



DEPARTMENT OF BIOLOGICAL SCIENCES

UNDERGRADUATE STUDENT HANDBOOK

2022/2023

Disclaimer

This document was published in September 2022 and was correct at that time. The department* reserves the right to modify any statement if necessary, make variations to the content or methods of delivery of programmes of study, to discontinue programmes, or merge or combine programmes if such actions are reasonably considered to be necessary by the College. Every effort will be made to keep disruption to a minimum, and to give as much notice as possible.

* Please note, the term 'department' is used to refer to 'departments', 'Centres and 'Schools'. Students on joint or combined degree programmes will receive two departmental handbooks.

Important information on terminology

- Degree Course – May also be referred to as 'degree programme' or simply 'programme', these terms refer to the qualification you will be awarded upon successful completion of your studies
- Module – May also be referred to as 'course', this refers to the individual units you will study each year to complete your degree course. Undergraduate degrees at Royal Holloway comprise a combination of modules in multiples of 15 credits to the value of 120 credits per year. On some degree courses a certain number of optional modules must be passed for a particular degree title.

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1 Introduction to the Department of Biological Sciences

1.1 Welcome

Welcome to the Department of Biological Sciences! We are excited to have you join us here at Royal Holloway University of London (referred to from here on as 'the College'). Royal Holloway is one of the UK's leading research-intensive universities, with nineteen academic departments spanning the arts and humanities, social sciences and sciences. On behalf of all the staff, I would like to welcome all students joining, or returning to, the Department of Biological Sciences. We hope that this will be an interesting, rewarding and enjoyable year and that you will take full advantage of the opportunities open to you.

The Department of Biological Sciences offers eight degree programmes, covering a wide range of subjects within the biological sciences. For all degrees, we aim to provide you with the highest level of teaching and pastoral care. Indeed, students recognize this and voted us the *Department of the Year*, in May 2017. In addition, in the 2020 National Student Survey the student satisfaction rating was 100% for biology. We are proud of these results, and continue to strive to ensure all students enjoy their time at Royal Holloway, and succeed in reaching their goals. Whatever degree course you are taking, we aim to guide you, challenge your intellect, provoke your curiosity and inspire you. We will help you prepare for employment, whatever your future career aspirations may be. You will be taught by some of the leading researchers in their field, and some of the sharpest minds you're likely to meet.

While we will outline the subject matter and point you towards many useful resources, you must take ownership of your learning. Your individual success requires a commitment from you to give of your best and to make the most of the opportunities offered for gaining both academic and transferable skills. You are expected to attend all timetabled sessions, the majority of which we are pleased to be delivering face-to-face. *Lectures* provide the foundation of knowledge on a topic, but they also offer much more than this: Lectures provide a time to ask and answer questions, an opportunity to learn about assessment requirements, and the invaluable chance to interact with your peers! While we audio-record lectures, that is no substitute for live in-person attendance. *Practicals* provide hands-on lab and field skills that form an important part of every bioscience degree, and are an essential part of the Royal Society of Biology accreditation requirements. *Tutorials* will take place through a combination of in-person and online meetings, to enable individual and small group discussions that will help to develop your skills, enhance your employability, and reflect on your strengths and weaknesses. Over the next three years, you have an amazing opportunity to read extensively and to think constructively and creatively about subjects that fascinate you. Make the most of this opportunity!

All degree programmes offered by the Department of Biological Sciences are accredited by the Royal Society of Biology. This accreditation provides independent evidence of the high quality of the degrees we offer, demonstrating confidence in the subject knowledge, practical skills, and graduate-level transferable skills that each student will acquire by the end of their degree. The accreditation is a mark of excellence for future employers, and is an award of which you should be proud.

The Department fosters a strong sense of community, with plenty of interaction between staff and students and many ways for individuals to have their voices heard. Students play a formal role in the Staff-Student Committee, where student representatives work alongside staff members to enable positive change. We also welcome informal contact with students and you can make an appointment to talk to any member of staff, or contact them without appointment during their scheduled 'drop-in hours'. There are other opportunities to provide feedback such as the module questionnaires and annual College surveys – your opinions are important to us and we will listen and act where we can. There is also an active student-run society for Biological Sciences students – *BioSoc* – which organizes regular events, including social activities that involve staff as well as students. The students also produce a termly magazine, *Scientists' Scribe*, to share ideas within the Biological Sciences. Please do take the opportunity to get involved!

I would encourage you to read this Undergraduate Handbook and the College Undergraduate Handbook carefully since they contain a lot of useful information. There are important sections outlining where to find support, communication, degree structure, attendance requirements, the processes for handing in work, what to do if you're ill, and the regulations about assessments and exams. This handbook will also direct you to places on the College website where you can find further information. You will undoubtedly want to refer to this Handbook at other times throughout the year, as many of the common questions from students are answered here. This handbook is available on the Department Moodle sites, and is updated on an annual basis. If you require further information, please do feel welcome to come and speak to me, or to any of the administrative or academic staff. We want you to enjoy your time at Royal Holloway and to achieve your best!

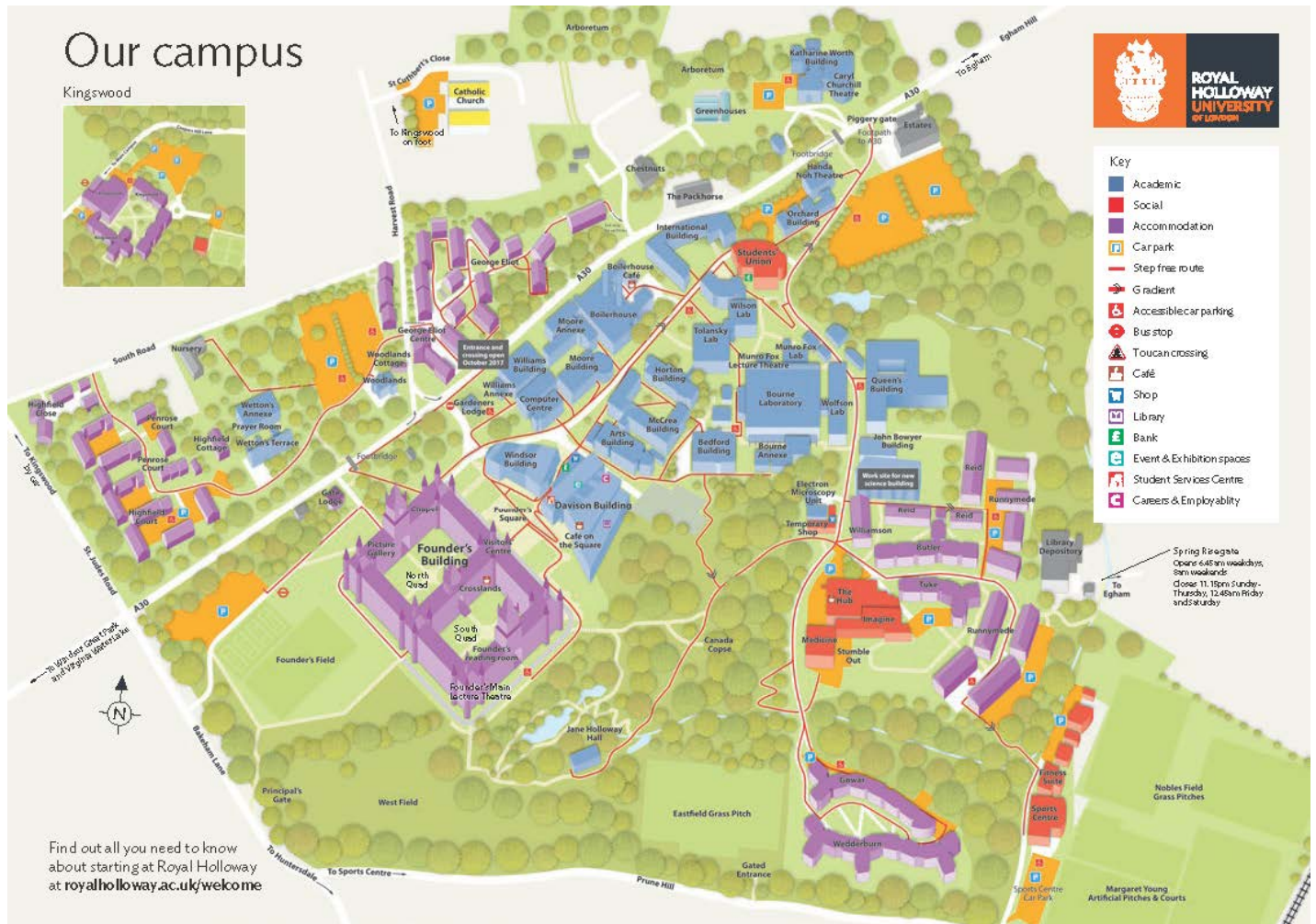
Our very warm wishes to you all for an enjoyable and successful academic year.

Dr Jenny Murdoch
Undergraduate Education Lead

1.2 How to find us: the Department

The Department of Biological Sciences is located in the Bourne Building. This can be found on the College campus map.

1.3 Map of the Egham campus



Please note, student parking is very limited and is not available if you live in Halls or within 1.5 miles of campus. If you do live more than 1.5 miles away or have a particular reason why you need to come to campus by car, you must apply for a parking permit. If you have a motorbike or scooter you must also register the vehicle with College. Find more information about the Parking Permit portal [here](#).

1.4 How to find us: the staff

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Administration of Teaching in the Department of Biological Sciences

Academic Staff

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Deputy Chair of UG Assessment Board	Dr Lydia Hanna	41-4988	3-20
Careers and Placement Lead	Dr Rudy Riesch	41-4659	5-20
Senior Tutor & UG Wellbeing Lead	Dr Becky Thomas	41-4420	5-19
Student Recruitment and Communications Lead	Dr Shobana Dissanayeke	44-3183	5-12
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Programme Lead for MSc Biological Sciences by Research	Dr Paul Devlin	41-4698	4-14

Helpdesk lse-school@rhul.ac.uk 27-6884 W118

If you telephone from outside the College, dial 01784 and the 6-digit number given above. If calling on an internal phone, dial the final 4-digits only.

1.5 How to find us: the School office

The School Admin Office is located in the Wolfson Building, room 118, on the ground floor.

1.6 The Department: practical information

The Department is the largest academic centre in the Science Faculty with 29 full-time and 6 part-time members of academic staff. We are responsible for teaching over 500 undergraduate students. In addition, there is a large population of postgraduate students (both MSc and PhD) and postdoctoral research scientists working in the School.

The Bourne building is open to undergraduate students from 8.00 am to 6.00 pm on working days, but not at weekends or on public holidays. For safety reasons undergraduate students are not normally allowed inside the building outside these times without written permission, signed by the Head of Department.

	Room
School Helpdesk	Wolfson 118
Teaching laboratories – second floor	Bourne 2-02/3
Teaching laboratory – third floor	Bourne 3-03

1.7 Staff research interests

Members of the Department of Biological Sciences have a wide range of research interests and teaching expertise. These, together with their academic and managerial and responsibilities, are shown in Appendix 1. Further information on research can be found on the Department website.

2 Support and advice

2.1 Support within your Department and School

There are many staff members in the Department and School who may be able to help you if you have a problem. Who you need to see will vary according to the type of question or problem you have. Here's a list that may help you identify the appropriate person to see if you have a problem:

The School Helpdesk is there to help you with any questions or concerns you might have about your studies. Depending on your query, the Helpdesk will answer your questions then and there, put you in touch with a colleague who can help, or find out the answer and get back to you.

- Email: LSE-School@rhul.ac.uk
The inbox is monitored from Monday to Friday from 9:00am to 5:00pm and they aim to respond to all queries within one working day.
- MS Teams appointment with a member of the admin team: [click here](#)
- Tel: 01784 276 884

Alternatively, you can visit us in-person at the Helpdesk in the Wolfson main entrance on the left-hand side. We are available to speak to in-person from Monday to Friday from 10:00am to 4:00pm during term time. Please refer to the General Information pages BS1000, BS2000 or BS3000 on Moodle for more information

- With general non-academic queries: go to the Student Services Centre in the Emily Wilding Davison building*
- With a topic in an individual course: post a question on the module discussion forum on Moodle, or see the lecturer concerned during their 'drop-in hours' or by appointment
- With the administration or examination of an individual module: see the Module Coordinator
- With examination arrangements in the Department: see the Chair of the Assessment Board, Dr Philip Chen
- With module selection: see your Personal Tutor
- With general academic organisation: see the UG Education Lead
- With personal difficulties: see your Personal Tutor or the Counselling Service*
- With a problem common to many students: bring it to the attention of the School Staff-Student Committee via your Academic Rep
- With English as a second language: contact your Personal Tutor or the Centre for the Development of Academic Skills (CeDAS)*
- With issues relating to specific learning difficulties: see the UG Wellbeing officer, Dr Becky Thomas

Students can also make an appointment to see the Department UG Education Lead, Dr Jenny Murdoch, regarding any regulatory or academic matter

*Please refer to the central College Content UG Student Handbook for further information and contact details.

2.2 Personal Tutors

Every student will be assigned to a member of the academic staff who will serve as their Personal Tutor throughout their undergraduate studies. Personal Tutors are available for advice on all academic matters and will be responsible for your formal tutorial group meetings, although specific information relating to lectures or practicals is best obtained from the lecturer concerned. The Teaching Office and your Personal Tutor should be informed of any health problems or other difficulties which may affect coursework or performance in the examinations, as well as anything which may have some bearing on safety in the laboratories.

Tutorials provide an important part of the School's student support activities and great emphasis is placed on your participation, and on the completion of tutorial assignments.. Tutorial activities are a major source of

training in transferable skills, such as written and verbal communication, and helping you to recognise where you are acquiring a range of other skills. Tutorials provide an opportunity to practice key skills in a small group setting, receiving and building on study skills and helping you to gain in confidence. Building a personal development plan is also part of the tutorial process; this will encourage you to reflect on your strengths and weaknesses, and help you decide what steps would be useful in working towards a career goal. Pre-selection of modules for the following year is made early during second term and you may wish to discuss your choices with your Personal Tutor.

Tutorial meetings will be conducted through a combination of in-person and online sessions. Some tutorial meetings occur in small groups, and for these we have arranged in-person meetings, so that you can get to know your fellow tutees! Other tutorials are shorter one-to-one meetings, such as when reviewing your progress over the term or year, and those will be held online. Full engagement with tutorials is expected, and attendance is recorded. Tutorial engagement is a key factor that Personal Tutors consider when writing references, for instance, when commenting on reliability, punctuality, ability to interact with others, and similar issues frequently required by potential employers.

Do not hesitate to contact your Personal Tutor if you have a problem. Your Personal Tutor acts to provide you with pastoral care as well as academic guidance. If staff cannot meet with you immediately, they will arrange a mutually convenient time for you to speak with them, usually within 1 or 2 days. It is possible in exceptional circumstances to change your Personal Tutor. In such cases please consult Dr Becky Thomas, Senior Tutor.

The easiest way to contact academic staff is by email, but you may also catch them briefly after lectures, during practicals, or by going to their office (or contacting them through MSTeams) during their 'drop-in hours'. You may find these advertised also as 'office hours' or 'consultation hours' – but these are the times when staff will make sure they are available for anyone to see them (either in person or online). Please do be aware that members of academic staff are involved in teaching and also run active research groups, and are unlikely to be able to see you at short notice outside of these times. You are asked to contact them during their 'drop-in hours' or seek an appointment via email, whenever possible.

Job references: Your Personal Tutor is best placed to provide academic references for any future employment or further study applications. However, students cannot assume that their Personal Tutor or any other academic member of staff will automatically provide a reference if their name is cited in an application. You should seek permission before providing their name as a referee, and you should also check that the academic will be available to write a reference in a timely fashion.

As you are likely to ask your Personal Tutor to provide references for you in the future, you should aim to make a good impression with them from an early stage, and to build a good professional relationship with them! Attend all tutorials punctually, complete all set assignments on time, prepare any required material beforehand and actively engage in discussions in the tutorials. It's also useful when asking for references to let your Personal Tutor know of any serious difficulties encountered over the year, as well as keeping them informed of any positive achievements. Remember that your CV should include your academic results and also information about the key transferable skills that you have acquired over the course of your degree. Also include brief information on any relevant work experience, voluntary activities or positions of responsibilities you've held. The more information you can provide, the more able we are to write an informed reference!

3 Communication

It is vitally important that you keep in touch with us and we keep in touch with you. Members of staff may need to contact you to inform you of special preparations you may have to make for a class, changes to teaching arrangements, reminders for upcoming deadlines, or about meetings you might be required or wish to attend. You will need to contact members of the Department or School if, for example, you are unable to attend a class, or you wish to arrange a meeting with your Personal Tutor.

3.1 Email

We will use email as the primary form of communication. You have been given a Royal Holloway email address, and it is to that address that we will correspond. We expect you to check this at least on a daily basis, though sometimes messages will be sent out that require quick action or response. Please do not use other email accounts (such as hotmail, icloud, gmail, Google accounts, etc) as these are often assigned to Clutter or Junk and therefore overlooked by the intended recipient.

3.2 Post

Please do not arrange for personal mail to be sent to you via the Department. If we do receive personal mail for students, we will email you to arrange collection from the School Admin Office, Wolfson 118.

3.3 Notice boards

There are student notice boards on the walls in the Bourne tunnel. The noticeboards are updated with information relating to Peer Guides, Staff Student Committee details, and various other notices throughout the academic year. However information will also be available on Moodle. We use the BS1000, BS2000 and BS3000 Moodle sites for general information pertaining to all students in the year. Module-specific information will be posted on the Moodle site for that module.

If a class is cancelled you will be notified via email or Moodle. It is your responsibility to check the times and venues of all class meetings and of any requirements (e.g. essay deadlines) relating to your modules. Information about timetabling is available through the College online system. Deadlines for all assessments should be stated on the Moodle page for each module. Please check these places first. But if in doubt, please ask!

3.4 Questionnaires

Questionnaires for obtaining student feedback on individual modules are generated by the College and distributed for completion midway through the term and/or in the penultimate lecture of the module. All responses are anonymous. Your comments are invaluable for highlighting aspects of the module that you've particularly enjoyed, as well as helping to improve modules for future students. Responses gained midway through the term also help us to remove problems during the term, though you do not need to wait until then to raise any issues! Students are also asked to complete a student experience survey, towards the end of their first and second year. Final year students complete the National Student Survey, to allow comparisons between universities across the country.

4 Teaching structure

4.1 Study week

The Department has a "Study Week" in the middle of first term, when the number of scheduled teaching sessions is reduced. The lighter load of scheduled teaching in Study Week is designed to provide you with extra time to read around the material you have covered in lectures, to consolidate your learning.

The Study Week is an integral part of the teaching programme and is not a 'half-term holiday'. Attendance at any scheduled teaching sessions remains compulsory. Some first and second year modules continue practical sessions through Study Week. Final year students may be able to carry out Project work in Study Week or, indeed, may be required to give their project presentation. The deadline for assignments may also fall within Study Week.

4.2 January exams

The Department examines term 1 modules with assessments that take place in January. In order to help spread these assessments, some online exams may occur in the week *before* the start of term 2: you will need to ensure you are available at that time. The first week of term 2 is dedicated to exam assessments, with no other scheduled taught classes. The term 2 modules will begin in the second week of term 2, week 18, and continue through the rest of the term; there is no study week in term 2.

5 Degree Structure

Full details about your programme of study, including, amongst others, the aims, learning outcomes to be achieved on completion, modules which make up the programme and any programme-specific regulations are set out in the programme specification available through the [Degree course library](#).

5.1 Department Specific information about degree structure

BIOSCIENCE DEGREES

Biochemistry
Biology
Biomedical Sciences
Ecology and Conservation
Genetics
Medical Biochemistry
Molecular Biology and Environmental Change
Zoology

C700 Biochemistry provides a comprehensive coverage of the principles of biochemistry, and includes a range of options that span the spectrum from medically-oriented biochemistry, through biochemistry in plants, to industrial applications of biochemistry. The biochemistry degree also incorporates some molecular biology, to provide knowledge of the essential tools to modify cellular biochemistry. A good degree of flexibility is possible throughout the degree programme, enabling it to incorporate interests in physiology, cell biology, microbiology, seed biology, and many other topics.

C100 Biology provides a degree that offers a diverse coverage across many aspects of biology ranging from molecular biology to ecology, and maximizes the choice available to students, at each stage. The first year provides a foundation in cell biology and genetics, as well as options in chemistry, biochemistry, physiology, plant biology, vertebrate biology and ecology. Students study the key areas of evolution, biological data

analysis and plant life in their second year, and can select from a wide range of modules that range from practical field ecology, marine biology, and animal behaviour to protein structure and function, cellular dynamics and plant biochemistry. You continue to tailor your degree towards your own interests in the final year, with options that span the spectrum from conservation biology, behavioural ecology and extreme animal physiology, to seed biology, medical microbiology and the molecular basis of inherited disease. The flexibility of this degree enables you to study either a broad-based course or to concentrate on areas which are predominantly ecological, physiological, organismal or molecular in nature.

B990 Biomedical Sciences focuses on understanding the biological basis of human disease and is primarily designed for students considering a career in biomedical research. The first year provides a core background in a range of subjects including biochemistry, physiology, cell biology, and genetics. In the second year you build your skill and knowledge base in biomedical areas that include immunology, neuronal and cellular signalling, and pharmacology, and have the option to study microbiology or developmental biology. In the final year you can select between various specialist medical subjects such as the neurosciences, fundamentals of disease diagnostics, clinical physiology, medical microbiology, the molecular basis of inherited disease, and human embryology. Choice has been incorporated into the programme to enable the degree to be tailored towards your own particular interests within the biomedical sciences.

C150 Ecology and Conservation is the study of interactions between plants and animals and their environments, and covers diverse aspects of ecology including both terrestrial and aquatic ecosystems, conservation and behavioural ecology. The first year modules provide a strong foundation in plant, animal and ecosystem topics, including vertebrate evolution and diversity, cell biology, genetics and biomes and ecosystems. Acquiring skills in biological data analysis and practical field ecology form a key part of the second year, with the opportunity also to study evolution, invertebrate biology, marine biology and animal behaviour. The final year includes the study of population and community ecology, and also marine ecology and biodiversity. There are options to study conservation biology, evolutionary ecology, entomology, extreme animal physiology, circadian biology, as well as to take part in the residential field courses that examine conservation and ecology of animals and plants in different environments.

C400 Genetics emphasizes the essence of the molecular and genetic mechanisms that control life processes and provides an understanding of the molecular tools that can be used to study and alter biological function. The programme incorporates the fundamentals of molecular biology, cell biology and biochemistry as well as options across a wide range of topics including microbiology, evolution, animal physiology and plant form and function. In the final year, students can take advanced level modules that build on the understanding of genetics and molecular biology, including molecular and medical microbiology, human molecular genetics and inherited diseases, circadian biology or the applications of molecular biology in biotechnology. You will also have a choice from a wide selection of final year projects in either biomedical, environmental, microbial or plant sciences in which molecular genetic approaches are used.

C741 Medical Biochemistry emphasises the importance of biochemistry in medicine, particularly in relation to understanding the molecular basis of disease and how this can lead to the development of novel therapeutic strategies. In addition to the fundamental biochemistry modules, you will take core modules in physiology, cell biology and genetics in the first year. The second year involves medically-orientated modules such as pharmacology and toxicology, immunology, bioenergetics and metabolism, with the option to include physiology, microbiology, cell dynamics, and plant biochemistry. The course also includes molecular biology, an essential tool for medical biochemists. In the final year you will study the biochemical aspects of immunology and neurobiology, the molecular basis of inherited disease, and how biochemistry is applied in the clinical diagnosis of disease.

C730 Molecular Biology and Environmental Change bridges across key 'molecular' and 'ecological' topics to provide the skills needed to develop scientific approaches to tackle the challenges posed by climate change. The course will include, from year one, a basic understanding of DNA and how genes encode proteins, through the biochemistry of protein action, to the physiological changes this creates, while also marrying from the other side the environmental changes caused by climate change and the problems these are causing in terms of sustainability. Through year 2, the application of molecular biology will be considered as the key to developing new biotechnology solutions to address the complex and increasingly interdisciplinary problems related to the changing environment. The areas of food security, energy production, natural

product synthesis for health and medicine, creation of new drugs, antibiotic resistance, and plant resilience to biotic and abiotic stress are addressed and are some of the areas that can be investigated in the final year projects. This course will equip students with the scientific knowledge and skills to be able to apply molecular biology in research or in industry.

C300 Zoology places particular emphasis on the study of animals. Following a selection of first year modules which provide basic training in organismal, ecological and physiological aspects of biology, a range of options is available in the second and third years. These cover the diversity and evolution of animals, their adaptations to different life styles and habitats, how they function and their behaviour. You can study invertebrate biology, insects, plants and fungi, as well as vertebrate evolution and diversity, and extreme animal physiology. Field courses in marine biology, practical field ecology, conservation ecology and also in the tropical rainforest are also available to you. The course includes the option to take some molecular course units each year, such as cell dynamics, developmental biology, and molecular biology of cancer.

All our degrees provide training in key skills, and promote an expanded interest across many areas of biological science, with the Becoming a Bioscientist course in first year. This module will also help you make the transition to university study, as well as to start building towards your future employment opportunities!

For all degrees, you may also select up to two modules (30 credits) from those offered by other Science departments, if timetabling allows, and if agreed by the Head of Department or UG Education Lead in Biological Sciences and in the host department.

5.2 Programme outlines

The list of modules and their coordinators are as follows:

Module Code (credits*)	Module Name	Module Coordinator	22-23 Term
First Year			
BS1021	Becoming a Bioscientist	Dr S Dissanayeke	1
BS1031	Chemistry of Life	Prof J McEvoy	1
BS1032	Fundamental Biochemistry	Prof J McEvoy	2
BS1041	Biology in a Changing World	Dr B Thomas	2
BS1042	Vertebrate Evolution and Diversity	Dr D McGregor	2
BS1043	Green Planet: Plants and Our Future	Dr E López-Juez	2
BS1051	Ecology and Conservation	Dr B Thomas	1
BS1052	Biomes and Ecosystems	Prof J Koricheva	1
BS1061	Introductory Animal Physiology	Dr L Hanna	2
BS1062	Introduction to Human Physiology in Health and Disease	Dr L Hanna	2
BS1071	Cell Biology and the Origin of Life	Dr W Lucchesi	1
BS1072	Genetics	Dr P F Devlin	1
BS1091	Protein Biochemistry and Enzymology	Dr C Wilkinson	2
Second Year			
BS2001X	Marine Biology	Prof D Morritt	Sept
BS2005	Microbiology	Dr S Dissanayeke	2
BS2010	Invertebrate Biology: Structure, Behaviour and Evolution	Prof M J F Brown	1
BS2020	Plant Life: from Genes to Environment	Dr E López-Juez	2
BS2040	Cell Dynamics: Division and Movement	Prof L Bögre	2
BS2050	Human Physiology in Health and Disease II	Dr L Hanna	1
BS2060	Developmental Biology	Dr E López-Juez	1
BS2090	Plant Biotic Interactions and Ecological Networks	Dr C Garcia-Perez	2

BS2110	Practical Field Ecology	Prof J Koricheva	3 Y1
BS2120	Biological Data Analysis and Interpretation	Dr S Papworth	1
BS2140	Animal Behaviour	Dr S Portugal	2
BS2150	Applications of Molecular Genetics in Biology	Dr P Devlin	1
BS2160	Evolution	Dr F Ubeda de Torres	2
BS2510	Bioenergetics and Metabolism	Dr J Tovar-Torres	1
BS2520	Protein Structure and Function	Dr M Soloviev	1
BS2530	Molecular Biology	Dr C Wilkinson	2
BS2540	Immunology	Dr W Lucchesi	2
BS2550	Neuronal and Cellular Signalling	Dr A Augustin	1
BS2560	Pharmacology and Toxicology	Dr P E Chen	2
BS2570	Physical Biochemistry for Life Scientists	Dr M Soloviev	1
BS2580	Natural Product Biochemistry and Sustainability	Prof G Leubner	2
Third Year			
BS3010*	Individual Research Project	Dr W Lucchesi	
BS3020	Special Study: Dissertation	Dr M Soloviev	1&2
BS3030	Biology of Parasitic Diseases	Dr J Tovar-Torres	1
BS3060	Conservation Science	Dr S Papworth	2
BS3100	Tropical Rainforest Expedition	Dr S Portugal	Sept
BS3110	Conservation Ecology in the Field	Prof E Leadbeater	June
BS3120	Population and Community Ecology	Prof V Jansen	1
BS3160	Behavioural Ecology	Dr R Riesch	1
BS3180	Marine Ecology and Biodiversity	Prof D Morrill	2
BS3190	Climate Change: Plants and the Environment	Prof A Devoto	2
BS3210	Evolutionary Ecology of Vertebrates #	Dr R Riesch	2
BS3220	Extreme Animal Physiology	Dr S Portugal	1
BS3230	Circadian Biology	Dr P Devlin	2
BS3240	Evolutionary Medicine ^	Dr F Ubeda de Torres	tbc
BS3410	Biotechnology ^	Prof S Cutting	tbc
BS3420	Nutrition and Medical Biochemistry	Dr W Lucchesi	2
BS3510	Molecular and Medical Microbiology	Dr S Dissanayeke	1
BS3520	Seed Biology: From Molecular & Conservation Biology to Industrial Applications	Prof G Leubner	1
BS3530	Applications of Genetic Engineering in Health and Disease	Prof R S Williams	1
BS3540	Cell & Molecular Biology of Cancer	Prof L Bögre	2
BS3560	Functional Genomics, Proteomics and Bioinformatics	Prof A Devoto	2
BS3570	Human Embryology	Dr J Murdoch	1
BS3580	Cell and Molecular Neuroscience	Dr A Augustin	2
BS3590	Molecular Basis of Inherited Disease	Prof R Yáñez	1
BS3595	Clinical Physiology and Medicine	Dr J Murdoch	2
BS3600	Clinical Diagnosis of Disease	Prof P Sharma	2

* BS3010 is worth 30 credits. All other modules are 15 credits.

module will not be running in 2022-23

^ module will be launched in 2023-24

To help you make good progress in your studies at RHUL, we have a simple on-line module SS1001 in 'Academic Integrity' which will guide you through preparing your assignments using the best academic standards. You will need to successfully complete this short module in your first year, and you can have as many attempts as you like before the deadline to pass it.

The Programme Specification provides the definitive record of the programme regulations. The Programme Specification for each of the eight degrees offered by the Department of Biological Sciences can be found in the [Degree course library](#) or through [Course Finder](#).

The tables over the next few pages provide a summary of the programme structure for each of the degrees. These tables relate to modules available during 2022-23, for current year 1, year 2 and year 3 students. The mandatory (core) modules are indicated as the shaded blue boxes; students must take these modules. Optional (non-mandatory) modules are indicated with the O. Students can select from the optional modules, to give a total of 120 credits for each year.

BioScience Programme Grids – an overview of mandatory and optional modules for each degree programme

How to use the grids: For each degree programme, the mandatory (shaded box) and optional (O) modules are indicated. The *Pre-requisite* column shows the prerequisite modules: these are the modules that you need to have taken in order to be accepted onto the module. Modules that are recommended rather than essential prerequisites are shown in parenthesis (). The *Term* column indicates when the module will run for 2022-23 though this is subject to change in future years.

For more information: A brief overview of modules is provided in the following sections while more detailed information can be found in the module specifications available on Moodle for BS1000, BS2000 or BS3000.

First Year Module Combinations – 2022/23

First year students must register for 8 modules, to achieve the requirement of 120 credits (all first year courses are worth 15 credits).

Code	Module title	Term	Biomed. Sciences	Medical Biochem	Biochem	Molecular Biology and Environmental Change	Genetics	Biology	Zoology	Ecology & Conservation
BS1021	Becoming a Bioscientist	1								
BS1031	Chemistry of Life	1						O	O	O
BS1032	Fundamental Biochemistry	2						O	O	
BS1041	Biology in a Changing World	2					O	O	O	O
BS1042	Vertebrate Evolution and Diversity	2						O		
BS1043	Green Planet: Plants and Our Future	2			O		O			
BS1051	Ecology and Conservation	1				O		O		
BS1052	Biomes and Ecosystems	1				O		O	O	
BS1061	Introductory Animal Physiology	2			O		O	O		
BS1062	Introduction to Human Physiology in Health and Disease	2			O		O	O	O	
BS1071	Cell Biology and the Origin of Life	1								
BS1072	Genetics	1								
BS1091	Protein Biochemistry and Enzymology	2					O	O	O	

Key: Mandatory Courses – Shaded Boxes, Optional Courses – O, if a box is not shaded and does not contain an O then it is not available to you within your degree programme.

Second Year Module Combinations – 2022/23

How to use the grids: For each degree course, the mandatory (shaded box) and optional (O) modules are indicated. The *Pre-requisites* column shows the modules that you need to have previously taken in order to be accepted onto that module. Pre-requisites that are recommended rather than essential are shown in parenthesis (.). The *Term* column indicates when the module will run for 2022-23. Second year students must register for 120 credits; all modules are worth 15 credits, except GG2041 (30).

Code	Module title	Pre-requisites	Term	Biomed. Sciences	Medical Biochem	Biochem	Molecular Biology and Environmental Change	Genetics (and Mol Biol)	Biology	Zoology	Ecology & Conservation
BS2005	Microbiology	BS1071, BS1072	2	O	O	O		O	O	O	O
BS2010	Invertebrate Biology: Structure, Behaviour & Evolution	None	1						O		
BS2020	Plant Life: Genes to Environment	BS1071 (BS1043)	2			O		O			
BS2040	Cell Dynamics: Division and Movement	BS1071, BS1072	2	O	O	O	O		O	O	
BS2050	Human Physiology in Health and Disease	BS1061, BS1062	1		O	O		O	O	O	
BS2060	Developmental Biology	BS1072	1	O	O	O		O	O	O	
BS2090	Plant Biotic Interactions and Ecological Networks	None	2				O		O	O	
BS2110	Practical Field Ecology	BS1051	3 Y1				O		O	O	
BS2120	Biological Data Analysis and Interpretation	None	1				O				
BS2140	Animal Behaviour	None	2						O		O
BS2150	Applications of Molecular Genetics in Biology	BS1072	1						O	O	O
BS2160	Evolution	None	2				O	O			
BS2001X	Marine Biology	BS1041 or BS1042 or BS1052	Sept						O	O	O
BS2510	Bioenergetics and Metabolism	BS1032, BS1091	1	O				O	O		
BS2520	Protein Structure and Function	BS1091	1	O			O		O		
BS2530	Molecular Biology	BS1071, BS1072 or BS1091	2						O	O	
BS2540	Immunology	BS1071, BS1072	2			O		O	O	O	
BS2550	Neuronal and Cellular Signalling	BS1061, BS1091	1			O		O	O		
BS2560	Pharmacology and Toxicology	BS1031, BS1032; BS1061 or BS1062	2		O	O	O	O			
BS2570	Physical Biochemistry for Life Scientists	BS1031, BS1032	1								
BS2580	Natural Product Biochemistry and Sustainability	BS1032, BS1091	2		O			O	O		
GG2041	Environmental Change (30 credits)		1&2				O				

Third Year Module Combinations – 2022/23

How to use the grids: For each degree programme, the mandatory (shaded box) and optional (O) modules are indicated. The *Pre-requisites* column shows the modules that you need to have previously taken in order to be accepted onto that module. Modules that are recommended rather than essential prerequisites are shown in parenthesis (). Third year students must register for the Project and 6 other modules, to achieve the requirement of 120 credits (BS3010 is worth 30 credits, all other third year modules are worth 15 credits). The *Term* column indicates when the module will run in 2022-23.

Code	Module title	Pre-requisites	Term	Biomed. Sciences	Medical Biochem	Biochem	Molecular Biology and Environmental Change	Molecular Biology	Biology	Zoology	Ecology & Conservation
BS3010	Individual Research Project (30 credits)	Varies*									
BS3020	Dissertation	None	1&2	O	O	O		O	O	O	O
BS3030	Biology of Parasitic Diseases	BS2005/BS2150/BS2530	1	O	O	O		O	O	O	O
BS3060	Conservation Science	BS1041 or BS1051	2				O		O	O	
BS3100	Tropical Rainforest Expedition	BS2140/BS2110 /BS2001X	Sept						O	O	O
BS3110	Conservation Ecology in the Field	(BS2110)	3 Y2						O	O	O
BS3120	Population and Community Ecology	None	1						O	O	
BS3160	Behavioural Ecology	BS2140	1						O		O
BS3180	Marine Ecology and Biodiversity	(BS2001X)	2						O	O	O
BS3190	Climate Change: Plants & the Environment	(BS1043 & BS2020)	2			O		O			
BS3220	Extreme Animal Physiology	BS2140 OR BS1061 & BS1062/BS2050	1						O	O	O
BS3230	Circadian Biology	BS1071, BS1072	2			O	O	O	O	O	O
BS3420	Nutrition and Medical Biochemistry	BS1032, BS1091, BS2510	2	O			O	O	O		
BS3510	Molecular and Medical Microbiology	BS1071, BS2005 (BS2540)	1	O	O	O	O	O	O		
BS3520	Seed Biology	(BS2020 or BS2150)	1			O		O	O		O
BS3530	Applications of Genetic Engineering in Health and Disease	BS2530	1	O	O	O	O	O	O	O	
BS3540	Cell and Molecular Biology of Cancer	BS1071 (BS2040/ BS2060/ BS2530/BS2540)	2	O	O	O			O	O	
BS3560	Functional Genomics, Proteomics, Bioinformatics	(BS2530)	2	O	O				O		
BS3570	Human Embryology	BS2050/BS2060/BS2550	1	O	O	O		O	O	O	
BS3580	Cell and Molecular Neuroscience	BS2550	2	O		O		O	O		
BS3590	Molecular Basis of Inherited Disease	BS1071, BS1072	1		O	O		O	O		
BS3595	Clinical Physiology and Medicine	BS1062, BS2050	2	O							
BS3600	Clinical Diagnosis of Disease	BS1091, (BS2050)	2	O							
GG3018	Global Warming		2				O				

With the prerequisites, a comma means 'and' while a slash (/) means 'either'. Eg for BS3420 you need to have taken BS1032, BS1091 AND BS2510, but BS3570 has the prerequisite of either BS2050 OR BS2060 OR BS2550.

Second Year Module Combinations – for 2023/24

The grids below show the programme structure for 2023/24, thus the second year mandatory and optional modules for students who begin their degree in September 2022.

Code	Module title	Pre-requisites	Term	Biomed. Sciences	Medical Biochem	Biochem	Molecular Biology and Environmental Change	Genetics	Biology	Zoology	Ecology & Conservation
BS2005	Microbiology	BS1071 BS1072	2	O	O	O		O	O	O	O
BS2010	Invertebrate Biology: Structure, Behaviour & Evolution	None	1						O		
BS2020	Food Security, Sustainability and Green Biotechnology	BS1071	2			O		O	O		
BS2040	Cell Dynamics: Division and Movement	BS1071, BS1072	2	O	O	O	O		O	O	
BS2050	Human Physiology in Health and Disease	BS1061 or BS1062	1		O	O		O	O	O	
BS2060	Developmental Biology	BS1072	1	O	O	O		O	O	O	
BS2090	Plant Biotic Interactions and Ecological Networks	None	2				O		O	O	
BS2110	Practical Field Ecology	BS1051	3 Y1				O		O	O	
BS2120	Biological Data Analysis and Interpretation	None	1				O				
BS2140	Animal Behaviour	None	2						O		O
BS2150	Applications of Molecular Genetics in Biology	BS1072	1						O	O	O
BS2160	Evolution	None	2				O	O			
BS2001X	Marine Biology	BS1041 or BS1042 or BS1052	Sept						O	O	O
BS2510	Bioenergetics and Metabolism	BS1032, BS1091	1	O				O	O		
BS2520	Protein Structure and Function	BS1091	1	O			O		O		
BS2530	Molecular Biology	BS1071, BS1072	2						O	O	
BS2540	Immunology	BS1071 BS1072	2			O		O	O	O	
BS2550	Neuronal and Cellular Signalling	BS1061, BS1091	1			O		O	O		
BS2560	Pharmacology and Toxicology	BS1031, BS1032; BS1061 or BS1062	2		O	O	O	O			
BS2570	Physical Biochemistry for Life Scientists	BS1031, BS1032	1								
BS2580	Natural Product Biochemistry and Sustainability	BS1032, BS1091	2		O			O			
BS2900	Dissertation		1&2	O	O	O	O	O	O	O	O
GG2041	Environmental Change (30 credits)		1&2				O				

Third Year Module Combinations – for 2024/25 (Feb 2022)

The grids below show the programme structure for 2024/25, thus the third year mandatory and optional modules for students who begin their degree in September 2022.

Code	Module title	Pre-requisites	Term	Biomed. Sciences	Medical Biochem	Biochem	Molecular Biol Env. Change	Genetics	Biology	Zoology	Ecology & Conservation
BS3010	Individual Research Project (30 credits)	Varies*									
BS3030	Biology of Parasitic Diseases	BS2005/BS2150/BS2530	1	O	O	O		O	O	O	O
BS3060	Conservation Science	BS1041 or BS1051	2				O		O	O	
BS3100	Tropical Rainforest Expedition	BS2140/BS2110 /BS2001X	Sept						O	O	O
BS3110	Conservation Ecology in the Field	(BS2110)	3 Y2						O	O	O
BS3120	Population and Community Ecology	None	1						O	O	
BS3180	Marine Ecology and Biodiversity	(BS2001X)	2						O	O	O
BS3190	Climate Change: Plants & the Environment	(BS1043 & BS2020)	2			O		O			
BS3210	Evolutionary Ecology of Vertebrates	BS2160	2						O	O	O
BS3220	Extreme Animal Physiology	BS2140/1061 & 1062/2050	1						O		O
BS3230	Circadian Biology	BS1071, BS1072	2			O	O	O	O	O	O
BS3240	Evolutionary Medicine			O	O	O		O	O		
BS3410	Biotechnology			O	O	O	O	O	O		
BS3420	Nutrition and Medical Biochemistry	BS1032, BS1091, BS2510	2	O			O	O	O		
BS3510	Molecular and Medical Microbiology	BS1071, BS2005 (BS2540)	1	O	O	O	O	O	O		
BS3520	Seed Biology	(BS2020 or BS2150)	1			O		O	O		O
BS3530	Applications of Genetic Engineering in Health and D	BS2530	1	O	O	O	O	O	O	O	
BS3540	Cell and Molecular Biology of Cancer	1071 (2040/ 2060/ 2530/2540)	2	O	O	O			O	O	
BS3560	Functional Genomics, Proteomics, Bioinformatics	(BS2530)	2	O	O				O		
BS3570	Human Embryology	BS2050/BS2060	1	O	O	O		O	O	O	
BS3580	Cell and Molecular Neuroscience	BS2550	2	O		O		O	O		
BS3590	Molecular Basis of Inherited Disease	BS1071, BS1072	1		O	O		O	O		
BS3595	Clinical Physiology and Medicine	BS1062, BS2050	2	O							
BS3600	Clinical Diagnosis of Disease	BS1091, BS2050	2	O							
GG3018	Global Warming		2				O				

5.3 MODULE OUTLINES

FIRST YEAR MODULES

Timetabling is subject to confirmation. Days given relate to lectures only; practicals may be scheduled on different days.

BS1021 – Becoming a Bioscientist – Dr S Dissanayake

This module aims to use current topics in biology to introduce students to key scientific concepts, instil the discipline of the scientific approach and introduce effective science communication. This module will use interactive lectures, group discussions and ongoing assessments to engage students with key scientific concepts. It will provide students with the skills to process and critique different forms of information and to communicate science to both scientific and non-scientific audiences. Skills will be applied to current biological topics to contextualise learning, while also emphasising to students the diversity of scientific topics and the excitement of scientific advance! This module will build a sound understanding of key scientific concepts and the basis for science communication in their subsequent years at university and in the workplace.

Value	- 15 credits
Available	- 1st term
On	- Thursday
Prerequisites	- None

BS1031 – Chemistry of Life – Prof J McEvoy

Students should achieve a sound knowledge of fundamental chemistry essential to the proper understanding of life processes and laboratory experiments. Students learn the basics of biological chemistry. These include the chemical bonding and structure of important biomolecules, the relationship between different isomers of a molecule, and acid/base chemistry. Students also learn basic biochemical lab techniques and carry out consequent data analysis.

Value	- 15 credits
Available	- 1st term
On	- Monday
Prerequisites	- A-level Biology plus another Science from either Chemistry, Maths or Physics is recommended.

BS1032 – Fundamental Biochemistry – Prof J McEvoy

Students learn the basics of biochemistry. These include the energetics, kinetics and analysis of biological reactions. The module involves understanding some of the techniques for biochemical analysis, including spectroscopy, and the fundamentals of protein structure. The module also introduces energetics, kinetics and analysis of biological reactions.

Value	- 15 credits
Available	- 2nd term
On	- Monday & Tuesday
Prerequisites	- A-level Biology plus another Science from either Chemistry, Maths or Physics is recommended.
Co-requisites	- BS1031 if no A-level chemistry

BS1041 – Biology in a Changing World – Dr B Thomas

Planet Earth faces many major challenges in the 21st Century, with humans placing ever-increasing pressures on limited resources. This module provides an introductory understanding of how biological and ecological principles can help develop sustainable solutions to the problems encountered in our changing world. Through a combination of lectures, practical laboratory classes and field trips students are introduced to these conservation challenges. Practical skills related to sampling techniques, biostatistical analyses and experimental design are taught as part of this applied module. The module will use a case-study approach to tackle the major challenges facing the planet and will use ecological principles to explain how sustainable solutions are being developed. Topics will range from the conservation of species to the problems caused by invasive species and the module will cover a range of habitats from tropical forests to aquatic environments.

Value	- 15 credits
Available	- 2nd term
On	- Wednesday
Prerequisites	- A level Biology or equivalent

BS1042 – Vertebrate Evolution and Diversity – Dr D McGregor

This course provides an introduction to the origins of the vertebrate classes, briefly outlining the steps in their

Key: Mandatory Courses – Shaded Boxes, Optional Courses – O, if a box is not shaded and does not contain an O then it is not available to you within your degree programme.

evolutionary history and an understanding of the functional aspects of their major morphological characteristics and life history features. The course explores the diversity, function and evolution of vertebrates, from the early vertebrates, through to fishes and amphibians to reptiles and birds and ending with mammals. Topics will range from the origin of jawed vertebrates, to living on land and the evolution of mammals. Through a combination of lectures, practical laboratory classes and field trips students are introduced to the study of the evolution and diversity of vertebrates, as well as fostering an understanding of their adaptations to the environment.

Value	- 15 credits
Available	- 2nd term
On	- Friday
Prerequisites	- A level Biology or equivalent

BS1043 – Green Planet: Plants and Our Future – Dr E López-Juez

This module will describe how plants have shaped our planet over evolutionary time, have been our helpers or targets in our own shaping of Earth, and are humanity's best partners to allow our long term future on it possible. For this, the module will explain key aspects of plant evolution, diversity, development, function and interaction with the environment and with other organisms, including us. The module particularly aims at illustrating key concepts in relevant laboratories.

Value	- 15 credits
Available	- 2nd term
On	- Tuesday
Prerequisites	- A level Biology or equivalent

BS1051 – Ecology and Conservation – Dr B Thomas

The module applies a "bottom-up" approach, from individuals to biomes, covering many important themes which include: ecological hierarchies, adaptation, behaviour, population distributions, species interactions, community structure, biodiversity and conservation. Through a combination of lectures, practical laboratory classes and field trips students are introduced to the study of the distribution and abundance of organisms, as well as fostering an understanding of ecological methods. Practical skills related to sampling techniques, biostatistical analyses and experimental design are taught as part of the major ecological themes.

Value	- 15 credits
Available	- 1st term
On	- Thursday
Prerequisites	- A level Biology or equivalent

BS1052 – Biomes and Ecosystems – Prof J Koricheva

The module covers variation in climate around the globe, global terrestrial and aquatic biomes, UK ecosystems, biogeochemical processes (including Nitrogen, Phosphorus and Carbon cycles), energy flow in ecosystems, and ecosystem services. Through a combination of lectures, practical laboratory classes and field trips students are introduced to key UK ecosystems. Practical skills related to sampling techniques and experimental design are taught as part of the major ecological themes.

Value	- 15 credits
Available	- 1st term
On	- Tuesday
Prerequisites	- A level Biology or equivalent

BS1061 – Introductory Animal Physiology – Dr L Hanna

This module introduces some of the fundamental physiological processes in animals. The module begins by considering the mechanism of action and organisation of the nervous system, and then introduces the endocrine system and discusses how neural and hormonal signalling are integrated. How animals obtain oxygen from different environments and how the respiratory system integrates with the circulation in terms of blood gas transport will be discussed. This is followed by an overview of the evolution of closed circulatory system separated into pulmonary and systemic circuits and driven by a four chambered heart, essential for the body-wide distribution of nutrients, oxygen and hormones, and for the removal of waste products. The module concludes by considering the differences between cold- and warm-blooded animals for regulation of body temperature.

Value	- 15 credits
Available	- 2nd term
On	- Thursday

Prerequisites - A level Biology or equivalent

BS1062 – Introduction to Human Physiology in Health and Disease – Dr L Hanna

BS1062 builds on and expands some of the topics introduced in BS1061 to explain the function of organ systems in humans and to illustrate the consequences of disease on physiological function. The module will begin by explaining how special sensory systems convert light, sound and position/movement into electrical signals that are transmitted to the brain and how our ability to sense the environment can be disrupted by diseased or damaged receptors. This will be followed by an explanation of the function and regulation of the mammalian kidney, and the roles of the adrenal gland. The module then covers aspects of basic haematology; the fluid and formed elements of blood and their roles in inflammation and the control of bleeding following vessel damage. This will be followed by an introduction to skeletal muscle function, how movement is controlled and sensed by the somatic nervous system.

Value - 15 credits
Available - 2nd term
On - Friday
Prerequisites - A level Biology or equivalent
Co-requisite - BS1061

BS1071 – Cell Biology and the Origin of Life – Dr W Lucchesi

Cell Biology and the Origin of Life focuses on the structure and function of prokaryotic and eukaryotic cells. The module explores subcellular and supracellular organisation and the relationship between the structure and function of the main cellular structures. The organization of cells into tissues is also discussed together with some important techniques widely used to stain, visualize and isolate cells. This module also focuses on providing students with fundamental skills for bright field microscopy.

Value - 15 credits
Available - 1st term
On - Friday
Prerequisites - A level Biology or equivalent

BS1072 – Genetics – Dr P F Devlin

Genetics aims to provide a basic understanding of genes that spans their behaviour in individual organisms, in populations, and at the molecular level within the cell. Genetics covers the structure and organisation of: chromosomes, mitosis, meiosis and recombination, the structure and inheritance of DNA, transcription, translation, the regulation of gene expression, the organisation of prokaryotic and eukaryotic genomes, and techniques and applications of recombinant DNA technology.

Value - 15 credits
Available - 1st term
On - Wednesday
Prerequisites - A level Biology or equivalent

BS1091 – Protein Biochemistry and Enzymology – Dr C Wilkinson

This module will provide a general understanding of the main concepts of classic protein biochemistry including protein purification, enzyme kinetics, enzyme structure, as well as relevant analytical methods and their practical applications. Practical classes demonstrate the techniques and approaches taught in the lectures.

Value - 15 credits
Available - 2nd term
On - Monday & Tuesday
Prerequisites - A-level Biology plus another Science from either Chemistry, Maths or Physics is recommended;
Co-requisite - BS1032, plus BS1031 if do not have A-level chemistry

SECOND YEAR MODULES

The following modules are available in 2022-23. **Please note** that module information is given as accurately as possible but is subject to change in the process of continually updating and reviewing the curriculum, thus modules may change slightly from one year to the next. Timetabling is also subject to confirmation. Days given relate to lectures only; practicals may be scheduled on different days. Refer to module specifications for further detail.

BS2001X – Marine Biology – Prof D Morrill

The module exposes students, first-hand, to the broadest possible range of marine taxa, especially invertebrates, but including vertebrates and algae, sampled alive from their natural habitats. Practical work includes intertidal sampling (rocky shores and sandy shores) and sampling from a research vessel (plankton and subtidal benthos). On site lectures underpin the practical sessions and the module considers behavioural, ecological and physiological aspects, morphological adaptations, systematic relationships and also the economic significance of selected groups. Students acquire skills in identification and the presentation of written work. Group project work will develop interpersonal skills, including organisation, leadership and oral presentation. The inclusion of an element of self-assessment will further foster critical abilities. Students are expected to cover their own travel costs and also to pay for their accommodation which is expected to be in the region of £330, although costs are still to be confirmed. Exam will take place in the first few weeks of the autumn term.

Value - 15 credits

Available - Late summer vacation between years 1 & 2 (counts as year 2 module)

Prerequisites - BS1041 or BS1042 or BS1052

BS2005 – Microbiology – Dr S Dissanayake

The module aims to introduce key concepts in microbiology, which encompasses studies in bacteria, viruses, and eukaryotic microbes. The historical milestones in this field of research will be considered, as well as the background of the important methodologies used in microbiology research. The module will include information on how microbes are classified, and how the different types of microbes are distinguished. We will discuss bacterial growth and differentiation, including genetic regulation. The module will explain the importance of microorganisms in health and disease, including human welfare issues such as opportunistic infections and the role of microorganisms in cancer. We will also consider how microorganisms can be used in research. This module is an essential prerequisite for the third year module BS3510 Molecular and Medical Microbiology.

Value - 15 credits

Available - 2nd term

On - Tuesday

Prerequisites - BS1071 and BS1072

BS2010 – Invertebrate Biology: Structure, Behaviour and Evolution – Prof M J F Brown

The module involves a broad and in-depth study of the invertebrate phyla. The main focus will be on understanding body-plans, how structure relates to behaviour, and evolutionary relationships. The module will also examine invertebrate diversity and ecological importance. The practicals are an integral part of the module, and are designed to introduce techniques relevant to the study of invertebrates. These include experiments, dissection, microscopy, and preparation of whole mounts and staining sections for microscopical study.

Value - 15 credits

Available - 1st term

On - Thursday

Prerequisites - None

BS2020 – Plant Life: From Genes to Environment – Dr E López-Juez

The module examines primarily the most advanced (flowering) plants, their evolution, developmental and functional biology. In part one, the origin and diversification of flowering plants is discussed, as it is reflected in their reproductive biology. In the second part the 'building' of a plant is analysed, with reference to the meristems, pools of 'stem cells' in which it primarily takes place. Part three reviews mechanisms by which the photosynthetic apparatus adapts to current light conditions or to water/CO₂ availability. Part four examines some case studies of the role and mode of action of plant hormones. Part five reviews plant environmental sensors of abiotic and biotic factors, key to adapt plant development and behaviour to the prevailing conditions. The mode of action of such sensors, and the responses that they evoke, are discussed. Part six touches upon plants in the context of their domestication ("accelerated evolution") in the hands of humans and in relation to global environmental change, the impact it has on plants and of the role

plants can play in reducing it.

Value - 15 credits
Available - 2nd term
On - Monday
Prerequisites - BS1071; BS1043 recommended

BS2040 – Cell Dynamics: Division and Movement – Prof L Bögre

The module will focus on the following key areas of modern cell biology: cell cycle, cell growth and differentiation, apoptosis, cell senescence, cell polarity, cell shape and cell motility, organelle origin and functions. The module will give theoretical knowledge in modern cell biology methods, including microscopy and live cell imaging, and will introduce basic concepts on evolutionary constraints in cellular functions and links between cellular functions and development.

Value - 15 credits
Available - 2nd term
On - Monday
Prerequisites - BS1071 and BS1072

BS2050 – Human Physiology in Health and Disease – Dr L Hanna

The module will focus on the functions and integration of selected human physiological systems and how these are disrupted by disease. The module begins with an overview of the gastrointestinal system, to consider its anatomy and function, and how this is hormonally regulated. The role of the thyroid gland, and the hypo-pituitary-thyroid axis, is discussed, and this leads to the nutritional needs of the body and regulation of energy balance. The function of the heart is extended following the introduction in first year, and the investigation of normal and abnormal electrical activity with electrocardiogram (ECG) is discussed. The module takes an integrated view of physiological effects in different situations, including the effects of exercise, the changes that occur in pregnancy, and finally, the physiological changes that occur at birth.

Value - 15 credits
Available - 1st term
On - Monday
Prerequisites - BS1061 and BS1062

BS2060 – Developmental Biology – Dr J E López-Juez

Multicellularity has allowed living things to achieve levels of complexity and sophistication impossible at the single cell level. This module will explore the mechanisms by which zygotes establish or make use of basic body plan axes, and how subsequent cellular differentiation and interaction is achieved and results in the variety of tissues and organs that build an animal body. The module will focus on model organisms in which both embryological and genetic approaches have been developed, and will explore axis establishment, segmentation, cellular differentiation, organ development, and the widely-shared signalling pathways that underpin them.

Value - 15 credits
Available - 1st Term
On - Tuesday
Prerequisites - BS1072

BS2090 - Plant Biotic Interactions and Ecological Networks – Dr C Garcia-Perez

The aim of this module is to introduce the ecological and evolutionary role of a variety of biotic interactions in shaping plant biodiversity. By doing so, we aim: (i) to demonstrate the importance of biotic interactions as building blocks of biodiversity and ecosystem functioning, thus providing an integrated understanding of biodiversity as opposed to reductionist approaches; and (ii) to challenge the widespread “plant blindness” approach to nature.

A third aim is to learn basic network analytical skills to investigate the structure and function of biotic interactions. Finally, we aim to apply the ecological and evolutionary principles that underpin biotic interactions in order to address pressing environmental issues, such as biodiversity loss, the advance of invasive species, and climate change.

Value - 15 credits
Available - 2nd term
On - Thursday
Prerequisites - None

BS2110 – Practical Field Ecology – Prof J Koricheva

The module covers the design and analysis of ecological experiments, including field sampling techniques. Emphasis will be placed on the difficulties of designing experiments in the field, compared to controlled conditions. Building on first year modules, it will provide an opportunity to design and perform simple investigations into several different taxonomic groups such as mammals, invertebrates and plants. The practical work aims to teach skills such as identification using keys, field sampling, quantitative population estimation and the analysis of diversity. The module will run as a continuous daily field module over three weeks in term 3 (i.e. after the first year examinations). It will take place on and around the College campus, with some daily excursions.

Value - 15 credits
Available - 3rd term of Year 1
On - Term 3, after the Year 1 examinations
Prerequisites - BS1051

BS2120 – Biological Data Analysis and Interpretation – Dr S Papworth

This module provides an introduction to the use of statistical methods in biological sciences. Emphasis is placed on understanding how questions in biology can be answered quantitatively using statistics. The most important and widely used descriptive, associative and comparative statistical tests are illustrated, especially how and when they can be used. Key concepts of statistical sampling and experimental design in biology are introduced. Exercises give students hands-on experience of using statistical techniques.

Value - 15 credits
Available - 1st term
On - Monday and Wednesday
Prerequisites - None

BS2140 – Animal Behaviour – Dr S Portugal

The module demonstrates the great variety of animal behaviour occurring across the range of animal taxa and in different ecological situations. The module outlines the major theories that seek to explain animal behaviour, such as kin selection, cooperation and altruism. In depth case studies will be used to illustrate the advantages of the main methods used to study animal behaviour, and how they can be applied to studying different types of behavioural questions.

Value - 15 credits
Available - 2nd term
On - Friday
Prerequisites - None

BS2150 – Applications of Molecular Genetics in Biology – Dr P Devlin

Molecular genetics is playing a key part in addressing some of the most fundamental questions in organismal biology. This module outlines the molecular tools currently available for the exploration of genetic diversity in a range of organisms and looks at how this forms the basis of a wide range of research in the field as well as in the lab. Examples looking at the application of molecular genetic strategies in areas as diverse as analysis of ancient DNA, environmental sampling, phylogeography, conservation of biodiversity, population and community ecology, agricultural improvement, diagnosis of disease and the study of evolution are presented and discussed.

Value - 15 credits
Available - 1st term
On - Friday
Prerequisites - BS1072

BS2160 – Evolution – Dr F Ubeda de Torres

Evolution is the study of how the genotypic and phenotypic compositions of populations change through time. This module covers the foundation of evolutionary biology and the mechanisms that have shaped organisms since life began. How the evolutionary synthesis came to be; the origin of variation; the allelic composition of a population and how different processes, including natural selection, modify this composition; and adaptation. These topics lead to considering how we can study evolution using phylogenetic methods. Finally, we consider the mechanisms of speciation and the special topic of human evolution.

Value - 15 credits
Available - 2nd term
On - Wednesday

Prerequisites - None

BS2510 – Bioenergetics and Metabolism – Dr J Tovar-Torres

The aim of this module is to foster understanding of the metabolic pathways, their assembly in the intermediate metabolism with particular focus on cellular respiration and its regulation. Attention will be given to the contextualisation of the pathways in their sub-cellular compartments and organs. Content includes intermediate metabolism and regulation with particular relevance to the cellular respiration and its regulation: reaction coupling and pathway formation, recurrent structures and E currencies, glycolysis, Krebs cycle and shuttles, oxidative phosphorylation, ATP synthase.

Value - 15 credits

Available - 1st term

On - Thursday

Prerequisites - BS1032 and BS1091

BS2520 – Protein Structure and Function – Dr M Soloviev

The module covers the principles of protein structure, including secondary structure, motifs and domains, and protein folding *in vivo*. Methods for separation, purification, detection, structural and functional analysis of proteins are considered. The module also covers protein-protein interactions, and the principles of protein engineering and design, as well as the post translational modification of proteins. The laboratory practical class will provide experience in using fundamental techniques in protein separation and analysis such as SDS-PAGE and Western blotting. The coursework will provide experience of a wide range of bioinformatics and computer-based tools for predicting and analysing the structure and function of proteins.

Value - 15 credits

Available - 1st term

On - Wednesday

Prerequisites - BS1091

BS2530 – Molecular Biology – Dr C Wilkinson

This module provides a sequential treatment of aspects of molecular biology leading from the structure and manipulation of DNA and gene expression, to RNA and protein synthesis. Topics covered include: the physical and chemical structure of DNA, recombinant DNA technology, DNA replication, gene organisation and structure, RNA and protein synthesis. The laboratory experiments cover a range of molecular biology techniques based on the theme of gene characterisation.

Value - 15 credits

Available - 2nd term

On - Thursday

Prerequisites - BS1071, BS1072, or BS1091

BS2540 – Immunology – Dr W Lucchesi

This module aims to examine the essential features of the innate and acquired immune system, by studying the main cell types and the function of the soluble and cell surface molecules involved in recognition and elimination of pathogens. The module also aims to develop an understanding of these processes in health and disease. Subjects include: the immune response and evolution in time and memory; innate and acquired immunity; antibody structure and function; antibody diversity and clonal selection; genetics of immunoglobulin expression; major histocompatibility complexes and antigen presentation; antibody structure, diversity and function; antibody techniques; viral infections; hypersensitivity reactions; and, immunodeficiency.

Value - 15 credits

Available - 2nd term

On - Wednesday

Prerequisites - BS1071 and BS1072

BS2550 – Neuronal and Cellular Signalling – Dr H Augustin

The first part of this module covers the principles of signalling in the nervous system, including electrical signalling along neurons and synaptic transmission. Different types of neurotransmitters will be considered and their receptors and intracellular signal transduction pathways will be studied. We will study the role and action of Acetylcholine, GABA and glutamate. The role of voltage-gated and ligand-gated ion channels will be discussed, including the role of potassium and calcium ion channels. The second part of the module will focus on central cell signalling pathways.

Lectures include an introduction to drug development from an industrial and research perspective. The module will also cover the basis of cell signalling, from the outside of the cell (membrane receptors) to key intracellular mechanisms. These will include kinase (and phosphatase) activity, the second messengers heterotrimeric G proteins and small GTPases, cAMP, calcium and two important families of inositol-containing compounds. Examples of disease-related signalling will be highlighted throughout. Finally the module will introduce a range of model systems for neuroscience research.

Value - 15 credits
Available - 1st term
On - Tuesday
Prerequisites - BS1061 and BS1091

BS2560 – Pharmacology and Toxicology – Dr P E Chen

The module aims to explain the chemical, physiological and biochemical factors which influence the efficacy of drugs. Topics covered include: drug-receptor interactions and the principal methods for receptor identification and characterisation, routes of administration of drugs, physico-chemical and physiological aspects of drug absorption and distribution, pathways of drug metabolism and excretion, renal clearance and ultra-filtration, mechanism of action of the major classes of analgesic and anti-depressant drugs, principles of toxicology and the major mechanisms of free radical induced tissue damage, pharmacology of the autonomic nervous system and the neuromuscular junction, general and local anaesthetic agents.

Value - 15 credits
Available - 2nd term
On - Monday
Prerequisites - BS1031, BS1032, and either BS1061 or BS1062

BS2570 – Physical Biochemistry for Life Scientists – Dr M Soloviev

The module aims to provide the theoretical basis and examples of applications of physical and analytical methods for the study of biological molecules. The module considers the behaviour of macromolecules in solution, electronic spectroscopy methods such as fluorescence, phosphorescence and circular dichroism, mass spectrometry and its application to studies of biological macromolecules; MS, MS-MS, quantitative MS, Surface Plasmon Resonance, interferometry, introduction to scanning force microscopy and nanobiotechnology.

Value - 15 credits
Available - 1st term
On - Friday
Prerequisites - BS1031 and BS1032

BS2580 – Natural Product Biochemistry and Sustainability– Prof G Leubner

Plant biochemistry is an important field of basic science that explains the molecular function of a plant. This knowledge is important to be able to use plant biochemistry as an applied science to provide sustainable solutions to the global challenges of food security and supply, climate change and agriculture, and to deliver compounds for health and wellbeing. This module will focus on the biochemistry of essential energy-generating reactions in plants, the roles of plants in the nitrogen biosphere cycle and the biosynthesis of nitrogen-containing molecules, the creation of complex natural products important for plant chemical ecology and for human uses as sustainable raw materials for applications in pharmaceutical technology and other industrial processes. Topics covered include: Photosynthesis and energy production, including the detailed biochemical pathway and its environmental adaptation and importance for food security; importance of green plants to sequester CO₂ as greenhouse gas, and strategies to reduce greenhouse gases from arable fields (N₂O) to mitigate climate change; nitrogen fixation and assimilation, the future of sustainable nitrogen-fertilisation in agriculture; the biosynthesis of aromatic amino acids and the importance of this pathway as molecular target for the herbicide glyphosate and for the production of aromatic secondary compounds; the biochemistry of plant natural products with key examples for their importance in plant function, chemical ecology, sustainable natural products and sustainable technological solutions; molecular techniques to engineer the pathways of plant natural compounds with key examples for applications in pharmaceutical technology and other industrial processes.

Value - 15 credits
Available - 2nd term
On - Friday
Prerequisites - BS1032 and BS1091

THIRD YEAR MODULES

The following modules are available in 2022-23. **Please note** that module information is given as accurately as possible but is subject to change in the process of continually updating and reviewing the curriculum, thus modules may change slightly from one year to the next. Timetabling is also subject to confirmation.

Research Links

At third year level we strongly link our teaching to our research. This helps ensure you are being taught material at the cutting-edge of developments in the field. For each of the taught modules below, we have provided a link to the module coordinator's research pages, which can provide a starting point to finding out more about their research activities.

BS3010 – Individual Research Project – Dr W Lucchesi

The aim of the project is to provide students with an opportunity to integrate skills and knowledge from previous years and apply them to an independent line of enquiry within the Biological Sciences. The process aims to develop transferable and subject specific skills and is viewed as the graduate capstone experience. The student will need to plan and carry out an investigative project, involving data collection and analysis, and then communicate the research outcomes both orally and in writing. Successful research requires determination, resilience, accurate recording of results, objective analysis of data, and careful project- and time-management. The research project will also foster understanding of health and safety and an appreciation of ethical issues including scientific integrity; these aspects are assessed with online quizzes. The culmination of the project will be a written report which must be underpinned by a range of relevant sources and demonstrate the student's ability to contextualise the project using critical thinking and evaluation of the current literature.

[https://pure.royalholloway.ac.uk/portal/en/persons/walter-lucchesi\(4b92cee9-e336-4cc4-b926-543acef4b62f\).html](https://pure.royalholloway.ac.uk/portal/en/persons/walter-lucchesi(4b92cee9-e336-4cc4-b926-543acef4b62f).html)

Value - 30 credits

Available - Summer vacation after 2nd year and 1st term; or, 1st and 2nd term, 3rd year

Prerequisites - As specified for individual projects in the BS3010 Handbook

BS3020 – Special Study: Dissertation – Dr M Soloviev

The student is asked initially to design a potential dissertation topic from their own interests within the first 3 weeks of term, which must be discussed, and agreed, with an appropriate Dissertation Supervisor before a final decision is made. Topics should be Molecular or Organismal in nature, and should relate to a focused area. Note, however, the Dissertation topic cannot be in the same area as, and must be distinct from, the Final Year Project topic (Module BS3010) that the student is undertaking. The project and dissertation supervisors should also be different academic staff.

Enough information should exist in the scientific literature to allow you to write an informative and critical review of the chosen subject. You will be expected to cite within the text and list all consulted scientific journal references at the end of your report (see sections 6.4 and 6.5 below). Full instructions about topic registration and about the dissertation report are given in Moodle and in the BS3020 Handbook respectively.

A literature research project on a biological or biochemical topic of the student's choice, acceptable to the School of Biological Sciences. The resulting word-processed and bound report should be at least 5,000 but not more than 7,500 words, with some 20-40 references and appropriate figures or diagrams. Students will exercise and develop their skills in critically evaluating the recent scientific literature on a topic of their choice. The exploration of the literature will enable them to see the manner in which scientific understanding is advanced by obtaining data that is used to generate and test hypotheses. The student, in preparing a detailed written report, is presented with an opportunity to improve their presentational skills. The student's expert knowledge in the topic may be investigated in the form of a *viva voce*.

[https://pure.royalholloway.ac.uk/portal/en/persons/mikhail-soloviev\(2b06f036-2cco-4375-87e1-57f662534dod\).html](https://pure.royalholloway.ac.uk/portal/en/persons/mikhail-soloviev(2b06f036-2cco-4375-87e1-57f662534dod).html)

Value - 15 credits

Available - 1st and 2nd term of 3rd year

Prerequisites - None, but subject choice must be appropriate to student's degree programme

BS3030 – Biology of Parasitic Diseases – Dr J Tovar-Torres

This module explores the principles of parasitism and the protective mechanisms employed by immuno-competent hosts to limit the spread of infection. It outlines the biological strategies used by a range of unicellular and multicellular organisms to colonise its host causing disease in human and non-human hosts. Case studies on the pathology and the cellular immunity elicited by various parasites are explored. The immune evasion strategies used by widely distributed

human parasites to protect themselves from immune attack are also reviewed. The principles and prospects of anti-parasitic vaccination in the 21st century are presented and discussed.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/jorge-tovartorres\(4774ccc1-ab75-4443-b7c8-c78e965bodef\).html](https://pure.royalholloway.ac.uk/portal/en/persons/jorge-tovartorres(4774ccc1-ab75-4443-b7c8-c78e965bodef).html)

Value - 15 credits
Available - 1st term
On - Tuesday
Prerequisites - BS2005 or BS2150 or BS2530

BS3060 – Conservation Science – Dr S Papworth

The module covers the biological basis of the great threats to biodiversity – habitat loss and fragmentation, intensive agriculture, over-harvesting and natural resource exploitation, alien species, disease and global climate change – and the approaches developed by conservation scientists to overcome these threats at local and global scales. The potential for subjectivity in conservation decision-making and the crucial importance of science-based conservation is stressed. Practical work is part of the assessment and involves writing an invasive species management plan.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/sarah-papworth\(3b19e970-8a1a-4a31-91c7-73bce6bb0093\).html](https://pure.royalholloway.ac.uk/portal/en/persons/sarah-papworth(3b19e970-8a1a-4a31-91c7-73bce6bb0093).html)

Value - 15 credits
Available - 2nd term
On - Friday
Prerequisites - BS1041 or BS1051

BS3100 Tropical Rainforest Expedition – Dr Steve Portugal

This module will take place in the tropical rainforest of Malaysian Borneo, with a focus on animal behaviour. You will work in and around the Dinau Girang field centre to learn about tropical rainforest ecology. There are many fascinating species of plants and animals in the rainforest, this is an opportunity to see some of them in their natural habitat, and to learn about the conservation challenges to maintaining the natural ecosystem. Details are yet to be confirmed, but we are hoping to run the module in September (at the end of the summer vacation between Y2 and Y3) for 10 days. It is likely to cost in the region of £800. Students will also need to pay for their travel to Borneo.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/steve-portugal\(1440de30-110a-4f0c-8981-419d652df90\).html](https://pure.royalholloway.ac.uk/portal/en/persons/steve-portugal(1440de30-110a-4f0c-8981-419d652df90).html)

Value - 15 credits
Available - tbc
On - tbc
Prerequisites - BS2110 or BS2140 or BS2001X. Available to students on the Biology, Zoology and Ecology and Conservation degree programmes.

BS3110 – Conservation Ecology in the Field – Prof E Leadbeater

The module exposes students to the two critical aspects of ecological conservation- monitoring and management- through a mixture of lectures, workshops taught practical work and independent practical work. We will consider why it is important to monitor and survey ecological systems, and consider what the presence and abundance of certain species can tell us about ecological conditions. We will discuss management strategies including ecological impact assessment, non-native species and pest management, and in situ conservation and habitat preservation approaches.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/elli-leadbeater\(a2edc845-5d79-4c83-bab4-6c58102f485f\).html](https://pure.royalholloway.ac.uk/portal/en/persons/elli-leadbeater(a2edc845-5d79-4c83-bab4-6c58102f485f).html)

Value - 15 credits, counts as Y3 module
Available - 3rd term of Y2
On - End of May/first half of June, after Y2 exams; dates tbc
Prerequisites - Recommended: BS2110

BS3120 – Population and Community Ecology – Dr V Jansen

The principles of population and community ecology are explained, using examples from animal and plant assemblages. We first focus on population growth, inter- and intra-specific competition, trophic relations and the factors which regulate populations. Next, the ecological processes that contribute to community organisation, such as food web structure, body size, succession and natural disturbances, involving topics such as invasive species and extinction, are considered. The role of population and community ecology in the maintenance of biodiversity is emphasised throughout. A research proposal writing exercise and modelling quizzes, which will involve the use of

computer simulations, are included.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/rudiger-riesch\(3ad55f25-7f78-4a47-b722-afob845939b1\).html](https://pure.royalholloway.ac.uk/portal/en/persons/rudiger-riesch(3ad55f25-7f78-4a47-b722-afob845939b1).html)

Value - 15 credits
Available - 1st term
On - Friday
Prerequisites - None

BS3160 – Behavioural Ecology – Dr R Riesch

The module demonstrates how the behaviour of animals can be explained in an ecological and evolutionary framework. The emphasis is upon functional and evolutionary hypotheses and testing models that seek to explain how animals find and use key resources (such as food, breeding territories, mates).

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/rudiger-riesch\(3ad55f25-7f78-4a47-b722-afob845939b1\).html](https://pure.royalholloway.ac.uk/portal/en/persons/rudiger-riesch(3ad55f25-7f78-4a47-b722-afob845939b1).html)

Value - 15 credits
Available - 1st term
On - Monday
Prerequisites - Recommended: BS2140

BS3180 – Marine Ecology and Biodiversity – Prof D Morritt

The module will begin with a brief introduction to the marine environment and basic oceanography. Following on from this a number of topical subjects will be used to illustrate developments in the field of marine ecology. The biodiversity and biogeography in the marine environment will be illustrated with reference to selected habitats, namely coral reefs and the deep ocean. The biology of the deep ocean, in particular the biology of mid-water and hydrothermal vent communities, will include consideration of technological advances in deep ocean exploration. This theme will be developed further in lectures on tracking studies, behaviour and conservation of marine megafauna, e.g. sharks, sea birds and marine mammals. The topical issues of marine pollution, including plastics pollution, hypoxia, ocean acidification and global climate change will be considered with respect to effects on marine biodiversity. Topicality is also maintained during coursework: pairs of students prepare a poster based on a recently published paper from a highly rated marine biological journal.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/david-morritt\(6dc42048-6568-44dc-8936-5017f268a0c4\).html](https://pure.royalholloway.ac.uk/portal/en/persons/david-morritt(6dc42048-6568-44dc-8936-5017f268a0c4).html)

Value - 15 credits
Available - 2nd term
On - Wednesday
Prerequisites - Recommended: BS2001X

BS3190 – Climate Change: Plants and the Environment – Prof A Devoto

The module will give an advanced treatment of the effect of global climate change on the interaction between plants and the environment and will provide new opportunities to consider at various levels (ecological, physiological and molecular) the reaction of plants to environmental changes. Topics include a historical perspective on plants and humanity, microbial science and crop improvement.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/alessandra-devoto\(bc9436ae-e822-4dea-bebf-9151dee8aeag\).html](https://pure.royalholloway.ac.uk/portal/en/persons/alessandra-devoto(bc9436ae-e822-4dea-bebf-9151dee8aeag).html)

Value - 15 credits
Available - 2nd Term
On - Tuesday
Prerequisites - Recommended: BS1043 and BS2020

BS3220 Extreme Animal Physiology – Dr S Portugal

The module demonstrates how vertebrate animals perform major feats within their annual cycles, focusing on those species either living in extreme environments, or exhibiting extreme behaviours. In depth case studies will be used to illustrate how physiology, morphology and anatomy combine to allow survival in harsh environments, and make extreme behaviours possible. Each lecture will include detail on the techniques used to examine animal physiology

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/steve-portugal\(1440de30-110a-4f0c-8981-419d652dfeg0\).html](https://pure.royalholloway.ac.uk/portal/en/persons/steve-portugal(1440de30-110a-4f0c-8981-419d652dfeg0).html)

Value - 15 credits

Available - Term 1
On - Wednesday
Prerequisites - BS2140 OR BS1061 with either BS1062 or BS2050

BS3230 Circadian Biology – Dr P Devlin

The module will look at rhythms throughout biology: in microbes, plants and animals. It will look at the impact of the internal circadian clock on behaviour, physiology, environmental responses and its wider implications for fitness. It will look at how the clock interacts with environmental signals. How the clock can be set to the right time; how the clock can moderate environmental responses; or how the clock can allow measurement of daylength for the timing of annual events. The emphasis will be upon the study of the real experimental data that have led to our understanding of the regulation of biological processes by clock and of the mechanism by which it works. This will include an examination of the methodology and analytical approaches used by circadian biologists. A wide range of organisms will be covered here.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/paul-devlin\(35c26f46-d131-45f9-b937-213a1b7d4cc6\).html](https://pure.royalholloway.ac.uk/portal/en/persons/paul-devlin(35c26f46-d131-45f9-b937-213a1b7d4cc6).html)

Value - 15 credits
Available - Term 2
On - Monday
Prerequisites - BS1071 and BS1072

BS3420 – Nutrition and Medical Biochemistry – Dr W Lucchesi

Nutrition and Medical Biochemistry aims at developing knowledge of the latest scientific literature supporting the present guidelines for a healthy diet. There will be a clear focus on how different diets affect the metabolism in health and disease with particular attention to gut microbiome, hypercholesterolemia, obesity and epilepsy. The course will integrate knowledge from previous biochemistry courses and will foster critical analysis skills through tailored coursework designed to evaluate and communicate relevant research findings. Topics to be covered include the role of the diet and nutrition in maintenance of health and prevention of disease, and the biochemical foundation of diet-related metabolic disorders in humans, particularly dyslipidaemia, atherosclerosis and obesity.

Research link – [https://pure.royalholloway.ac.uk/portal/en/persons/walter-lucchesi\(4b92cee9-e336-4cc4-b926-543acef4b62f\).html](https://pure.royalholloway.ac.uk/portal/en/persons/walter-lucchesi(4b92cee9-e336-4cc4-b926-543acef4b62f).html)

Value - 15 credits
Available - Term 2
On - Thursday
Prerequisites - BS1032, BS1091 and BS2510

BS3510 – Molecular and Medical Microbiology – Dr S Dissanayeke

This module will present advanced topics in molecular microbiology with particular emphasis on microbial pathogens, their epidemiology, diagnosis, prevention and treatment. Topics include pathogen mechanisms for infection, the host immune response to infection, vaccine development, gastrointestinal health and disease and resistance to antibiotics.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/shobana-dissanayeke\(83e88b62-a1c3-479c-8e94-1c6637745fac\).html](https://pure.royalholloway.ac.uk/portal/en/persons/shobana-dissanayeke(83e88b62-a1c3-479c-8e94-1c6637745fac).html)

Value - 15 credits
Available - 1st term
On - Monday, plus Wednesday in the week of oral presentations
Prerequisites - BS1071 and BS2005; plus BS2540 recommended

BS3520 – Seed Biology: From Molecular & Conservation Biology to Industrial Applications – Prof G Leubner

Plant seeds and fruits are of central importance to human existence as they constitute the beginning and the end of most food supply chains (food security and sustainability). They are the delivery systems of agricultural biotechnology and a cornerstone of ecosystem conservation (seed banking) and key to novel weed management strategies. The module provides a solid introduction into the fundamental processes of seed development and food reserve deposition, germination and reserve mobilisation, as well as the utilisation of seeds for molecular pharming. The evolution of the seed habit and the biomolecular paleobotany of fossil seeds focus on the key advantages and diversity of seeds and fruits which evolved in interaction with climate change. The morphological diversity of seeds and fruits includes a one-day visit and practical at Kew's Millennium Seed Bank. This is followed by the biophysics of seed dispersal and the developmental biomechanics of seed fibres and seed germination. Further topics include the

molecular mechanisms underlying seed dormancy, germination and persistence in the soil bank, and their environmental control including by abiotic and biotic stress factors. The module also covers technologies used by the seed industry to improve crop seed quality including with innovative environment-friendly technologies and the research in agricultural biotechnology and horticultural praxis. The lectures are complemented by coursework including a "seed conference" as highlight in which selected topics from the actual literature are presented by the students. Websites: [The Seed Biology Place](#), [Kew's Millennium Seed Bank](#), [Syngenta](#), [Tozer Seeds](#)

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/gerhard-leubner\(b07cd3da-9c1d-4167-8d52-199a13d54351\).html](https://pure.royalholloway.ac.uk/portal/en/persons/gerhard-leubner(b07cd3da-9c1d-4167-8d52-199a13d54351).html)

Value - 15 credits

Available - 1st Term

On - Tuesday, plus a Friday for field trip

Prerequisites - Recommended BS2020 or BS2150

BS3530 – Applications of Genetic Engineering in Health and Disease – Prof RSB Williams

The ability to manipulate genes provides one of the most important advances in modern research since the discovery of the structure and function of DNA. This process, called genetic engineering, is critical for biomedical research, since it has enabled an improved understanding of the role of proteins at both a cellular and organismal level – through gene deletion or through the introduction or removal of disease-associated mutations. This module will provide an advanced-level module on Genetic engineering. The module will focus on the use of Genetic engineering in a range of systems including a simple non-animal model (*Dictyostelium*), and both *in vitro* and *in vivo* animal systems. The module will describe the use of these models for Genetic Engineering research, the underlying principles in the research, and the practical application of this research in areas of human health and disease, with a particular focus on current advances.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/robin-williams\(f59210ed-f7c6-4b50-a29c-05c861d4b6c1\).html](https://pure.royalholloway.ac.uk/portal/en/persons/robin-williams(f59210ed-f7c6-4b50-a29c-05c861d4b6c1).html)

Value - 15 credits

Available - 1st term

On - Tuesday

Prerequisites - BS2530

BS3540 – Cell and Molecular Biology of Cancer – Prof L Bögre

This module will cover selected topics in molecular cell biology relevant to cancer: Cell-cell adhesion and signalling. Stem cells in development and disease. We cover the importance of the cytoskeleton, including microtubule structure and its functional role for cell division, cell cycle and polarity, cell dynamics and disease. Additional topics on cancer biology include oncogenes, tumour suppressor genes, caretaker genes and the signalling and regulatory pathways these are involved in. The module covers the cellular, tissue and developmental barriers that have to be broken for the development of cancer. These will include apoptosis, senescence, angiogenesis and metastases. The module will also include case studies and novel research avenues for diagnosis and the rational treatment of cancer.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/laszlo-bogre\(1bd7dd10-4a82-479b-ab69-ec13db21076d\).html](https://pure.royalholloway.ac.uk/portal/en/persons/laszlo-bogre(1bd7dd10-4a82-479b-ab69-ec13db21076d).html)

Value - 15 credits

Available - 2nd term

On - Friday

Prerequisites - BS1071 (recommended BS2040, BS2060, BS2530 and BS2540)

BS3560 – Functional Genomics, Proteomics and Bioinformatics – Dr A Devoto

The module will give an advanced treatment of structure-function relationships in proteins and of new opportunities for the use of genome-wide analyses in dissecting regulation in biological systems. Gene and protein networks will also be discussed. Topics include, post-genomic science; modes of specific recognition in mediating protein interactions; domains and functions; and, protein engineering. Students complete guided bioinformatics coursework. This assesses individual competencies and practical skills as each student will have to analyse separate datasets and develop own conclusions on the function of a gene/protein within a network through the analysis of databases and literature.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/alessandra-devoto\(bc9436ae-e822-4dea-bebf-9151dee8ae9\).html](https://pure.royalholloway.ac.uk/portal/en/persons/alessandra-devoto(bc9436ae-e822-4dea-bebf-9151dee8ae9).html)

Value - 15 credits

Available - 2nd term

On - Wednesday
Prerequisites - BS2530 recommended

BS3570 – Human Embryology – Dr J Murdoch

This module will cover selected aspects in the development of human embryos, and will examine the morphological events, cellular changes and molecular regulation involved. Topics covered in detail include early embryonic development, with formation of the three germ layers during gastrulation and the specification of anterior-posterior and left-right axes. The formation and early patterning of the brain and spinal cord will be discussed, and the effects of genetic and environmental insults in causing birth defects will be considered. Other topics include craniofacial development, and early steps in formation of the eye. Sexual determination and differentiation will be discussed. The processes of egg and sperm maturation and fertilization will be covered, leading us back to early preimplantation development. Techniques used to help study embryonic development will be integrated into the module.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/jenny-murdoch\(1dc4987d-dcb2-4b9b-a10a-7a157d06561a\).html](https://pure.royalholloway.ac.uk/portal/en/persons/jenny-murdoch(1dc4987d-dcb2-4b9b-a10a-7a157d06561a).html)

Value - 15 credits
Available - 1st term
On - Thursday
Prerequisites - BS2050 or BS2060 or BS2550

BS3580 – Cellular and Molecular Neuroscience – Dr H Augustin

This module covers brain development, function and disorders. We discuss the cellular and molecular mechanisms of central nervous system development with particular reference to the cerebral cortex. We discuss in detail the synthesis, storage and release of neurotransmitters. We will review the molecular basis of learning and memory. We will also study the cellular and molecular basis of brain disorders, including neurodegenerative disorders, particularly Alzheimer's disease, as well as epilepsy and bipolar disorder. The module also includes lectures from a clinician, on the cellular and molecular basis of neuroprotection in preterm babies and infants.

Research Link – [https://pure.royalholloway.ac.uk/portal/en/persons/hrvoje-augustin\(8ddobeof-gcof-44ad-b4c4-409977a712dc\).html](https://pure.royalholloway.ac.uk/portal/en/persons/hrvoje-augustin(8ddobeof-gcof-44ad-b4c4-409977a712dc).html)

Value - 15 credits
Available - 2nd term
On - Wednesday (and Thursday for one week)
Prerequisites - BS2550

BS3590 – Molecular Basis of Inherited Disease – Prof R Yáñez

The module provides an introduction to the theory, technology, and clinical practice of human molecular genetics: the metabolic and molecular bases of human inherited disease, mapping disease genes, the human genome project, bioinformatics, clinical aspects of the biochemistry of inborn errors of metabolism, and therapeutic approaches. The module is taught in relation to a selected range of illustrative genetic disorders and inborn errors of metabolism such as muscular dystrophies, cystic fibrosis, haemophilia, lysosomal storage disorders, haemoglobinopathies, mitochondrial respiratory chain disorders, neurotransmitter synthesis disorders, lipoprotein diseases and primary immunodeficiencies. This module is taught primarily by external lecturers who are experts in the field.

Research Link: https://pure.royalholloway.ac.uk/portal/en/persons/rafael-yanez_7a966e44-a812-4293-99a8-1016a6fe919a.html

Value - 15 credits
Available - 1st term
On - Friday
Prerequisites - BS1071 and BS1072

BS3595 – Clinical Physiology and Medicine – Dr J Murdoch

This module will be taught by clinicians from Ashford and St Peter's Hospital, who are experts in their field and working at the patient interface. The module will therefore be taught from the clinical perspective, providing both background in a topic but taking it through to consider common disorders, their causes, investigations and the medical treatments. The module will consider the clinical physiology of selected systems, including smooth muscle, bone and soft tissues, and will set these tissues into context in terms of intestinal function, anorectal physiology, and the formation and function of bone and soft tissues. The lectures will consider common clinical conditions including aetiology and demographics, investigations and treatment (management). Clinical problems with bone and soft tissue will be discussed, including disorders of calcium homeostasis, metabolic defects, and the effects of exercise, ageing and injury.

The module will address the processes involved in making an initial clinical assessment of a patient. This module will also discuss how to rigorously scientifically evaluate new interventions and new drug treatments, and students will learn how to critically appraise treatment evaluation data.

Value	- 15 credits
Available	- 2 nd term
On	- Monday and Tuesday
Prerequisites	- BS1062 and BS2050; Biomedical Sciences degree programme only

BS3600 – Clinical Diagnosis of Disease – Prof P Sharma

The module will cover the clinical application of biochemistry and physiology. The chemical pathology of a range of physiological systems will be studied, including stroke genetics, kidney, liver, heart, and thyroid. In addition clinical biochemical aspects of cancer diagnosis and infertility and rheumatology in medicine will be covered. Lectures will concern the rationale behind the analyses used in the biochemical investigation of disease and the clinical aspects of disorders affecting the various organs/systems. The lectures will be followed by tutorials based on individual clinical cases and their investigation.

Research Link: [https://pure.royalholloway.ac.uk/portal/en/persons/pankaj-sharma\(57baa148-2b46-4014-ac09-55fe1b81d8fo\).html](https://pure.royalholloway.ac.uk/portal/en/persons/pankaj-sharma(57baa148-2b46-4014-ac09-55fe1b81d8fo).html)

Value	- 15 credits
Available	- 2 nd term
On	- Thursday and Friday
Prerequisites	- BS1091; BS2050 recommended; Biomedical Sciences or Medical Biochemistry only

5.4 Module registrations

You can only register for 120 credits of modules in each academic year (this excludes modules which are being re-sat). You will have the option of changing modules up to the beginning of the second week after the start of teaching (excluding Welcome week). Any modules that you wish to take on an extracurricular basis (that is, not counting towards your degree) must be identified at the start of the academic year.

Preliminary registration: In the second term of their first and second years, students must pre-register for the optional (non-mandatory) modules they intend to take the following academic year. Registration for mandatory modules is automatic. Pre-registration for optional modules is completed conveniently by MS Forms and full instructions are provided.

Brief information about modules taught in the Department is given in this handbook, and more detailed information will be given in the module specification document for each individual module, available on Moodle. Students should consider their module choices carefully, taking into account their individual strengths and interests, their future aims and ambitions as well as noting any module pre-requisites. Guidance on selection of modules is available from Personal Tutors and the UG Education Lead. Whilst every effort is made to avoid clashes and provide maximum flexibility, inevitably some module combinations are not possible, owing to timetabling restraints. If a timetabling clash is identified then you will need to alter your module selection. Students should be aware that there are also College thresholds for the minimum number of students required for a module to be taught, maximum limits in some cases, and that some optional modules will not run each year dependent on sabbatical absences. After preliminary registration if a module is no longer available students will be notified as soon as possible and an alternative selection can then be made.

Registration: Confirmation of module registration occurs at the beginning of the relevant academic session. It is imperative that students check and respond to information about this at the appointed time; the official College 'Module Entry Form' confirmed by the student at that time constitutes the basis for examination entries. You can check this on Campus Connect, under the 'Degree Structure' section. Please note that the Department makes every effort to retain module timetabling but that there may be unavoidable changes to the timetable over the summer vacation. Students should therefore check their timetable carefully at the beginning of the academic year.

6 Facilities

6.1 Binding

Most work is now submitted electronically, so it's unlikely that you'll need to print and bind a hard-copy report. However should you need to do so, there are facilities for binding reports available in the Library.

6.2 Social facilities

Students may use the Bourne foyer as a social area, though please keep current social distancing measures in mind to help keep all staff and students safe. Please keep the area tidy and use the litter bins provided. Please refrain from accessing the flat roof area above the Bourne lecture theatres; this damages the roofing structure.

6.3 BioSoc

The Department has an active Biological Society that is run by students. BioSoc organises a variety of social and educationally inspiring events through the year, both on campus and further afield. BioSoc helps to maintain the strong sense of community within the Department, fostering interactions between staff and students as well as strengthening the mix across different academic year groups. BioSoc has a noticeboard in the Bourne Tunnel and Foyer as well as a dedicated website <https://www.su.rhul.ac.uk/societies/a-z/bioscience/>. Look out for notices about events throughout the year as well as information about how to get involved.

6.4 Smoking and drinking policy

Smoking is not permitted anywhere in the College buildings nor within 5 metres of the buildings. Please do not smoke in the covered walkways next to Bourne as your smoke will infiltrate adjacent offices and labs. This is particularly important next to the greenhouses as smoke affects the plants growing in them. Please also do not smoke in front of Bourne building, as your smoke is then taken into the ventilation system for the lecture theatres. A covered smoking area is provided in front of Bedford building. Absolutely no food or drinks are permitted in any of the laboratories, and only water may be taken into lecture rooms.

7 Assessment Information

7.1 Anonymous marking and cover sheets

The majority of coursework will be submitted electronically, through Moodle. This includes Moodle quizzes, Smart Worksheets, and reports submitted into Turnitin. For all electronic coursework submissions, the system will record your identity, so please do not put your name, student number or candidate number anywhere on your submission unless specifically instructed to do so by the academic who set the work. Some first year work is marked with the names obvious to the marker (for instance, so that your personal tutor can identify your submission) while other first year work and the vast majority of second and third year work is marked anonymously, with the names revealed to the marker only after all marking is complete. Indeed, if the work is being marked anonymously, you *must not* have your name on the submission!

A small number of coursework assessments need to be submitted in hard copy. In those cases, the current policy on anonymous marking of coursework requires that you **include either your name or your candidate number** clearly on your coursework and on any supplementary material which could become detached. Your candidate number is available via Campus Connect, and will change each year; this is not the same as your Student ID number. **Do not** put both your name and candidate number! Please see the assessment instructions for that piece of work to check what is required. Please attach a coursework submission sheet to the front, to clearly identify the work.

College policy is that there should be anonymous marking of all undergraduate coursework. However, the College has approved exemption from anonymous marking for all first year, and certain second and third year coursework

assessments, in the Department of Biological Sciences as follows:

First Year Course Units: Coursework may be submitted by student name. Electronic submissions will record your identity in the system, so please do not put your name or your candidate number on these unless specifically instructed to do so.

Second Year Course Units: BS2001X (group project), BS2110 (field journal) and BS2570 have been granted exemption from anonymous marking of coursework and so may be submitted by student name. Coursework from all other modules must be marked anonymously. For hard copy work please include your candidate number. Electronic submissions will record your identity, so please **do not** put your name nor your candidate number on these.

Third Year Course Units: Some aspects of work in these modules have been granted exemption from anonymous marking: BS3010, BS3090, BS3110, BS3180, BS3190, BS3510, BS3520, BS3540, BS3560, BS3590, and BS3595. These exemptions apply to the aspects that cannot be marked anonymously, such as a presentation. A small number of hard copy written assessments have been granted exemption from anonymous marking and will be handed in by student name; for other hard copy work please submit by candidate number. Electronic submissions should remain anonymous, so please **do not** put your name or your candidate number on these; the system will record your identity.

DO NOT write both your name and candidate number on any piece of hard copy work.

DO NOT write either your name or candidate number on any piece of electronically submitted coursework unless specifically instructed to do so.

7.2 Submission of written work

Students are told, in writing, in individual modules when and how reports, essays or other material for assessment are to be submitted. Material will not be accepted at other locations or through other submission systems. Work for formal assessment will not normally be accepted by e-mail or by post, except in exceptional circumstances, if agreed in advance.

The majority of submissions will be made electronically, through Moodle. All submissions must be made before the stated deadline unless you are advised otherwise. For Turnitin submissions of work that includes Figures, you are advised to save your document as a PDF file prior to submission. This helps to avoid formatting issues that can result in Figures moving and obscuring other parts of your work! You are also advised to ensure you check your submission. Make sure it has fully uploaded, and double check that you have submitted the correct document. We can only mark the work that you have submitted. Turnitin submissions normally have a deadline of **4.30pm**, but you should aim to submit well in advance of this time (not in the last few minutes!) in case of technical problems. If you have technical issues with submitting your work please contact lse-school@rhul.ac.uk in advance of the deadline. Work that is submitted after the deadline will incur a penalty.

Some work may be required as a hard copy submission. Most of these are handed in at the end of a lab or fieldwork session, but others may be submitted at a later date, in which case they will need to be posted in the correct locked box in Wolfson foyer before the stated deadline. For hard copy submissions, make sure that all the components of the coursework are firmly attached using a staple and that every page is labelled with either your name or candidate number, as required (see section 7.1 above). Please note that deadlines are strictly enforced, and the boxes will be closed at the deadline (normally **4.30pm**). Work posted in the wrong box will be given a mark of zero, even if you claim to have placed it there before the deadline. When a piece of hard-copy coursework is late it must be handed in to the School Admin Office Wolfson 118, not to a member of academic staff. If the office is closed (usually at 5:30pm each day) it must be handed in to this office as soon as possible the following day. The report will be date-stamped and, if an extension has been given, this will be recorded alongside the date stamp. Students will be asked to sign for submission of late work.

Loss of coursework through car theft: You are strongly advised not to leave your lecture notes, coursework or project reports in an unattended car. The increasing incidence of car theft has resulted in some students losing irreplaceable written work. Be warned!

Loss of coursework through computer and/or printing problems: Note that the loss of coursework prior to submission due to computer failure, corruption of a file or other computer- or printer-associated problems is not an

acceptable reason for the late submission of work. **Always** make **regular** backups of work on a separate system, such as a USB stick or online, so that any such problems are avoided. It's also a good idea to save files intermittently as a new version, as you progress through your work, so that you have something to go back to should your working file become corrupted. Remember not to leave printing or submission until the last minute!

Laboratory reports: Attendance at all laboratory classes and the submission of written reports is essential, unless there are valid and documented reasons for failure to attend or to submit a report on time. Writing an account of your investigations is an integral part of your training as a scientist. For some practicals you will be provided with worksheets, for others you will complete an online Smart Worksheet, and some will involve writing parts of or a complete lab report. You will find advice on how to write good practical reports in the Department Study Guide, in video guides on Moodle, and for further detail we recommend the book entitled "Study and Communication Skills for the Biosciences" by Johnson and Scott, which is available in the library. You should also adhere to specific instructions from academics on what is required for particular coursework assessments. In all cases you need to complete the write-up and submit it into the correct online submission space, or post it into the appropriate labelled box in Wolfson foyer, **by 4.30pm** on the day stated on Moodle or the module specification.

7.3 Marking of over-length work

Learning to write concisely is an important transferable skill. The consequences of submitting over-length work helps promote in students the discipline of writing to a pre-determined specification. Work which is longer than the stipulated length in the assessment brief will be treated in line with Section 13, paragraph (5) of the College's [Undergraduate Regulations](#):

Section 13 (5)

Any work (written, oral presentation, film, performance) may not be marked beyond the upper limit set. The upper limit may be a word limit in the case of written work or a time limit in the case of assessments such as oral work, presentations, films or performance. In the case of presentations, films or performance these may be stopped once they exceed the upper time limit

In addition to the text, the word count should include quotations and footnotes. It will also include figure legends, tables and in-text citations. Please note that the following are excluded from the word count: candidate number, title, course title, preliminary pages, bibliography/reference list and appendices.

7.4 Extensions to deadlines

Please refer to the Extensions Policy and guidance on the College's webpage about [Applying for an Extension](#).

Please note: - Not every assessment is eligible for an extension.

Listed below are the assessments for which extensions cannot be granted (i.e. are exempt):-

All first and second year work; assessments that involve group work; posters and presentations; Moodle quizzes, Smart Worksheets, and any work that is purely formative.

7.5 Support and exam access arrangements for students requiring support

Please refer to the College Student Handbook for information on registering with the Disability and Neurodiversity Services Office and the support available. For time-limited quizzes (eg those limited to a 1-hour attempt) on Moodle the Department can usually provide additional time for those students awarded extra time in exams by the Disability and Neurodiversity (formerly DDS) office. We aim to set this up automatically, but if this has been missed then please alert the Module Coordinator to this requirement *before* you begin the relevant quiz.

7.6 Referencing

For all written coursework, you are expected to reference your sources with appropriate citations in the text, and to

include a reference list at the end of your work. Reference citations must be clear and uniform throughout. Familiarise yourself with reference styles used in journals and use a comprehensive style which gives all the authors' names and the full title of the paper in the final reference list.

Make sure that all the references that you cite in the text are listed in the reference section and that all references listed in the reference section are cited in the text. No reference should be cited that you have just read for extra information but have then not cited information from.

Using a form of reference managing software is strongly encouraged, particularly for larger bodies of work such as your final year project and dissertation. RefWorks is a web-based bibliographic manager that is available free of charge to students, and training is available through the Library. Alternatively, various other on-line programmes are now available, or students can purchase software such as EndNote or Reference Manager.

Including appropriate citations and complete referencing of your work is important, as without this you may find you are committing plagiarism.

There are a range of referencing and bibliographic conventions, examples of which may be seen in current academic and scientific journals (e.g. Nature, Parasitology Today, Current Opinion in Infectious Diseases). The School would like students to use the "Harvard style" of citation and referencing. A separate "Biological Sciences Referencing Guide" has been prepared, to give you the details of what is required. You can find this on the BS100/BS2000/BS3000 general Moodle sites. Please use it!

7.1 Academic Misconduct - Plagiarism

What is Plagiarism?

'Plagiarism' means the presentation of another person's work in any quantity without adequately identifying it and citing its source in a way which is consistent with good scholarly practice in the discipline and commensurate with the level of professional conduct expected from the student. The source which is plagiarised may take any form (including words, graphs and images, musical texts, data, source code, ideas or judgements) and may exist in any published or unpublished medium, including the internet. Plagiarism may occur in any piece of work presented by a student, including examination scripts, although standards for citation of sources may vary dependent on the method of assessment.

Identifying plagiarism is a matter of expert academic judgement, based on a comparison across the student's work and on knowledge of sources, practices and expectations for professional conduct in the discipline. Therefore it is possible to determine that an offence has occurred from an assessment of the student's work alone, without reference to further evidence.

You are **strongly advised** to read Chapter 5 in the book "Study and Communication Skills for the Biosciences", which is available in the library. This chapter explains clearly what constitutes plagiarism and how to avoid it. You must also complete the Moodle-based online module about Academic Integrity SS1001, and passing this module is a requirement for progression.

8 Attendance and Engagement Requirements

You will be monitored for engagement on all summative pieces of work. . Please refer to the central [Attendance Monitoring web pages](#) for full details.

9 Scholarships and Prizes

The College is fortunate to possess a number of endowed bursaries, scholarships and prizes. Some were set up many years ago by former staff and students but others were established more recently to encourage or reward new initiatives. Within the Department of Biological Sciences, prizes are awarded to individual students to reward academic

excellence or greatest improvement. The list of prizes currently available is included in the table overleaf. Members of the Department Assessment Board decide which students will be awarded or nominated for these prizes after the assessment board meeting. Individual recipients are notified of their awards. There are also a number of prizes within the School. The Department makes nominations for these each year, although the award is not guaranteed. Details are available from Dr Enrique López-Juez (Bourne 416, e.lopez@royalholloway.ac.uk)

There are Travel or Research Awards available through the College to help you study, travel or work on your professional development. Awards range from £200 to £2,000 for undergraduate and postgraduate students. All you need to do to apply is tell us how you would use the money and where it could take you. To find out more visit: www.royalholloway.ac.uk/travelawards.

One travel award that is allocated by the Department is the Peter Marsh Prize in Ecology or Conservation. This was established by his parents in memory of a former student of Royal Holloway. The value of the award will vary and is currently up to a maximum of £200. It is normally awarded to a student in his/her second year to assist with a field project in the area of ecology or conservation. Details are available from Dr Enrique Lopez-Juez.

Prizes available to students in the Department of Biological Sciences

Please note that not all prizes are awarded every year.

Prize	Conditions of award	Type of award
Achievement in Biosciences OUP Prize (external)	Awarded to the student who achieved the most or made the most improvement in experimental work over the year.	OUP books
Arnold Spicer Prize	Awarded to the best finalist in Biochemistry/Medical Biochemistry.	Monetary
Blackwell Prize	Awarded to the best student in each year in organismal biosciences. Third year prize is for best student in plant sciences continuing to PG study.	Monetary
Bramley Prize	Awarded for an outstanding project in Biochemistry.	Monetary
Dudley Cheesman Prize	Awarded to the student(s) who has made the most progress in the second or third year of a molecular degree.	Monetary
Edkins Memorial Prize in Physiology	Awarded to the best finalist with a strong physiology component in their degree.	Monetary
Elizabeth Calvert Prize	Awarded to the student who has made most progress in the final year of a molecular degree.	Monetary
H. Munro Fox Prize in Zoology	Awarded to the Zoology finalist who has made the most progress in their final year.	Monetary
Lillian Hildebrandt Rummel Prize (external)	Awarded to the best student of behavioural ecology	Monetary
Paxton Prize	Awarded to the best finalist in the School.	Monetary
Pentelow Prize	Awarded to the best finalist in organismal biology.	Monetary
The Physiological Society UG Prize(external)	Awarded to the best physiological third year project.	Monetary
Rodgers Prize	Awarded to the second year student with the greatest promise as a lab worker (highest aggregate practical marks). Chemistry focus.	Amazon voucher
RSC Download Section Prize (external)	Awarded to an outstanding student in a chemistry-related course. Normally the student with the highest mark in BS1030.	Monetary
Royal Society of Biology Student Award (external)	Awarded to the best finalist in the Department.	Associate membership of RSB
Department Horizons prize	Awarded for an outstanding research project	Monetary
Department outstanding bioscientist prize	Awarded to the best first and second year students	Amazon voucher
Spencer Prize	Awarded to the second year student (specialising in chemistry) who has made the most progress in the academic year.	Amazon voucher
University of London Contribution to BioSci award	Awarded for outstanding (curricular and extra-curricular) contribution to the department overall.	Monetary
Warren Prize	Awarded for an outstanding dissertation/project on molecular biology and genetics of plants or microorganisms.	Monetary

Faculty Prizes

Martin Holloway Prize

Awarded annually to a final single honours student in the Faculty of Science, to the best and most efficient student with regard to academic and intellectual distinction. The prize is a £100 Amazon voucher.

Harrison Prize

Awarded annually to a final joint honours student in the Faculty of Science, to the best and most efficient student with regard to academic and intellectual distinction. The prize is a £100 Amazon voucher

Murgoci Prize

Awarded annually to the best student in the faculty at the end of his/her first year. The prize is a £100 Amazon voucher.

Lilian Heather Prizes

Three prizes are awarded annually. One in a Biological Science and two in the Physical and Mathematical Sciences for "students whose work in the first year of attendance at BSc classes (BA Geography is also considered) is excellent". The prize is a £50 Amazon Voucher.

For this purpose it has been agreed in the past that the following delineations would be appropriate:

- Biological Sciences: Biological Sciences, Psychology
- Physical Sciences: Geography, Earth Sciences, Electronic Engineering
- Mathematical Sciences: Computer Science, Mathematics, Physics

10 Health and Safety Information

The [Health and Safety webpage](#) provides general information about our health and safety policies.

10.1 Code of practice on harassment for students

The College is committed to upholding the dignity of the individual and recognises that harassment can be a source of great stress to an individual. Personal harassment can seriously harm working, learning and social conditions and will be regarded and treated seriously. This could include grounds for disciplinary action, and possibly the termination of registration as a student.

The College's [Code of Practice on personal harassment for students](#) should be read in conjunction with the [Student Disciplinary regulations](#) and the [Complaints procedure](#).

10.2 Lone working policy and procedures

The College has a 'Lone Working Policy and Procedure' that can be found [here](#).

Lone working is defined as working during either normal working hours at an isolated location within the normal workplace or when working outside of normal hours.

The Lone working policy for Undergraduates in the Department: No Lone Working with chemicals is to be carried out in any UG Research or Teaching Laboratories during or outside of the normal hours (for Undergraduates, Monday to Friday 09:00 – 17:30 during term time, 09:00 – 17:00 out of term time). Lone working that does not involve chemicals (such as for behavioural studies) must be supported with a risk assessment and prior approval from the Department's Health and Safety Coordinator. No Undergraduates are permitted in the Department on days when the College is closed, such as around Christmas and Easter, except in exceptional circumstances.

Any health and safety concerns should be brought to the attention of the Departmental Health and Safety Coordinator, Ms E Turton, or to the College Health and Safety Office.

It is likely that most activities will take place on College premises. However, the principles contained in the above section will apply to students undertaking duties off campus.

10.3 Field trips

Field work is defined as work or study which is undertaken outside the normal work/study environment, including

any undertaken away from College owned or leased property. It will also include work that is beyond normal daily activities on College premises (examples include biological surveys at Huntersdale, soil sampling at Alderhurst).

A trained Department field work risk assessor/health and safety coordinator must be consulted at an early stage in the planning. All field work shall be risk assessed using the standard College 'Field Work Risk Assessment Form'.

Prior to a trip, a set of contact details shall be prepared by the member of academic staff responsible for organizing the field trip and a copy will also be held by the Head of Security. Details will consist of contact address, at least two contact phone numbers and, if possible an alternative means of contact. This is to allow the College the ability to contact or re-establish contact with the group in case of an emergency.

10.4 Practicals

You are expected to read the relevant practical instructions before coming to a practical class so that you have a clear idea of what you are going to do. Please check on Moodle for this information, or in the lab handbook. Some labs include pre-lab quizzes (on Moodle) so make sure you complete these beforehand: they are designed to help ensure you gain the most of the lab class, and some may contribute towards your grade for the module. Lab classes often run multiple times, and you must attend the practical session that is shown in your online timetable. Attempts to attend alternative sessions are likely to be unsuccessful: class sizes are limited. Students who do not attend the practical are not permitted to submit the relevant assessment.

Practical classes have been designed to illustrate certain aspects of the lectures and to teach you how to plan, conduct and interpret experiments with biological material. Consequently, the lack of detailed instructions in some experiments is deliberate and is meant to emphasize the need for you to design your own experiments. Demonstrators will supervise you for all practical classes. If you are unsure of any aspect of the practical do not hesitate to ask the Demonstrators for help.

You must arrive promptly for practicals so that you can be briefed on the day's activities and safety measures. If you arrive late you will distract demonstrators who will have already started to supervise laboratory exercises and may have missed important instructions and safety information. This is inconvenient to everybody concerned. Arrival in the laboratory later than 15 minutes after the scheduled time to start is likely to mean that you are not permitted to take part in that practical and may result in a mark of zero for that particular experiment, unless there is an adequate, documented reason. Please refer back to section 3.

Safety instructions are given at the beginning of the class by the academic in charge and are also indicated in the laboratory handbooks. Make sure that you ask the demonstrators or the module leader if you require clarification.

10.5 Specialist equipment

Specialist scientific equipment is used in laboratory classes. Instruction on its safe usage is provided by the academic in charge and by practical demonstrators. You may also use specialist laboratory equipment during the conduct of your final year project. Production of safety risk assessments will be part of your academic training during your project. Please follow instructions on equipment usage and if you are unsure – ask!

11 Department codes of practice

This behavioural code of conduct in teaching and learning stems from a consultation between Student representatives and Academic staff at the Department of Biological Sciences. It highlights areas of responsibility by Staff and Students that facilitate academic activity and promote effective learning.

Teaching and learning environments include lectures, practical or laboratory classes, seminars and small group tutorials. It is the responsibility of students and academic staff engaged in these activities to create and maintain a cordial and respectful atmosphere conducive to effective learning.

Schedule and Punctuality

1. Lectures are scheduled as 50 minute teaching and learning sessions that should normally commence on the hour and be completed 10 minutes before the hour. With the exception of laboratory classes, double or treble teaching sessions should incorporate a 10 minute break between sessions. Lecturing staff will make every effort to adhere to this schedule.
2. Students should make every effort to arrive before the start of the lecture and to take their places before the hour.
3. Late arrival at lectures impacts the learning environment and affects all those participating in it. Students arriving after the start of the lecture must make every effort to enter the lecture theatre as discretely as possible to minimize disruption.
4. In case of double or treble teaching sessions it may be appropriate for a student who arrives after the start of the lecture to wait for a break to attend the second and/or third teaching session(s). If late arrival is a habitual problem lecturers may ask students not to enter.
5. Lecturing staff generally appreciate apologies for late arrivals, provided these are given after the end of the lecture and not on arrival.
6. Late arrival to laboratory classes must be negotiated in advance with the academic in charge. In most cases however, late arrival to practical classes will not be permitted. This is because those arriving late would have missed relevant instructions regarding health and safety hazards associated with experimental work and could put themselves and other class members in danger.

Conduct during teaching sessions

1. Eating and drinking (except water) in class is not permitted by the College, in compliance with current Health and Safety legislation.
2. Students must not engage in conversation with one another during a lecture or class unless it is part of an organized class activity.
3. When wishing to ask a question or contribute a comment students should draw the lecturer's attention by putting their hands up.
4. Mobile phones and other electronic devices must be switched off at the beginning of the lecture unless these devices are directly related to the lecture; for instance, laptops for note-taking or authorised recording devices for students registered with the Disability and Neurodiversity Services and will not cause disruption to the class.
5. Personal electronic recording of lectures is discouraged and should only be requested for good reason (e.g., specific learning difficulty). Permission to record lectures should be sought in advance from the lecturer in charge. Lectures will be recorded with Panopto.
6. Students are welcome to use laptop computers in class for the purpose of note-taking. Web browsing should only be done as part of an organised class activity. Gaming and social networking in class is prohibited. Disruptions caused to an online lecture will not be tolerated.
7. Students should ensure their attendance in a practical session is recorded by the academic in charge of the session, for instance by signing the paper register. Students need to self-record their attendance in other sessions (lectures and tutorials) in the online Attendance Tracking system which is accessed from Campus Connect; this closes 30 minutes after the end of a scheduled session.

Remedial Actions

8. Students are required to treat the learning environment with respect and to adhere to this code of conduct. Lecturing staff will remind individuals of their responsibilities to others as class members when breaches to this code of conduct are identified. In exceptional circumstances, persistent individuals may be asked to leave.
9. When unacceptable behaviour escapes the attention of lecturing staff, breaches to this code of conduct should be brought to the attention of the lecturer in charge during a break or at the end of a lecture. Lecturing staff will be proactive in reminding individuals to be respectful of the needs of other members of the class. If lecturing staff fail to adhere to these principles, or if students have other concerns relating to staff teaching or conduct, students can contact the UG Education Lead with details of the incident. The UG Education Lead will raise the matter with the lecturer.

12 APPENDICES

12.1 APPENDIX 1: Staff academic and managerial responsibilities, teaching expertise and research interests.

Surnames hyperlink to research pages.

Staff Member	Managerial Responsibilities	Teaching areas	Research Interests
Dr Hrvoje Augustin	Library Liaison, BS2550 coordinator	Neuronal structure and function	Glutamate receptors and synaptic physiology; Ageing and ageing-associated diseases
Dr Laurence Bindschedler	Demonstrating Coordinator; Deputy PG Education Lead; BS1043 Coordinator	Proteomics, Genomics and Bioinformatics. Molecular Biology.	Quantitative proteomics. Molecular aspects of plant- pathogen interactions.
Professor Laci Bögge	Schools Liaison and Outreach; BS2040 and BS3540 Coordinator.	Molecular Biology; the cell cycle; cell-signalling; proteomics; cancer biology.	Elucidation of signalling mechanisms that regulate plant cell division and growth; mitogen-activated protein kinases and phospholipid-activated protein kinases.
Professor Mark Brown	Head of Ecology, Evolution and Behaviour Research Centre; BS2010 Coordinator.	Invertebrate biology; evolutionary ecology; conservation biology.	Evolutionary ecology of host-parasite associations. Conservation biology of insects, particularly bumble bees. Biology of social insects.
Dr Philip Chen	Academic Misconduct Liaison, Deputy Chair of Dept Assessment Board; BS2560 Coordinator.	Pharmacology and neuroscience.	The pharmacology and function of neurotransmitter receptors; structure and function of the NMDA-subtype of ionotropic glutamate receptor.
Professor Simon Cutting			Bacterial sporulation and germination. Developmental gene expression in <i>B. subtilis</i> . Prokaryotic molecular genetics.
Dr Paul Devlin	MSc Programme Director; BS1072, BS2150 and BS3230 Coordinator.	Genetics; application or genetic tools in organismal biology; circadian rhythms.	Plant responses to light. Plant circadian clocks. Plant-microbiome interactions.
Professor Alessandra Devoto	Deputy Head of Department; Equality and Diversity Champion; BS3190 and BS3560 Coordinator.	Analysis of gene function and regulation of cell signalling in plants; analysis of protein structure – function; strategies for high throughput gene – expression and function analysis; bioinformatics.	Hormone perception and stress signalling in plants. Role of ubiquitin-mediated protein degradation. Protein biochemistry and functional genomics. Genetic regulation of plant secondary metabolism. Construction of gene regulatory networks in plants.

Staff Member	Managerial Responsibilities	Teaching areas	Research Interests
Dr Shobana Dissanayeke	Chair of the Department Assessment Board; Student Recruitment and Communications Lead; BS1021, BS2005, BS3010 and BS3510 Coordinator.	Molecular and medical microbiology.	The human response to infectious disease particularly tuberculosis.
Professor Paul Fraser	Head of Plant Molecular Sciences Research Centre	Biochemistry	Plant molecular biology. Biosynthesis, regulation and metabolic engineering of carotenoids and other isoprenoids.
Dr Cristina Garcia-Perez	BS2090 Coordinator		
Dr Lydia Hanna	(Maternity leave for 2021-22)	Animal physiology.	Learning and memory, synaptic plasticity, circadian biology.
Dr Deborah Harvey	UG Recruitment Lead; BS1061, BS1062 and BS2050 Coordinator.	Entomology, ecology and conservation, impact of humans on the environment	Developing pheromone lures for monitoring insects. Investigating the links between engaging children in improving biodiversity in their local area and their mental health and science engagement
Professor Vincent Jansen		Biodiversity; populations and communities biology; evolution.	Mathematical modeling to study population dynamics and evolution in ecological and biomedical systems.
Professor Julia Koricheva	Research Lead; BS1052 and BS2110 Coordinator.	Ecology; plant-insect interactions; plant resistance to pests and pathogens; biodiversity and ecosystem functioning; methods of quantitative research synthesis.	Ecology and evolution of plant-insect interactions. Mechanisms of plant resistance to herbivores. Forest biodiversity and ecosystem functioning. Research synthesis and meta-analysis in ecology.
Professor Elli Leadbeater	DTP Lead; BS3110 Coordinator	Molecular genetics and applications in biology.	Behavioural ecology: Evolution of social behaviour and learning, using social insect model systems.
Professor Gerhard Leubner	Degree Validation Committee; REF Lead; BS2580 and BS3520 Coordinator.	Biochemistry; seed biology.	Molecular basis of seed dormancy and germination. Cross-species approaches to germination, dormancy and quality of plant seeds.
Dr Enrique López-Juez	BS2020 Coordinator.	Vascular plants; plant physiology; developmental biology.	The molecular genetics of the photoregulation of plant development.

Staff Member	Managerial Responsibilities	Teaching areas	Research Interests
Dr Walter Lucchesi	Deputy Careers and Placements Lead; Deputy Schools Liaison and Outreach; BS1071, BS2540 and BS3420 Coordinator	Immunology, biochemistry	Molecular basis of memory and development of autistic disorders; particular attention to the modelling of synaptic protein interactions in health and disease
Dr James McEvoy	Head of Department, BS1031 and BS1032 Coordinator.	Principles of Molecular Bioscience.	Biological redox processes, particularly catalysis, including photosystem II and EFT dehydrogenase.
Professor David Morritt	BS2001X and BS3180 Coordinator.	Biodiversity of animals; zoology; marine biodiversity and ecology.	Physiological ecology and ecotoxicology of inter-tidal and aquatic invertebrates. Colonisation of land by crustaceans. Invasive and threatened species in the River Thames.
Dr Jenny Murdoch	UG Education Lead; Study Abroad Programme Advisor; Visiting Student Advisor; BS2060, BS3570, BS3580 and BS3595 Coordinator.	Developmental biology, embryology.	Molecular genetics of mammalian development. Neural tube defects and patterning. Sonic hedgehog and planar cell polarity signaling pathways.
Dr Sarah Papworth	Deputy MSc Programme Director; BS2120 and BS3060 Coordinator	Conservation biology	Human and animal behaviours which impact biodiversity conservation
Dr Linda Poplewell	Head of Biomedical Sciences; Deputy Director of Research	Gene therapy, vaccine development	Gene therapy for Duchenne muscular dystrophy
Dr Steve Portugal	Website Manager; BS2140 and BS3220 Coordinator	Animal behaviour	Physiology and adaptation of animals in extreme conditions.
Dr Rudiger Riesch	Careers and Placements Lead; BS3160 and BS3210 Coordinator	Behavioural ecology; evolution.	Evolutionary processes that generate biological diversity; ecological speciation.
Professor Pankaj Sharma	BS3600 Coordinator	Clinical neurology and stroke	Clinical neurology; cardiovascular genetics.
Dr Stuart Snowden	Deputy Careers and Placements Lead	Statistics; biochemistry	Metabolic phenotyping, mass spectrometry
Dr Mikhail Soloviev	PG Education Lead; BS2520, BS2570 and BS3020 Coordinator	Proteomic technologies for profiling protein expression and molecular diagnostics.	Physical chemistry techniques. Proteomics.

Staff Member	Managerial Responsibilities	Teaching areas	Research Interests
Dr Becky Thomas	Senior Tutor, Social Media Manager, UG Wellbeing Lead, Student Survey Champion. BS1041 & BS1051 Coordinator	Biodiversity of animals; Zoology; Ecology, Behaviour.	Conservation ecology of birds and mammals; how people's decisions affect the ecology of wild species; urban ecology.
Dr Jorge Tovar-Torres	UG Admissions Tutor; BS2510 and BS3030 Coordinator.	Biology of parasitic diseases; molecular and medical microbiology; parasitology; mitochondrial and eukaryotic cell evolution.	Mitochondrial and eukaryotic cell evolution. Mitosome biology and function in the intestinal human pathogens <i>Giardia</i> and <i>Entamoeba</i> . Parasite differentiation. Molecular parasitology.
Dr Francisco Ubeda de Torres	Finance Lead; BS2160 Coordinator.	Natural selection and evolution.	Evolution of genomic and social structures driven by conflict. Mathematical modelling and predictions in evolutionary theory.
Dr Christopher Wilkinson	Biological Safety Officer, Deputy Health and Safety Coordinator, Research Ethics Officer; BS1091 and BS2530 Coordinator.	Cell biology and development.	The role of centriole-associated proteins in vertebrate development, both as part of cilia and the centrosome.
Professor Robin Williams	BS3530 Coordinator.	Molecular cell biology; cell signaling; neuroscience.	Molecular cell biology of bipolar disorder and epilepsy. Drug function and targets.
Professor Rafael Yáñez	School Director of Student Experience, BS3590 Coordinator.	Molecular genetics; genetic diseases.	Gene therapy; gene repair; viral vectors; neurological disease.

12.2 APPENDIX 2: Marking criteria examination essays

UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1st	70-79%
Essay scale	92, 95, 98	Essay scale	82, 85, 88	Essay scale	72, 75, 78
<i>Outstanding work:</i>	<ul style="list-style-type: none"> highly detailed, accurate and wide-ranging knowledge of topic full use of learning resources exceptional understanding of the topic superbly organized and presented excellent analysis and/or problem-solving evidence of insight 	<i>Excellent work:</i>	<ul style="list-style-type: none"> detailed, accurate and wide-ranging knowledge of topic wide use of learning resources excellent understanding of the topic excellent organization and presentation excellent analysis and/or problem-solving may be evidence of insight 	<i>Very good work:</i>	<ul style="list-style-type: none"> detailed, largely accurate and thorough knowledge of topic very good use of learning resources very good understanding of the topic very well organized and presented very good analysis and/or problem-solving may be evidence of insight
UPPER 2 nd	60-69%	LOWER 2 nd	50-59%	3 rd CLASS	40-49%
Essay scale	62, 65, 68	Essay scale	52, 55, 58	Essay scale	42, 45, 48
<i>Good work:</i>	<ul style="list-style-type: none"> generally accurate and reasonably detailed knowledge of the topic with few significant errors good use of learning resources sound understanding of the main points well organized and presented good analysis and problem-solving little evidence of insight 	<i>Satisfactory work:</i>	<ul style="list-style-type: none"> sound knowledge of the topic with some errors and omissions fair but limited use of learning resources understanding of the main points, partial understanding elsewhere reasonably well organized and presented fair analysis and problem-solving no evidence of insight 	<i>Adequate work:</i>	<ul style="list-style-type: none"> Some knowledge of the topic with significant errors and omissions minimal use of learning resources partial understanding of the main points, poor understanding elsewhere acceptably organized and presented not fully focused on the topic passable analysis and problem-solving
MARGINAL FAIL	30-39%	POOR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale	32, 35, 38	Essay scale	22, 25, 28	Essay scale	12, 15, 18
<i>Inadequate work:</i>	<ul style="list-style-type: none"> little knowledge of the topic (¼ to ½ of expected material) with major inaccuracies inadequate use of learning resources major conceptual errors insufficient organization and presentation partial focus on topic inadequate analysis and/or problem-solving 	<i>Poor work:</i>	<ul style="list-style-type: none"> information mostly irrelevant, inaccurate or missing (less than ¼ of expected material) poor use of learning resources widespread confusion poor organization and presentation little focus on topic poor analysis and/or problem-solving 	<i>Very poor work:</i>	<ul style="list-style-type: none"> information very largely wrong, irrelevant and/or missing; a few facts present. very poor use of learning resources widespread confusion and incoherence badly organized and presented very little focus on topic very poor analysis and/or problem-solving
EXTREME FAIL	0-9%	<h1>YEAR 1</h1>			
Essay scale	0, 2, 5, 8				
<i>Extremely poor work:</i>	<ul style="list-style-type: none"> information (almost) all wrong, irrelevant or missing; 1 or 2 relevant statements (almost) no use of learning resources (almost) totally confused and incoherent (almost) completely disorganized (almost) no recognition of the topic (almost) no analysis and/or problem-solving 				
UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1st	70-79%

<p>Essay scale 92, 95, 98</p> <p><i>Outstanding work:</i></p> <ul style="list-style-type: none"> • exceptional understanding of the topic • highly detailed, accurate and comprehensive knowledge of the topic • wide use of learning resources with reading beyond the lectures • superbly organized and presented • excellent analysis and/or problem-solving • good level of critical evaluation 	<p>Essay scale 82, 85, 88</p> <p><i>Excellent work:</i></p> <ul style="list-style-type: none"> • excellent understanding of the topic • detailed, accurate and wide-ranging knowledge of the topic • wide use of learning resources • extremely well organized and presented • excellent analysis and/or problem-solving • evidence of critical evaluation 	<p>Essay scale 72, 75, 78</p> <p><i>Very good work:</i></p> <ul style="list-style-type: none"> • very good understanding of the topic • detailed, largely accurate and wide-ranging knowledge of the topic • very good use of learning resources • very well organized and presented • very good analysis and/or problem-solving • may be evidence of critical evaluation
<p>UPPER 2nd 60-69%</p> <p>Essay scale 62, 65, 68</p> <p><i>Good work:</i></p> <ul style="list-style-type: none"> • sound understanding of the main points • generally accurate and reasonably detailed knowledge of the topic; few significant errors • good use of learning resources • well organized and presented • good analysis and/or problem-solving • may be evidence of critical evaluation 	<p>LOWER 2nd 50-59%</p> <p>Essay scale 52, 55, 58</p> <p><i>Satisfactory work:</i></p> <ul style="list-style-type: none"> • understanding of the main points, partial understanding elsewhere • sound knowledge of the topic with errors and omissions • fair but limited use of learning resources • reasonably well organized and presented • fair analysis and/or problem-solving little or no evidence of critical evaluation 	<p>3rd CLASS 40-49%</p> <p>Essay scale 42, 45, 48</p> <p><i>Adequate work:</i></p> <ul style="list-style-type: none"> • partial understanding of the main points but flaws in understanding evident • some knowledge of the topic, with significant errors and/or omissions • minimal use of learning resources • barely acceptable organization and presentation • not fully focused on the topic passable analysis and/or problem-solving
<p>MARGINAL FAIL 30-39%</p> <p>Essay scale 32, 35, 38</p> <p><i>Inadequate work:</i></p> <ul style="list-style-type: none"> • limited understanding of the main points • major conceptual errors • major omissions and/or inaccuracies • weak organization and presentation • partial focus on the topic inadequate analysis and/or problem-solving 	<p>POOR FAIL 20-29%</p> <p>Essay scale 22, 25, 28</p> <p><i>Poor work:</i></p> <ul style="list-style-type: none"> • minimal understanding evident • profound conceptual errors • information mostly irrelevant and/or inaccurate • weak organization and presentation • failure to properly address topic • poor analysis and/or problem-solving 	<p>VERY POOR FAIL 10-19%</p> <p>Essay scale 12, 15, 18</p> <p><i>Very poor work:</i></p> <ul style="list-style-type: none"> • clear lack of understanding • almost complete confusion • very little correct and relevant • badly organized and presented • little recognition of the topic • very poor analysis and/or problem-solving
<p>EXTREME FAIL 0-9%</p> <p>Essay scale 0, 2, 5, 8</p> <p><i>Extremely poor work:</i></p> <ul style="list-style-type: none"> • (almost) no understanding evident • (almost) totally confused and incoherent • information (almost) all wrong, irrelevant or missing; 1 or 2 relevant statements • (almost) totally disorganized • (almost) no recognition of the topic • (almost) no analysis and/or problem-solving 	<h1>YEAR 2</h1>	

UPPER 1st 90-100%	MIDDLE 1st 80-89%	LOWER 1st 70-79%
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Essay scale <i>Outstanding work:</i>	92, 95, 98	Essay scale <i>Excellent work:</i>	82, 85, 88	Essay scale <i>Very good work:</i>	72, 75, 78
<ul style="list-style-type: none"> exceptional understanding of the topic highly detailed, accurate and comprehensive knowledge of the topic wide use of learning resources with reading beyond the lectures superbly organized and presented excellent analysis and/or problem-solving very high level of critical evaluation and/or originality 		<ul style="list-style-type: none"> excellent understanding of the topic detailed, accurate and wide-ranging knowledge of the topic wide use of learning resources with reading beyond the lectures extremely well organized and presented excellent analysis and/or problem-solving evidence of critical evaluation and/or originality 		<ul style="list-style-type: none"> very good understanding of the topic detailed, largely accurate and wide-ranging knowledge of the topic very good use of learning resources with reading beyond the lectures very well organized and presented very good analysis and/or problem-solving usually evidence of critical evaluation and/or originality 	
UPPER 2nd	60-69%	LOWER 2nd	50-59%	3rd CLASS	40-49%
Essay scale <i>Good work:</i>	62, 65, 68	Essay scale <i>Satisfactory work:</i>	52, 55, 58	Essay scale <i>Adequate work:</i>	42, 45, 48
<ul style="list-style-type: none"> sound understanding of the main points generally accurate and reasonably detailed knowledge of the topic; few significant errors good use of learning resources well organized and presented good analysis and/or problem-solving usually evidence of critical evaluation 		<ul style="list-style-type: none"> understanding of the main points, partial understanding elsewhere sound knowledge of the topic with errors and omissions fair but limited use of learning resources reasonably well organized and presented fair analysis and/or problem-solving little evidence of critical evaluation 		<ul style="list-style-type: none"> partial understanding of the main points but flaws in understanding evident some knowledge of the topic, with significant errors and/or omissions minimal use of learning resources barely acceptable organization and presentation not fully focused on the topic passable analysis and/or problem-solving 	
MARGINAL FAIL	30-39%	POOR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale <i>Inadequate work:</i>	32, 35, 38	Essay scale <i>Poor work:</i>	22, 25, 28	Essay scale <i>Very poor work:</i>	12, 15, 18
<ul style="list-style-type: none"> limited understanding of the main points major conceptual errors major omissions and/or inaccuracies weak organization and presentation partial focus on the topic inadequate analysis and/or problem-solving 		<ul style="list-style-type: none"> minimal understanding evident profound conceptual errors information mostly irrelevant and/or inaccurate weak organization and presentation failure to properly address topic poor analysis and/or problem-solving 		<ul style="list-style-type: none"> clear lack of understanding almost complete confusion very little correct and relevant badly organized and presented little recognition of the topic very poor analysis and/or problem-solving 	
EXTREME FAIL	0-9%				
Essay scale <i>Extremely poor work:</i>	0, 2, 5, 8				
<ul style="list-style-type: none"> (almost) no understanding evident (almost) totally confused and incoherent information (almost) all wrong, irrelevant or missing; 1 or 2 relevant statements (almost) totally disorganized (almost) no recognition of the topic (almost) no analysis and/or problem-solving 	<h1>YEAR 3</h1>				

12.3

APPENDIX 5: Marking criteria for short answer questions in Year 1

UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1 st	70-79%
Essay scale	92, 95, 98	Essay scale	82, 85, 88	Essay scale	72, 75, 78
Outstanding work: <ul style="list-style-type: none"> accurate, balanced and thorough knowledge/comprehension of topic full use of learning resources exceptional coverage of the topic superbly organized and presented fully focused on the topic 		Excellent work: <ul style="list-style-type: none"> accurate and balanced knowledge/comprehension of topic wide use of learning resources excellent coverage of the topic excellent organization and presentation focused on the topic 		Very good work: <ul style="list-style-type: none"> largely accurate and balanced knowledge/comprehension of topic very good use of learning resources very good coverage of the topic very well organized and presented generally focused on the topic 	
UPPER 2 nd	60-69%	LOWER 2 nd	50-59%	3 rd CLASS	40-49%
Essay scale	62, 65, 68	Essay scale	52, 55, 58	Essay scale	42, 45, 48
Good work: <ul style="list-style-type: none"> generally accurate and reasonably balanced knowledge/comprehension of the topic with few significant errors good use of learning resources good coverage of the main points well organized and presented largely focused on the topic 		Satisfactory work: <ul style="list-style-type: none"> sound knowledge/comprehension of the topic with some errors and omissions fair but limited use of learning resources generally sound coverage of the main points reasonably well organized and presented fairly well focused on the topic 		Adequate work: <ul style="list-style-type: none"> some knowledge/comprehension of the topic with significant errors and omissions minimal use of learning resources partial coverage of the main points acceptably organized and presented not fully focused on the topic 	
MARGINAL FAIL	30-39%	POOR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale	32, 35, 38	Essay scale	22, 25, 28	Essay scale	12, 15, 18
Inadequate work: <ul style="list-style-type: none"> little knowledge/comprehension of the topic ($\frac{1}{4}$ to $\frac{1}{3}$ of expected material) with major inaccuracies inadequate use of learning resources major conceptual errors insufficient coverage of the main points deficient organization and presentation insufficient focus on topic 		Poor work: <ul style="list-style-type: none"> information mostly irrelevant, inaccurate or missing (less than $\frac{1}{4}$ of expected material) poor use of learning resources widespread confusion deficient coverage of the main points poor organization and presentation little focus on topic 		Very poor work: <ul style="list-style-type: none"> information very largely wrong, irrelevant and/or missing; a few facts present. very poor use of learning resources widespread confusion and incoherence very poor coverage of the topic badly organized and presented very little focus on topic 	
EXTREME FAIL	0-9%	<h1>YEAR 1</h1> <h2>Short answer questions</h2>			
Essay scale	0, 2, 5, 8				
Extremely poor work: <ul style="list-style-type: none"> information (almost) all wrong, irrelevant or missing; 1 or 2 relevant statements (almost) no use of learning resources (almost) totally confused and incoherent (almost) no relevant coverage of the topic (almost) completely disorganized (almost) no recognition of the topic 					

UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1 st	70-79%
Essay scale	92, 95, 98	Essay scale	82, 85, 88	Essay scale	72, 75, 78
<i>Outstanding work:</i> <ul style="list-style-type: none"> accurate, balanced and thorough knowledge/comprehension of topic full use of learning resources exceptional coverage of the topic superbly organized and presented fully focused on the topic excellent application / analysis / problem-solving 		<i>Excellent work:</i> <ul style="list-style-type: none"> accurate and balanced knowledge/comprehension of topic wide use of learning resources excellent coverage of the topic excellent organization and presentation focused on the topic excellent application / analysis / problem-solving 		<i>Very good work:</i> <ul style="list-style-type: none"> largely accurate and balanced knowledge/comprehension of topic very good use of learning resources very good coverage of the topic very well organized and presented generally focused on the topic very good application / analysis / problem-solving 	
UPPER 2 nd	60-69%	LOWER 2 nd	50-59%	3 rd CLASS	40-49%
Essay scale	62, 65, 68	Essay scale	52, 55, 58	Essay scale	42, 45, 48
<i>Good work:</i> <ul style="list-style-type: none"> generally accurate and reasonably balanced knowledge/comprehension of the topic with few significant errors good use of learning resources good coverage of the main points well organized and presented largely focused on the topic good application / analysis / problem-solving 		<i>Satisfactory work:</i> <ul style="list-style-type: none"> sound knowledge/comprehension of the topic with some errors and omissions fair but limited use of learning resources generally sound coverage of the main points reasonably well organized and presented fairly well focused on the topic fair application / analysis / problem-solving 		<i>Adequate work:</i> <ul style="list-style-type: none"> some knowledge/comprehension of the topic with significant errors and omissions minimal use of learning resources partial coverage of the main points acceptably organized and presented not fully focused on the topic passable application / analysis / problem-solving 	
MARGINAL FAIL	30-39%	POOR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale	32, 35, 38	Essay scale	22, 25, 28	Essay scale	12, 15, 18
<i>Inadequate work:</i> <ul style="list-style-type: none"> little knowledge/comprehension of the topic ($\frac{1}{4}$ to $\frac{1}{2}$ of expected material) with major inaccuracies inadequate use of learning resources major conceptual errors insufficient coverage of the main points deficient organization and presentation insufficient focus on topic inadequate application / analysis / problem-solving 		<i>Poor work:</i> <ul style="list-style-type: none"> information mostly irrelevant, inaccurate or missing (less than $\frac{1}{4}$ of expected material) poor use of learning resources widespread confusion deficient coverage of the main points poor organization and presentation little focus on topic poor application / analysis / problem-solving 		<i>Very poor work:</i> <ul style="list-style-type: none"> information very largely wrong, irrelevant and/or missing; a few facts present. very poor use of learning resources widespread confusion and incoherence very poor coverage of the topic badly organized and presented very little focus on topic very poor application / analysis / problem-solving 	
EXTREME FAIL	0-9%				
Essay scale	0, 2, 5, 8				
<i>Extremely poor work:</i> <ul style="list-style-type: none"> information (almost) all wrong, irrelevant or missing; 1 or 2 relevant statements (almost) no use of learning resources (almost) totally confused and incoherent (almost) no relevant coverage of the topic (almost) completely disorganized (almost) no recognition of the topic (almost) no application / analysis / problem-solving 					

YEAR 2

Short answer questions

12.5 APPENDIX 7: Marking criteria for BS3010 Project Reports

UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1 st	70-79%
Essay scale	92, 95, 98	Essay scale	82, 85, 88	Essay scale	72, 75, 78
<p><i>Outstanding project:</i></p> <ul style="list-style-type: none"> All the qualities of an excellent report. In addition the work should be virtually publishable, as it stands, by itself or as a significant component of a paper, in a good journal. 		<p><i>Excellent project:</i></p> <p>Evidence of originality in approach and/or interpretation. Results as good as can be expected at this level. Research and analysis wholly sound. Report concise, very well organised, relevance to field clearly understood. Discussion shows real insight. Only minor inaccuracies or other shortcomings</p>		<p><i>Very good project:</i></p> <ul style="list-style-type: none"> All the qualities of a good project, but with some evidence of insight and originality. Results satisfactory and well analysed. Report well written, carrying the conviction that the science is thoroughly understood and the implications of the work fully appreciated. 	
UPPER 2i	65-69%	LOWER 2i	60-64%	UPPER 2ii	55-59%
Essay scale	65, 68	Essay scale	62	Essay scale	55, 58
<p><i>Good project:</i></p> <ul style="list-style-type: none"> Research efficiently conducted, with a well-organised, well presented report, but lacking insight and originality. Good reference to the work of others. Sound interpretation, analysis and presentation of data. 		<p><i>Fairly good project:</i></p> <p>Generally sound, but with some weaknesses in research activity, understanding, analysis, interpretation and/or presentation</p>		<p><i>Adequate project</i></p> <p>The student has carried out instructions and achieved results, but the report shows little or no original thought, interpretation or synthesis, or has significant deficiencies in at least one section.</p>	
LOWER 2ii	50-54%	UPPER 3 rd	45-49%	LOWER 3 rd	40-44%
Essay scale	52	Essay scale	45 48	Essay scale	42
<p><i>Weak project:</i></p> <ul style="list-style-type: none"> Some results have been achieved, but the experimentation, analysis and/or interpretation show significant weaknesses. The report may show poor organisation. 		<p><i>Very weak project</i></p> <ul style="list-style-type: none"> Few data and/or poor comprehension. Report poorly organised with significant weaknesses in more than one section. 		<p><i>Barely acceptable project:</i></p> <ul style="list-style-type: none"> Serious deficiencies in research activity, analysis and understanding, but some mitigating qualities eg good presentation, some basic understanding of principles involved 	
MARGINAL FAIL	30-39%	CLEAR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale	32, 35, 38	Essay scale	22, 25, 28	Essay scale	12, 15, 18
<p><i>Inadequate project:</i></p> <ul style="list-style-type: none"> Some relevant material, but serious omissions, errors of practice and interpretation. Evidence of limited work. Serious deficiencies in basic understanding of principles involved.. 		<p><i>Poor project:</i></p> <ul style="list-style-type: none"> Evidence that the student has carried out some limited work, but the project distinctly fails on the grounds of research inadequacy, incompetent analysis and/or poor interpretation 		<p><i>Very poor project:</i></p> <ul style="list-style-type: none"> Minimal content. Little relevance to the aim of the project, or very short report with no evidence that it would be better if longer. 	
+EXTREME FAIL	0-9%	<h1 style="margin: 0;">BS3010</h1> <h2 style="margin: 0;">Individual Project</h2>			
Essay scale	0, 2, 5, 8				
<p><i>Extremely poor project:</i></p> <ul style="list-style-type: none"> Almost total lack of content or very short report with virtually no merit. 					

12.6 APPENDIX 8: Marking criteria for BS3020 Dissertations

UPPER 1 st	90-100%	MIDDLE 1 st	80-89%	LOWER 1 st	70-79%
Essay scale	92, 95, 98	Essay scale	82, 85, 88	Essay scale	72, 75, 78
<i>Outstanding dissertation:</i> All the qualities of an excellent report. In addition the work should be virtually publishable, as it stands, in an academic journal dedicated to publishing undergraduate research or reviews, for example Bioscience Horizons (Oxford university press).		<i>Excellent dissertation:</i> All the qualities of a very good report with clear evidence of originality in approach and/or interpretation. Review as good as can be expected at this level. Research and analysis wholly sound. Report concise, very well organised, relevance to field clearly understood. Discussion shows real insight. Only minor inaccuracies or other shortcomings.		<i>Very good dissertation:</i> All the qualities of a good report, but with some evidence of insight and originality. Topic coverage satisfactory and area well analysed. Report well written, carrying the conviction that the science is thoroughly understood and the implications of the work fully appreciated.	
UPPER 2 ⁱ	65-69%	LOWER 2 ⁱ	60-64%	UPPER 2 ⁱⁱ	55-59%
Essay scale	65, 68	Essay scale	62	Essay scale	55, 58
<i>Good dissertation:</i> Literature research efficiently conducted, with a well-organised, well presented report, but lacking insight and originality. Good reference to the work of others. Sound interpretation, analysis and presentation of data.		<i>Fairly good dissertation:</i> Generally sound, but with some weaknesses in literature researched, understanding, analysis, interpretation and/or presentation.		<i>Adequate dissertation</i> The student has carried out instructions and achieved some coverage, but the report shows little or no depth, original thought, interpretation or synthesis, or has significant deficiencies in at least one section.	
LOWER 2 ⁱⁱ	50-54%	UPPER 3 rd	45-49%	LOWER 3 rd	40-44%
Essay scale	52	Essay scale	45 48	Essay scale	42
<i>Weak dissertation:</i> Some reporting of information has been achieved, but the report depth, analysis and/or interpretation show significant weaknesses. The report may show poor organisation		<i>Very weak dissertation</i> Little research information conveyed. Report poorly organised with significant weaknesses in more than one section.		<i>Barely acceptable dissertation:</i> Serious deficiencies in literature research, analysis and understanding, but some mitigating qualities e.g. good presentation, some basic understanding of the topic evident.	
MARGINAL FAIL	30-39%	CLEAR FAIL	20-29%	VERY POOR FAIL	10-19%
Essay scale	32, 35, 38	Essay scale	22, 25, 28	Essay scale	12, 15, 18
<i>Inadequate dissertation:</i> Some relevant material, but serious omissions, errors of interpretation and understanding. Poor presentation of material.		<i>Poor work:</i> Evidence that the student has carried out some limited work, but the report distinctly fails on the grounds of inadequacy, incompetent analysis and/or poor interpretation.		<i>Very poor work:</i> Minimal content. Little relevance to the aim of the Report, or very short report with no evidence that it would be better if longer.	
EXTREME FAIL	0-9%	<h1 style="margin: 0;">BS3020</h1> <h1 style="margin: 0;">Dissertation</h1>			
Essay scale	0, 2, 5, 8				
<i>Extremely poor work:</i> Almost total lack of content or very short report with virtually no merit.					

