Biomolecular options (excluding the Institution Wide Language Programme).

Biomolecular options for Biomolecular stream

BI2BA5	Clinical Biochemistry	10	5
BI2BB4	Endocrinology	10	5
BI2BC4	Human Development, Organogenesis and Anatomy	10	5
BI2BD4	Life and Death of a Cell	10	5
BI2BE4	Pharmacology and Toxicology	10	5
BI2BI5	Immunology	10	5
BI2BJ5	Microbiology: A Medical Perspective	10	5
BI2BL5	Protein Structure and Function	10	5
BI2BO4	Virology	10	5
BI2BR4	Function of the Bacterial Cell	10	5
BI2BT5	Introduction to Bioinformatics and Computational Biology	10	5
BI2EH4	Introduction to the History and Philosophy of Science	10	5
LA1XX1	Institution Wide Language Programme	20	4

Bio-environmental options for Biomolecular stream

BI2BN4	Vertebrate Zoology: Structure, Form and Function	10	5
BI2BS5	Vertebrate Zoology: Structure, Form and Function (2)	10	5
BI2EC4	Ecology and Management of Plant Diseases	10	5
BI2EH4	Introduction to the History and Philosophy of Science	10	5
BI2EI4	Invertebrate Zoology	10	5
BI2EN5	Animal Behaviour	10	5
BI2EWEV	Biodiversity Field Course	10	5
BI2EX5	Introduction to Entomology	10	5
BI2EY5	Birds: Diversity, Behaviour and Conservation	10	5
FB2AG1	Farm to Fork: Primary Production of Food Commodities	10	5

Bio-environmental stream

Compulsory module for Bio-environmental stream:

BI2EWEV	Biodiversity Field Course	10	5
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Students will select additional optional modules, to achieve a total of 120 credits. Students whose main interests lie in the Bio-environmental area should choose at least 40 credits from the list of Bio-environmental options (excluding the Institution Wide Language Programme).

Bio-environmental options for Bio-environmental stream

BI2BN4	Vertebrate Zoology: Structure, Form and Function	10	5
BI2BS5	Vertebrate Zoology: Structure, Form and Function (2)	10	5
BI2EC4	Ecology and Management of Plant Diseases	10	5
BI2EH4	Introduction to the History and Philosophy of Science	10	5
BI2EI4	Invertebrate Zoology	10	5
BI2EN5	Animal Behaviour	10	5
BI2EX5	Introduction to Entomology	10	5
BI2EY5	Birds: Diversity, Behaviour and Conservation	10	5
FB2AG1	Farm to Fork: Primary Production of Food Commodities	10	5
LA1XX1	Institution Wide Language Programme	20	4

Biomolecular options for Bio-environmental stream

BI2BA5	Clinical Biochemistry	10	5
BI2BB4	Endocrinology	10	5
BI2BC4	Human Development, Organogenesis and Anatomy	10	5
BI2BD4	Life and Death of a Cell	10	5
BI2BE4	Pharmacology and Toxicology	10	5
BI2BI5	Immunology	10	5
BI2BJ5	Microbiology: A Medical Perspective	10	5
BI2BL5	Protein Structure and Function	10	5
BI2BO4	Virology	10	5
BI2BP6	Practical Skills: Recombinant DNA Exercise	10	5
BI2BR4	Function of the Bacterial Cell	10	5
BI2BT5	Introduction to Bioinformatics and Computational Biology	10	5
BI2EH4	Introduction to the History and Philosophy of Science	10	5

Year abroad/Year away/Additional year (three terms)

Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
BI2IND	Industrial Placement	120	5

Students spend one year in an industrial or institute research or similar placement. Satisfactory attendance and performance during this year is an integral and compulsory part of this course.

Part 3 (three terms)

Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
BI3PRA	Research Project in Ecology and Evolution Section	40	6
Or			
BI3PRB	Research Project in Biomedical Sciences Section	40	6

Students will choose further modules, to achieve a total of 120 credits, from the lists of options below. Subject to agreement from the Programme Advisor, alternative modules may be chosen from the School of Biological Sciences or, exceptionally, from other Schools. Timetable restrictions may apply. No more than 70 credits should be taken in any one term.

Optional modules

AP3A67	Animal Welfare	10	6
AP3A76	Principles and Practice in Biological Control	10	6
AP3A84	Dogs and Cats	10	6
AP3A91*	Captive Animal Management	10	6
AP3A99	Plants, Greenspaces and Urban Sustainability	10	6
AP3AE75	Wildlife and Farming	10	6
BI3B67*	Microbiology Field Trip	20	6
BI3BA7	Medical Genetics	10	6
BI3BB7	Selected Topics in Endocrinology and Endocrine Disease	10	6
BI3BC7	Bacterial Pathogens	10	6
BI3BD8	Cancer	10	6
BI3BE8	Cardiovascular Disease	10	6
BI3BF7	Cell Communication and Disease	10	6
BI3BG8	Mechanisms for Microbial Function	10	6
BI3BH8	Mammalian Reproduction	10	6
BI3BI8	Neurobiology	10	6
BI3BJ8	Viral Pathogens	10	6
BI3BN8	Use and Abuse of the Microbial World	10	6
BI3BP7	Systems Biology	10	6
BI3EB7	Forensic Zoology	10	6
BI3EF7	Urban Ecology	10	6
BI3EG7	Evolutionary Genetics and Phylogeny	10	6
BI3EI8	Research Topics in Ecology	10	6
BI3EJ8	Conservation Biology	10	6
BI3EK7	Behavioural Ecology and Life History Theory	10	6
BI3EM7	Plants, Animals and Climate Change	10	6
BI3EN7	Conservation and Biodiversity: Global and Local Scales	10	6
BI3E08	Science in Culture	10	6
BI3S78	Seminars in Biology	10	6
FB3N2A	Diet and Disease	10	6
FB3N2B	Genes, Lifestyle and Nutrition	10	6

*Follows Part 2 examinations. Registration takes place during the Spring Term, Part 2 - places restricted

Progression requirements

To gain a threshold performance at Part 1 a student shall normally be required to achieve an overall average of 40% over 120 credits taken at Part 1 and a mark of at least 30% in individual modules amounting to not less

than 100 credits. **In order to progress from Part 1 to Part 2** a student shall normally be required to achieve a threshold performance at Part 1.

To gain a threshold performance at Part 2 a student shall normally be required to achieve an overall average of 40% over 120 credits taken at Part 2 and a mark of at least 30% in individual modules amounting to not less than 100 credits. **In order to progress from Part 2 to Part 3** a student shall normally be required to achieve a threshold performance at Part 2.

The industrial placement is assessed on a Pass/Fail basis. A mark of 40% is required to achieve a Pass. To proceed from the industrial placement to Part 3, it is necessary to obtain a satisfactory report of attendance and performance from the industrial supervisor, to have submitted a satisfactory report to the School and to have presented a satisfactory seminar on the work carried out during the placement; a satisfactory mark will not be lower than 40%.

Students who at any stage fail to meet the progression requirements for this 4-year programme but who meet the progression requirements for the 3-year programme for BSc (Honours) in Biological Sciences will automatically be offered the opportunity to change to the 3-year programme.

Part 2 contributes one third of the overall assessment and Part 3 the remaining two thirds. In order to be eligible for Honours, students must gain an overall weighted average mark of 40%, at least 40% in modules amounting to 80 credits in Part 3, and must gain a mark of at least 40% in the Research Project module. For a Pass degree, candidates must have an average of at least 35% and at least 35% in modules amounting to 80 credits in Part 3, and must gain a mark of at least 35% in the Research Project module.

Assessment and classification

The University's honours classification scheme is:

<i>Mark</i>	<i>Interpretation</i>
70% - 100%	First class
60% - 69%	Upper Second class
50% - 59%	Lower Second class
40% - 49%	Third class
35% - 39%	Below Honours Standard
0% - 34%	Fail

For the University-wide framework for classification, which includes details of the classification method, please see: www.reading.ac.uk/internal/exams/Policies/exa-class.aspx.

The weighting of the Parts/Years in the calculation of the degree classification is

Four-year programmes, including placement year: Normally:

Part 2 one-third

Placement Year not included in classification

Part 3 two-thirds

(where students fail a placement year which does not contribute to classification they transfer to the three-year version of the programme)

Teaching is organised in modules. Teaching in Part 1 consists of lectures and practical classes with small group work being largely restricted to the Experiments: Design and Interpretation module. Modules can be assessed by 100% coursework but more usually are assessed by a combination of coursework (30%) and formal examination (70%).

In Parts 2 and 4, lectures and practical classes continue to be major modes of teaching but they are increasingly supplemented by seminars and other group work. Modules can be 100% in-course assessed but are more usually assessed by a combination of coursework (30%) and formal examination (70%).

Admission requirements

Entrants to this programme are normally required to have obtained:

UCAS Tariff: 320 points from no more than 4 A-level or AS subjects, including 2 full A-levels. Points include grade B in two A-level Science subjects, including Biology and grade C in a further A-level Science subject.

International Baccalaureate: Pass Diploma and achieve 6,6,5 in 3 higher level Science subjects. Applicants with other types of qualifications and mature students are also encouraged to apply

Admissions Tutor: Dr Ross Cameron

Support for students and their learning

University support for students and their learning falls into two categories. Learning support is provided by a wide array of services across the University, including: the University Library, the Careers, Placement and Experience Centre (CPEC), In-session English Support Programme, the Study Advice and Mathematics Support Centre teams, IT Services and the Student Access to Independent Learning (S@il) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, School Senior Tutors, the Students' Union, the Medical Practice and advisers in the Student Services Centre. The Student Services Centre is housed in the Carrington Building and offers advice on accommodation, careers, disability, finance, and wellbeing, academic issues (eg problems with module selection) and exam related queries. Students can get key information and guidance from the team of Helpdesk Advisers, or make an appointment with a specialist adviser; Student Services also offer drop-in sessions and runs workshops and seminars on a range of topics. For more information see www.reading.ac.uk/student

In addition to the above, the School of Biological Sciences has several well-equipped teaching laboratories and a dedicated computer laboratory providing students with in-house access to on-line educational material. The School of Biological Sciences also houses an extensive zoological museum and collection, a herbarium and botanic garden. These provide a rich source of material and specimens that are incorporated into several modules.

Career prospects

Reading Biological Science graduates are eligible for membership of the Institute of Biology and can achieve Chartered Biologist status. They are qualified to enter a variety of careers in the biological sciences, including work in industry (pharmaceuticals, biomedical, agrochemicals), government service (research institutes and bodies such as the Environment Agency) and other public bodies (local conservation units, animal charities). As numerate scientists they also enter a wide variety of commercial and business occupations.

Opportunities for study abroad or for placements

Industrial Placement:

Students who are interested in a scientific career, whether in industry, research or some other related field can apply for a year's placement between Parts 2 and 3. Students who wish to apply would normally be expected to have a weighted average of at least 60% in Part 1.

Study Abroad:

The Erasmus programme enables undergraduates to undertake project work for one term in their final year at one of a number of European Universities. Recent exchanges involving School of Biological Science students have taken place with the following: University of Tours, France; Odense University, Denmark; Uppsala University, Sweden; University College Cork, Ireland; University of Zaragoza, Spain; ENSA, Montpellier, France; University of Cagliari, Sardinia. Students also have the opportunity to go to Rostock University, Germany and Siena University, Italy.

Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

Knowledge and Understanding

A. Knowledge and understanding of:

1. The basic principles underlying the biological sciences
2. The variety of groups of living organisms, from

Teaching/learning methods and strategies

Compulsory and optional modules in Parts 1 and 2 introduce students to the diversity of living organisms at a variety of levels. A wide range of

viruses and bacteria to complex multicellular organisms such as mammals and flowering plants

3. Different levels of biological organisation of living organisms, from the molecular, biochemical and cellular to the physiological, environmental and ecological
4. In depth understanding of least one specialist field of biology, the precise area to be selected by the student.

teaching strategies is employed in these modules, initially in relatively large-group lecture and practical sessions in Part 1. Smaller group teaching comes to dominate in Parts 2 and 3 and includes, depending on the modules chosen, additional teaching methods such as seminars, fieldwork and discussion sessions. Students within the Environmental stream will also attend full-time field courses during vacations. In Part 4 students will be able to select a specific area of biology for in-depth study and will undertake a research project with one-to-one supervision by a member of academic staff or equivalent.

Assessment

Knowledge and understanding gained in the majority of modules will be assessed by a combination of coursework and formal examination. Some modules, for example field courses, will be assessed by 100% coursework. The project undertaken in Part 3 will be assessed primarily by written report.

Skills and other attributes

B. Intellectual skills - *able to:*

1. Address problems in a logical and structured manner
2. Manipulate and analyse numerical data
3. Construct and test hypotheses
4. Critically evaluate scientific literature and data

Teaching/learning methods and strategies

Basic skills associated with problem solving and data analysis are taught in specific modules using a variety of teaching methods. These skills are further developed in individual modules, for example on field courses students in small groups will be taught how to construct and logically investigate a hypothesis and to analyse the data produced. In Part 3 students are able to enhance their critical and analytical skills by undertaking a project and to demonstrate this by presenting the results in an accompanying dissertation.

Assessment

Assessment of 1 and 2 is by examination. Critical evaluation of scientific data and literature is assessed in essay and dissertation form.

C. Practical skills - *able to:*

1. Conduct practical laboratory and/or fieldwork safely and successfully.
2. Design and undertake a programme of scientific investigation

Teaching/learning methods and strategies

Practical laboratory skills will be taught in School teaching laboratories while fieldwork forms an integral part of several modules and is specifically taught on field courses. Further practical and field skills may also form part of the Part 3 project, where students will be taught on a one-to-one basis how to design and implement a programme of scientific investigation.

Assessment

Skill 1 is typically assessed by course work, while skill 2 is assessed by written report.

D. Transferable skills - *able to:*

Teaching/learning methods and strategies

1. To be able to communicate effectively in both written and oral form
2. To be numerate and capable of approaching problems in a logical and structured manner
3. To be able to operate effectively as part of a team
4. To be familiar with IT operation and resources
5. To be able to work independently
6. To be able to effectively plan and time manage projects

Specific modules throughout the programme teach skills 1 to 4 using a combination of seminars, demonstrations and practical approaches. In addition, other modules include aspects of different skills, for example field courses include teamworking as part of structured group work and many modules include an integral component of written and oral communication as coursework. In Part 3 students undertake a detailed solo project during which their individual planning and time management skills are developed through contact with their academic supervisor.

Assessment

Skills are assessed by coursework as part of the Professional Career Development module. In addition, most individual modules include written and oral coursework as 20-30% of the total module assessment. Other skills are assessed by coursework as part of the Concepts and Skills modules. In addition, most individual modules include written and oral coursework as 30% of the total module assessment.

Please note - This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the module description and in the programme handbook. The University reserves the right to modify this specification in unforeseen circumstances, or where the process of academic development and feedback from students, quality assurance process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.