

Royal Holloway, University of London
Course specification for an undergraduate award
BSc Molecular Biology and Environmental Change (C730)

Section 1 – Introduction to your course

This course specification is a formal document, which provides a summary of the main features of your course and the learning outcomes that you might reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities that are provided. Further information is contained in the College prospectus, and in various handbooks, all of which you will be able to access online. Alternatively, further information on the College's academic regulations and policies can be found [here](#). Further information on the College's Admissions Policy can be found [here](#).

Your degree course in Molecular Biology and Environmental Change is delivered in three stages, each of which comprises one year of full-time study, or two years of part-time study, during which you must follow modules to the value of 120 national credits. The curriculum is based around a core set of mandatory modules and there is a strong foundation in Stages one and two, which covers the requirements of the benchmarking statements in molecular aspects of the biosciences.

Stage one comprises a fixed selection of mandatory modules and seeks to provide the necessary grounding for the study of the subject at degree level, with appropriate Genetics and Cell Biology as well as an introduction to Biochemistry and the Green Planet. In addition you will select one further module from either Ecology and Conservation or Biomes and Ecosystems. Stage one also includes a strong element of laboratory training, with practical work in all modules, as well as providing support with the skills necessary for the study of biological sciences. In **Stage two** the mandatory modules build on the foundations laid in stage one and provide a strong basis for the understanding of molecular biology and its application to addressing changes in the natural world. Again the modules all include a substantial element of laboratory training that prepares you for the selection and implementation of the individual research project in stage three. The optional modules allow you to either concentrate on molecular biology or to diversify into other areas depending on your interests. In **Stage three** the modules available all have a strong molecular basis, but include topics as diverse as Conservation Science, Circadian Biology, and Global Warming. You also complete an individual research project, which provides training in a specialised research area and also in generic skills such as independent working, literature searching, report writing, use of word processing, graphics and statistics. The project is regarded as your graduate capstone experience, as it is the culmination of your training in experimental design, research techniques, data analysis and presentation.

The course emphasises the importance of molecular biology as a tool to create solutions to the problems caused by environmental change. It includes training in a range of practical techniques and skills relevant to research work in molecular bioscience and to the applications of molecular genetics. The system is also flexible and allows you to transfer to another degree course within the Department up to the start of the second term, or indeed to other Molecular Bioscience degrees up to the start of stage two. You can also take up to 30 credits from outside the Department of Biological Sciences, but within other Science Departments during stage two/three. Options are selected in consultation with your Personal Tutor and the Department Lead in UG Education.

While Royal Holloway keeps all the information made available under review, courses and the availability of individual modules, especially optional modules are necessarily subject to change at any time, and you are therefore advised to seek confirmation of any factors which might affect your decision to follow a specific course. In turn, Royal Holloway will inform you as soon as is practicable of any significant changes which might affect your studies.

The following is brief description for some of the most important terminology for understanding the content of this document:

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.

Section 2 – Course details			
Date of specification update	March 2022	Location of study	Egham Campus
Course award and title	BSc Molecular Biology and Environmental Change	Level of study	Undergraduate
Course code	3596	UCAS code	C730
Year of entry	2022/23		
Awarding body	Royal Holloway, University of London		
Department or school	Department of Biological Sciences School of Life Sciences and the Environment	Other departments or schools involved in teaching the course	Department of Geography
Mode(s) of attendance	Full-time or Part-time	Duration of the course	Three years or Six years
Accrediting Professional, Statutory or Regulatory Body requirement(s)	You must pass the BS3010 Individual Research Project in order to qualify for an Honours Degree in Molecular Biology and Environmental Change; this is a requirement of the Royal Society of Biology for an accredited degree.		
Link to Coursefinder for further information:	https://www.royalholloway.ac.uk/studying-here/	For queries on admissions:	study@royalholloway.ac.uk

Section 3 – Degree course structure										
3.1 Mandatory module information										
The following table summarises the mandatory modules which students must take in each year of study										
Year	Module code	Module title	Contact hours*	Self-study hours	Written exams**	Practical assessment**	Coursework**	Credits	FHEQ level	Module status (see below)
1	BS1021	Becoming a Bioscientist	66	84	0	25	75	15	4	MC
1	BS1031	Chemistry of Life	61	89	50	20	30	15	4	MC
1	BS1032	Fundamental Biochemistry	59	91	50	10	40	15	4	MC
1	BS1043	Green Planet: Plants and Our Future	44	106	60	0	40	15	4	MC
1	BS1071	Cell Biology and the Origin of Life	39	111	50	20	30	15	4	MC
1	BS1072	Genetics	35	115	50	0	50	15	4	MC
1	BS1091	Protein Biochemistry and Enzymology	49	101	50	20	30	15	4	MC
2	BS2005	Microbiology	32	118	50	25	25	15	5	MC
2	BS2020	Food Security, Sustainability and Green Biotechnology	51	99	70	10	20	15	5	MC
2	BS2150	Applications of Molecular Genetics in Biology	28	122	50	20	30	15	5	MC
2	BS2530	Molecular Biology	36	114	60	0	40	15	5	MC
2	BS2580	Natural Product Biochemistry and Sustainability	44	106	50	10	40	15	5	MC

3	BS3010	Individual Research Project	183	117	0	35	65	30	6	MNC
3	BS3190	Climate Change: Plants & the Environment	25	125	60	15	25	15	6	MC
3	BS3520	Seed Biology: From Molecular and Conservation Biology to Industrial Applications	30	120	50	30	20	15	6	MC
3	BS3560	Functional Genomics, Proteomics and Bioinformatics	21	129	75	0	25	15	6	MC

This table sets out the most important information for the mandatory modules on your degree course. These modules are central to achieving your learning outcomes, so they are compulsory, and all students on your degree course will be required to take them. You will be automatically registered for these modules each year. Mandatory modules fall into two categories; 'condonable' or 'non-condonable'.

In the case of mandatory 'non-condonable' (MNC) modules, you must pass the module before you can proceed to the next year of your course, or to successfully graduate with a particular degree title. In the case of mandatory 'condonable' (MC) modules, these must be taken but you can still progress or graduate even if you do not pass them. Please note that although Royal Holloway will keep changes to a minimum, changes to your degree course may be made where reasonable and necessary due to unexpected events. For example; where requirements of relevant Professional, Statutory or Regulatory Bodies have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of external advisors, to enhance academic provision.

*Contact hours come in various different forms, and may take the form of time spent with a member of staff in a lecture or seminar with other students. Contact hours may also be laboratory or, studio-based sessions, project supervision with a member of staff, or discussion through a virtual learning environment (VLE). These contact hours may be with a lecturer or teaching assistant, but they may also be with a technician, or specialist support staff. It is intended that these contact hours will face-to-face as far as possible, but in certain unavoidable situations, these may take place virtually.

**The way in which each module on your degree course is assessed will also vary, however, the assessments listed above are all 'summative', which means you will receive a mark for it which will count towards your overall mark for the module, and potentially your degree classification, depending on your year of study. On successful completion of the module you will gain the credits listed. 'Coursework' might typically include a written assignment, like an essay. Coursework might also include a report, dissertation or portfolio. 'Practical assessments' might include an oral assessment or presentation, or a demonstration of practical skills required for the particular module.

3.2 Optional modules

In addition to mandatory modules, there will be a number of optional modules available during the course of your degree. The following table lists a selection of optional modules that are likely to be available. However, not all may be available every year. Although Royal Holloway will keep changes to a minimum, new options may be offered or existing ones may be withdrawn. For example; where reasonable and necessary due to unexpected events, where requirements of relevant Professional, Statutory or Regulatory Bodies (PSRBs) have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of External Advisors, to enhance academic provision. There may be additional requirements around option selection; please contact the [Department](#) for further information.

Year 1	Year 2	Year 3
BS1051: Ecology and Conservation	BS2040: Cell Dynamics: Division and Movement	BS3060: Conservation Biology
BS1052: Biomes and Ecosystems	BS2090: Plant Biotic Interactions and Ecological Networks	BS3230: Circadian Biology
		BS3240: Evolutionary Medicine
	BS2110: Practical Field Ecology	BS3420: Nutrition and Medical Biochemistry
	BS2120: Biological Data Analysis and Interpretation	BS3510: Molecular and Medical Microbiology
	BS2160: Evolution	BS3530: Applications of Genetic Engineering in Health and Disease
	BS2520: Protein Structure and Function	GG3018: Global Warming
	BS2560: Pharmacology and Toxicology	
	BS2900: Dissertation	
	GG2041: Environmental Change	

3.3 Optional module requirements

In year 1 you must choose one option to the value of 15 credits from the list of stage one modules offered by the Department.
 In year 2 you must choose options to the value of 45 credits from the list of stage two modules offered by the Department.
 In year 3 you must choose options to the value of 45 credits from the list of stage three modules offered by the Department.

Section 4 - Progressing through each year of your degree course

For Part-time study:

Stage one (a):

BS1021 Becoming a Bioscientist (15 credits; condonable)

BS1031 Chemistry of Life (15 credits; condonable)

BS1032 Fundamental Biochemistry (15 credits; condonable)

and choose a 15 credit option from the Stage one modules listed above.

Stage one (b):

BS1043 Green Planet: Plants and Our Future (15 credits; condonable)

BS1071 Cell Biology and the Origin of Life (15 credits; condonable)

BS1072 Genetics (15 credits; condonable)

BS1091 Protein Biochemistry and Enzymology (15 credits; condonable)

Stage two (a)

BS2005 Microbiology (15 credits; condonable)

BS2150 Applications of Molecular Genetics in Biology (15 credits; condonable)

BS2530 Molecular Biology (15 credits; condonable)

and choose 15 credits of options from the stage two modules listed above

Stage two (b)

BS2020 Food Security, Sustainability and Green Biotechnology (15 credits; condonable)

BS2580 Natural Product Biochemistry and Sustainability (15 credits; condonable)

and choose 30 credits of options from the stage two modules listed above

Stage three (a)

BS3010 Individual Research Project (30 credits) [Non-condonable fail – must be passed to qualify for specific field of study].

BS3190 Climate Change: Plants & the Environment (15 credits; condonable)

BS3520 Seed Biology: From Molecular and Conservation Biology to Industrial Applications (15 credits; condonable)

Stage three (b)

BS3560 Functional Genomics, Proteomics, and Bioinformatics (15 credits; condonable)

and choose 45 credits of options from the stage three modules listed above.

Progression and Award

For further information on the progression and award requirements for your degree, please refer to Royal Holloway's [Academic Regulations](#).

All first year undergraduate students are required to take and pass the non-credit bearing Moodle-based Academic Integrity module SS1001 in order to progress into the second year of study (unless their course includes the alternative mandatory SS1000 module). The pass mark for the module assessment is stated in the on-line Academic Integrity Moodle module. Students may attempt the assessment as often as they wish with no penalties or capping. Students who meet the requirements for progression as stipulated in the [College's Undergraduate Regulations](#) (Section: Conditions for progression to the next stage) but fail to pass the Moodle-based Academic Integrity module will not be permitted to progress into their second year of academic study at the College.

Section 5 – Educational aims of the course

The aims of the Honours Degree course in Molecular Biology and Environmental Change are to:

- Provide a sound knowledge and critical understanding of the function of organisms at molecular level and how this applies to addressing the challenges of environmental change, through a core of modules that will develop insights into and beyond the state of the art of the field;
- provide an understanding of how the principles of molecular sciences underlie much of the basis of modern research and have informed our biological and cellular understanding of nature, and how molecular biology tools can be applied;
- provide knowledge of the essential biochemical principles underpinning molecular biology, and how the study at molecular level can be integrated with other research scales to understand biological functions;
- develop, through a flexible and progressive structure, a range of subject-specific and transferable skills, including practical laboratory skills, self-management, information retrieval, communication and presentation skills, team-work, decision making and meeting deadlines, to ultimately equip the students with an all-round portfolio that is adaptable for an ever-changing employment market.
- provide experience of independent research through a final year project;
- produce graduates who can work safely and responsibly, and with respect for sustainability, with biological and chemical materials and laboratory equipment.

Section 6 - Course learning outcomes

In general terms, the courses provide opportunities for students to develop and demonstrate the following learning outcomes. (*Categories – Knowledge and understanding (K), Skills and other attributes (S), and Transferable skills (*)*)

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| <ol style="list-style-type: none"> 1. demonstrate an understanding of the essential molecular and chemical principles that underlie the study of molecules, and of how molecular biology relates to biological function and the chemistry that underlies biochemical reactions (K); 2. discuss state of the art knowledge and understanding of gene structure and function, including at genome-wide level, and describe the expression and regulation of signalling and metabolic pathways, and the methods used (K); 3. demonstrate a critical knowledge of the importance of molecular biology for the development of gene editing and manipulation, and discuss the adaptation of organisms to a changing environment (K); 4. describe the basis of sub-cellular organisation and function and the principles that determine the growth and responses of plants, at the cellular and molecular level and how these integrate at different levels with ecosystems (K); 5. discuss the effects of environmental change at the biological level and how the study of the function of molecules helps monitor and address these changes (K); 6. elaborate on the application of molecular biology to biotechnology and wider areas of research, and how this has influenced the development of sustainable methods at global level (K); 7. engage with philosophical and ethical issues arising from some of the current developments in the biosciences and their impact on society, and explain how ethical issues underpin professional integrity and standards (K); 8. demonstrate competence in a broad range of appropriate practical techniques and skills in relevant areas of biology, applying standard safety protocols and Good Laboratory Practice (S); 9. perform accurate data collection, analysis and interpretation including relevant numerical calculations, statistical analysis, testing of hypotheses, and show ability to place the work in context analyse and solve problems, make decisions, and suggest lines of further study (S); | <ol style="list-style-type: none"> 10. apply well-developed strategies for accessing information from a wide range of sources to maintain, update, and enhance your knowledge of the Biosciences including the cutting edge developments in the field and cross-disciplinary awareness, and sort, filter, synthesise and abstract information to communicate the principles clearly in oral and written forms in a way that is organised, topical and recognises the limits of current hypotheses (K,S*); 11. critically assess the merits of contrasting subject-specific theories, paradigms, concepts and principles and develop a reasoned argument to support your position (S); 12. plan, design, execute and present an independent piece of research through a theoretical or practical project in molecular biology, demonstrating time management, initiative, problem solving and independence are evident, and critically assess the quality of evidence (S); 13. take personal responsibility for your own behaviour to benefit learning and wellbeing, and develop habits of reflection on that learning (S*); 14. creatively apply original ideas, using imaginative and/or innovative approaches to tackle problems (S*); 15. write and speak to effectively communicate science to peers and non-scientists (S*); 16. use information technology, including spreadsheets, databases, and bioinformatics approaches in the analysis of large datasets (S*); 17. demonstrate interpersonal skills and social intelligence, including collaborating with others in teams, taking opportunities for leadership and recognising and respecting the views of others (S*); 18. prepare for your career and develop awareness of your graduate-level transferable skills (S*). |
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Section 7 - Teaching, learning and assessment

The overall strategy is to provide a progressive approach to molecular biology concepts and systems of increasing complexity through teaching methods that aid learning and stimulate interest. Teaching is mostly by means of lectures, laboratory classes, seminars, tutorials, study/revision sessions, with knowledge and understanding further developed by guided independent study. Learning and analytical ability are developed and reinforced through problem solving, essay writing, laboratory classes, critical evaluation and by giving you the opportunity to design, execute and evaluate your own experiments. You are encouraged to acquire further knowledge beyond taught material, e.g. by reading topical reviews, original research literature and attending research seminars, especially in the final year.

The practical assignments associated with first year and second year modules provide training in a range of subject specific laboratory techniques, including safety assessment. The culmination of these skills is demonstrated in the final year research project, and for literature skills the preparation of a literature report. You have to prepare your own risk assessment prior to commencing your final year project work.

Training in intellectual and key transferable skills is embodied throughout the course and forms a strong element of the tutorial and study session programmes. You are required to meet basic standards in information technology.

Assessment is typically by formal unseen written examinations, practical exams and a range of coursework assignments such as essays and laboratory reports, in addition to poster preparation, oral presentations and the individual research project. Full details of the assessments for individual modules can be obtained from the [Department](#).

Section 8 – Additional costs

There are no additional costs associated with this course.

These estimated costs relate to studying this particular degree course at Royal Holloway. General costs such as accommodation, food, books and other learning materials and printing etc., have not been included, but further information is available on our website.

Section 9 – Indicators of quality and standards	
QAA Framework for Higher Education Qualifications (FHEQ) Level	4-6
Your course is designed in accordance with the FHEQ to ensure your qualification is awarded on the basis of nationally established standards of achievement, for both outcomes and attainment. The qualification descriptors within the FHEQ set out the generic outcomes and attributes expected for the award of individual qualifications. The qualification descriptors contained in the FHEQ exemplify the outcomes and attributes expected of learning that results in the award of higher education qualifications. These outcomes represent the integration of various learning experiences resulting from designated and coherent courses of study.	
QAA Subject benchmark statement(s)	http://www.qaa.ac.uk/quality-code/subject-benchmark-statements
Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of courses in a specific subject or subject area. They also represent general expectations about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated.	

Section 10 – Further information

This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate when taking full advantage of the learning opportunities that are available. More detailed information on modules, including teaching and learning methods, and methods of assessment, can be found via the online [Module Catalogue](#). The accuracy of the information contained in this document is reviewed regularly by the university, and may also be checked routinely by external agencies, such as the Quality Assurance Agency (QAA).

Your course will be reviewed regularly, both by the university as part of its cyclical quality enhancement processes, and/or by your department or school, who may wish to make improvements to the curriculum, or in response to resource planning. As such, your course may be revised during the course of your study at Royal Holloway. However, your department or school will take reasonable steps to consult with students via appropriate channels when considering changes. All continuing students will be routinely informed of any significant changes.

Section 11 – Intermediate exit awards (where available)

You may be eligible for an intermediate exit award if you complete part of the course as detailed in this document. Any additional criteria (e.g. mandatory modules, credit requirements) for intermediate awards is outlined in the sections below.

Award	Criteria	Awarding body
Diploma in Higher Education (DipHE)	Pass in 210 credits of which at least 90 must be at or above FHEQ Level 4 and at least 120 of which must be at or above FHEQ Level 5	Royal Holloway and Bedford New College
Certificate in Higher Education (CertHE)	Pass in 120 credits of which at least 90 must be at or above FHEQ Level 4	Royal Holloway and Bedford New College

Section 12 - Associated award(s)

BSc Molecular Biology and Environmental Change (C730)	
BSc Molecular Biology and Environmental Change with a Year in Industry (C731)	