

**BSc Biological Sciences with Industrial Experience  
For students entering Part 1 in 2006**

**UCAS code: C101**

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject benchmarking group(s):	Biosciences
	Programme length: 4 years
Faculty of Life Sciences	
Date of specification:	July 2006
Programme Director:	Dr D Savva
Programme Adviser:	Professor PG Knight
Industrial Liaison Co-ordinator:	Dr AC Wetten
Board of Studies:	Biomolecular Sciences
Accreditation:	None

**Summary of programme aims**

This degree aims to provide a broad academic training in biology together with experience of the wider applied needs of the community for biology. This will be achieved through a 4 year degree programme such that the student follows the full three year B.Sc. Hons. Degree programme in Biological Sciences but between years 2 and 3 the student would spend one year out in an industrial or institute research or similar environment.

At an academic level, this degree is concerned especially with the diversity of living organisms and includes studies of the biology of all types of organisms from viruses to flowering plants and mammals. The subject matter of Parts 1 and 2 is broadly based with specialisation in Part 3 to provide a coherent, in-depth area of study which the student will select. Students are expected to gain a broad understanding of the concepts underpinning biological sciences and to demonstrate the ability to complete a detailed study of at least one discipline during Part 3. They will receive training and be expected to demonstrate competence in laboratory techniques in biology, the use of computers to access information resources and the use of statistical programmes for data analyses. Students will be expected to acquire individual and group communication skills in written work and in oral and poster presentations. The development of critical reading skills will be strongly encouraged. (For a full statement of the programme aims and learning outcomes see below)

**Transferable skills**

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem solving, team working and use of information technology.

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.

### 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 adviser, to make 120 credits in Parts 1, 2 and 4. The number of module credits for each module is shown after its title.

<b>Part 1 (three terms)</b>		<i>Credits</i>	<i>Level</i>
<i>Compulsory modules</i>			
BI1C10	<i>Cell biology and biochemistry</i>	10	C
BI1M10	<i>Biodiversity</i>	10	C
BI1C11	<i>Genetics and molecular biology</i>	10	C
BI1S12	<i>Field course</i>	10	C

In addition, students must select one from

		<i>Credits</i>	<i>Level</i>
AM1M13	<i>Practical biochemistry</i>	10	C
BI1Z11	<i>Community ecology</i>	10	C

Also, students without AS or A2 level Chemistry or an equivalent qualification must take:

CH1FC1	<i>Fundamental concepts in chemistry 1</i>	10	C
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### *Optional modules*

Students will choose additional modules up to a total of 120 credits subject to timetabling constraints and with the agreement of the Programme Adviser. This may include a range of Bioscience modules as listed below, plus modules from other areas of the University including languages from the Institution Wide Language Programme. Further details can be found on the University Website at [www.info.rdg.ac.uk/Module/](http://www.info.rdg.ac.uk/Module/).

### **Term 1**

AM1M11	<i>Fundamental microbiology</i>	10	C
CH1O2	<i>Fundamental organic chemistry</i>	10	C
PM1PB2	<i>Human physiology (Terms 1 and 2)</i>	20	C
PM1PB2	<i>Human physiology A (Term 1 only)</i>	10	C
PS1BA1	<i>Plant world</i>	10	C
PS1HB1	<i>Principles of horticulture</i>	10	C

### **Term 2**

AM1C13	<i>Digestion and nutrition</i>	10	C
AM1C14	<i>Biochemistry and metabolism</i>	10	C

AM1M12	<i>Important microbes</i>	10	C
AM1Z10	<i>The whole mammal</i>	10	C
AP1A10	<i>Countryside and the environment</i>	10	C
AP1A12	<i>Introduction to crop production</i>	10	C
BI1Z10	<i>Ecology</i>	10	C
CH1O1	<i>Introduction to organic chemistry (Terms 1, 2 and 3)</i>	20	C
CH1P2	<i>Physical biochemistry (Terms 1, 2 and 3)</i>	20	C
PS1AB2	<i>Physical ecology</i>	10	C
		<i>Credits</i>	<i>Level</i>
PS1BA2	<i>Plant development and physiology</i>	10	C
PS1BC2	<i>Introductory botany</i>	10	C

## Part 2 (three terms)

### Compulsory modules

A compulsory concepts and skills module, worth 10 credits in total and running in Term 4, will further develop the transferable skills students have acquired at Part 1.

AM2S31	<i>Concepts and Skills</i>	10	I
AS2A1	<i>Statistics for life sciences</i>	10	I

### Optional modules

Students will choose additional modules up to a total of 120 credits subject to timetabling constraints and with the agreement of the Programme Adviser. This may include a range of Bioscience modules, plus modules from other areas of the University including languages from the Institution Wide Language Programme. Details can be found on the University Website at [www.info.rdg.ac.uk/Module/](http://www.info.rdg.ac.uk/Module/).

No more than 60 credits may be taken in any one term.

## Term 3 (following the Part 1 exams or in the Summer Vacation)

AP2A43	<i>Small animal management*</i>	10	I
AM2Z38	<i>Field course*</i>	10	I
PS2BG3	<i>Flora of the British Isles (Field Course)</i>	10	I

\* Subject to spaces being available.

## Term 4

AM2C31	<i>Molecular biology and bioinformatics</i>	10	I
AM2C32	<i>Endocrinology</i>	10	I
AM2C33	<i>Pharmacology and toxicology</i>	10	I
AM2C35	<i>Cellular biology</i>	10	I
AM2M32	<i>Physiology and genetics of the bacterial cell</i>	10	I
AM2M33	<i>Practical virology</i>	10	I
AM2Z32	<i>Vertebrate zoology</i>	10	I
AM2Z34	<i>Invertebrate zoology</i>	10	I

AM2Z35	<i>Immunology</i>	10	I
BI2B31	<i>Macro-evolution</i>	10	I
		<i>Credits</i>	<i>Level</i>
PS2AB4	<i>Weed biology and control</i>	10	I
PS2BB4	<i>Evolution of plant biodiversity</i>	10	I
PS2BD4	<i>Plants and the environment</i>		
PS2HD4	<i>Crop disease and its control</i>	10	I

### Term 5

AM2C34	<i>Introduction to human disease</i>	10	I
AM2C36	<i>Protein structure and function</i>	10	I
AM2C38	<i>Receptors and signal transduction</i>	10	I
AM2C39	<i>Regulation of gene expression</i>	10	I
AM2M31	<i>Viruses and their hosts</i>	10	I
AM2M35	<i>Medical microbiology</i>	10	I
AM2Z33	<i>Animal behaviour</i>	10	I
AM2Z37	<i>Aquatic biology</i>	10	I
AM2Z41	<i>Applied ecology</i>	10	I
BI2Z31	<i>Micro-evolution</i>	10	I
PS2AA5	<i>Plant genetics</i>	10	I
PS2AB5	<i>Crop pests and integrated crop protection</i>	10	I
PS2BC5	<i>Ecological aspects of environmental assessment</i>	10	I
PS2BE5	<i>Ecological biochemistry</i>	10	I

### Term 6

AM2C40	<i>Recombinant DNA exercise</i>	10	I
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This module runs in weeks one and two of term 6.

### Part 3 (three terms)

*Compulsory year out in an industrial placement or institute*

AM2I01	<i>Industrial placement</i>	120	H
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Students will 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 4 (three terms)

*Compulsory modules*

One compulsory module, the Research Project, worth 40 credits, occupies 20 credits in Term 7 and 20 credits in Term 8. The Research Project is designed to take students to the cutting edge of biological research.

AM3S75	<i>Research Project</i>	Credits 40	Level H
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#### *Optional modules*

Students will choose additional modules up to a total of 120 credits subject to timetabling constraints and the agreement of the Programme Adviser. Details can be found on the University Website at [www.info.rdg.ac.uk/Module/](http://www.info.rdg.ac.uk/Module/). In this final year students will be expected to focus their studies in one of several possible specialisations, including Zoology, Microbiology, Biochemistry and Botany.

No more than 60 credits should be taken in any one term.

#### **Term 6 (following the Part 2 exams or in the Summer Vacation)**

AM3Z80	<i>Marine Biology Field Course**</i>	10	H
AP3A75	<i>Equine Management***</i>	10	H

\*\* The Marine Biology Field Course takes place in the Summer Vacation between years 2 and 3. Enrolment for this course will begin during Part 2, following the Christmas Vacation, and you will be advised of the enrolment procedures at this time. Availability to be confirmed.

\*\*\* This module is based at Sparsholt College and runs in week 9. Availability to be confirmed.

#### **Term 7**

AM3C71	<i>Cardiovascular disease</i>	10	H
AM3C72	<i>Life and death of the cell</i>	10	H
AM3C73	<i>Chromosome mapping and genetic disease</i>	10	H
AM3M71	<i>Specialised groups of bacteria</i>	10	H
AM3M72	<i>Bacterial pathogenicity</i>	10	H
AM3Z75	<i>Evolutionary genetics and phylogeny</i>	10	H
AM3Z76	<i>Behavioural ecology and life history theory</i>	10	H
		<i>Credits</i>	<i>Level</i>
AP3A67	<i>Animal welfare</i>	10	H
AP3A76	<i>Principles and practice in biological control</i>	10	H
AP3A84	<i>Dogs and cats</i>	10	H
PS3AA7	<i>Plant biotechnology for post harvest quality</i>	10	H
PS3AB7	<i>Crops and climate</i>	10	H
PS3AE7	<i>Weed management</i>	10	H
PS3BD7	<i>Physiological ecology</i>	10	H

#### **Term 8**

AM3C78	<i>Mammalian reproduction</i>	10	H
AM3C79	<i>Pathology and clinical biochemistry</i>	10	H
AM3C80	<i>Cancer</i>	10	H
AM3M73	<i>Viruses as pathogens</i>	10	H
AM3M74	<i>Molecular microbiology</i>	10	H

AM3Z72	<i>Insects and society</i>	10	H
AM3Z74	<i>Conservation biology</i>	10	H
AM3Z77	<i>Research topics in ecology</i>	10	H
AP3A68	<i>Wildlife in the farming environment</i>	10	H
AP3A85	<i>Horses</i>	10	H
PS3AF8	<i>Plant tissue culture</i>	10	H
PS3AG8	<i>Weed ecology</i>	10	H
PS3BA8	<i>Biodiversity assessment and the sustainable use of plant resources</i>	10	H
PS3BE8	<i>Biodiversity informatics</i>	10	H

### **Progression requirements**

#### **Progression from Part 1 to Part 2**

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 in 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.

#### **Progression from Part 2 to Part 3**

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 in 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 Part 3 to Part 4 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.

#### **Summary of teaching and assessment**

Teaching is organised in modules. Teaching in Part 1 consists of lectures and practical classes with some small group work. 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%).

In the year out in Part 3, learning will be as directed within the placement selected and offered to the student. Good attendance record and satisfactory performance is a requirement for progression to Part 4 of the degree programme. Assessment will be by report from the industrial supervisor, a written report to the School and a seminar presentation on the work carried out during the placement.

Part 2 contributes one third of the overall assessment and Part 4 the remaining two thirds. In order to be eligible for Honours, students must gain an overall weighted average mark of 40% and must gain a mark of at least 40% in the Research Project module (AM3S75).

The assessment is carried out within the University's degree classification scheme, details of which are in the programme handbooks.

### **Admission requirements**

Entrants to this programme are normally required to have obtained:

**UCAS Tariff:** 300 points from no more than 4 A2 or AS subjects including at three A2 science subjects at grade B or C, plus Mathematics, Double Science and English at Grade B at GCSE level.

**International Baccalaureat:** 32 points

**Scottish Highers** BBBB (including Biology B)

**Irish Leaving Certificate:** BBBBB(including Biology B)

GNVQ is accepted and mature students are also encouraged to apply

Admissions Tutor: Dr P.D. Darbre

### **Support for students and their learning**

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses 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, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

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 AMS Building also houses an extensive Zoological museum and collection and the Plant Sciences building a herbarium and botanic garden. These provide a rich source of material and specimens that are incorporated into several modules.

### **Career prospects**

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**

Students of Biological Sciences can take part in the Erasmus exchange programme in which they can spend the first term of Part 4 studying in a variety of other European Universities. Recent exchanges involving SBS 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; Rostock University, Germany; Siena University, Italy.

### **Educational aims of the programme**

The BSc in Biological Sciences is concerned especially with the diversity of living organisms. It 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 Parts 1 and 2 is broadly based with specialisation in Parts 3 and 4 to provide a coherent, in-depth area of study which the student will select. Students are expected to gain a broad understanding of the concepts underpinning biological sciences and to demonstrate the ability to complete a detailed study of at least one discipline during Parts 3 and 4.



## 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 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/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 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 4 and includes, depending on the modules chosen, additional teaching methods such as seminars, fieldwork and discussion sessions. Students will also have the option of attending full-time field courses during vacations. In Parts 3 and 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 4 will be assessed primarily by written report.

*Skills and other attributes*

<p><b>B. Intellectual skills</b> – able to:</p> <ol style="list-style-type: none"><li>1. Address problems in a logical and structured manner</li><li>2. Manipulate and analyse numerical data</li><li>3. Construct and test hypotheses</li><li>4. Critically evaluate scientific literature and data</li></ol>	<p><b><i>Teaching/learning methods and strategies</i></b> Basic skills associated with problem solving and data analysis are taught in a specific module 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 Parts 3 and 4 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.</p> <p><i>Assessment</i> Assessment of 1 and 2 is by examination. Critical evaluation of scientific data and literature is assessed in essay and dissertation form.</p>
<p><b>C. Practical skills</b> – able to:</p> <ol style="list-style-type: none"><li>1. Conduct practical laboratory and/or fieldwork safely and successfully.</li><li>2. Design and undertake a programme of scientific investigation</li></ol>	<p><b><i>Teaching/learning methods and strategies</i></b> Practical laboratory skills will be taught in Departmental teaching laboratories while fieldwork forms an integral part of several modules and is specifically taught on optional Field Courses. Further practical and field skills may also form part of the Part 4 project, where students will be taught on a one-to-one basis how to design and implement a programme of scientific investigation.</p> <p><i>Assessment</i> Skill 1 is typically assessed by course work, while skill 2 is assessed by written report.</p>

**D. Transferable skills:**

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

***Teaching/learning methods and strategies***

A Specific Concepts and Skills module in Parts 2 teaches 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 4 students undertake a detailed project during which their individual planning and time management skills are developed through contact with their academic supervisor.

***Assessment***

Numeracy and Problem Solving are assessed by specific exam. 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 processes or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.**