ROYAL HOLLOWAY
University of London

PROGRAMME SPECIFICATION

This document describes the **Honours Degree programme in Biomedical Sciences.** This specification is valid for new entrants from **September 2007.**

The aims of the Honours Degree programme in Biomedical Sciences are to:

- provide, through a core of courses, a sound knowledge and understanding of those areas of Bioscience necessary for understanding the biology of diseases and the scientific investigation of human health and disease. These include biochemistry, cell biology, chemistry, genetics, molecular biology, physiology and anatomy, and pharmacology;
- provide a sound knowledge and understanding of those areas of the subject relevant to the diagnosis and development of therapies for a range of diseases;
- develop an insight into the current frontiers of knowledge in major aspects of Biomedical Science, primarily through a series of specialised level 3 courses;
- 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, working with others, decision making and meeting deadlines, that equip students for future employment.
- provide experience of independent research through a final year project;
- produce graduates who can work safely and responsibly with biological and chemical materials and laboratory equipment.

The programme is delivered normally in three stages, each of which comprises one year of full-time study during which the student must follow courses to the value of four units (one unit is equivalent to 30 national credits). The curriculum is based around a core of mandatory units and the programme offers a strong foundation in Stages one and two, which covers the requirements of the benchmarking statements in Biosciences and Biomedical Science and allows for specialisation in Stage three, while at the same time allowing some degree of diversification of interests.

Stage one comprises a fixed selection of core courses and seeks to provide the necessary grounding for the study of the subject at degree level with appropriate Biochemistry, Cell Biology, Chemistry, Genetics, Microbiology, Molecular Biology, Physiology and Anatomy and including a strong element of laboratory training that forms the cornerstone of the subject. In **Stage two** students take 8 core courses to the value of 4 course units in Biochemistry, Physiology and Molecular Biology building on the foundations laid in the stage one and providing a basis for the study of the research led specialist options in the Stage three. Many of the courses specialise in medically oriented aspects of the subject. All the courses include a substantial element of laboratory training that prepares the student for the selection and implementation of the independent research project in stage three. In **Stage three** there are 5 core courses to the value of 3 course units and the students select the remaining courses from half-unit options. Most of the core courses have a strong element covering specific categories of disease, their underlying cause and treatment. Experts from local hospital laboratories staff BS3600, The Clinical Diagnosis of Disease, while experts from the Institute of Child Health contribute to BS3590, The Molecular Bases of Inherited Disease. For students who attain an average of over 50% in their second year the optional units can be chosen from a variety of courses offered by Kingston University, and St George's University of London via video-streaming. Students also complete an independent research project, submit a written report and make an oral presentation of their project work. This is regarded as the culmination of their training in experimental design, research techniques analysis and presentation.

The programme emphasises the importance and relevance of a wide range of subject areas for medicine and the understanding and scientific investigation of human disease. It also involves training in a variety of practical techniques and skills relevant to research work in Biomedical Science. The system is also flexible and allows the students to transfer to other degree streams within the Molecular Biosciences, particularly up to the start of the second stage.

Further information

Learning outcomes
Teaching, learning and assessment
Details of the programme structure(s)
Progression and award requirements
Student support and guidance
Admission requirements
Further learning and career opportunities
Indicators of quality and standards
List of programmes, with details of awards, degree titles, accreditation and teaching arrangements

This document provides a summary of the main features of the programme(s), and of the outcomes which a student might reasonably be expected to achieve if full advantage is taken of the learning opportunities provided. Further information is contained in the College prospectus, the College Regulations and in various handbooks issued to students upon arrival. Whilst Royal Holloway keeps all its information for prospective applicants and students under review, programmes and the availability of individual courses are necessarily subject to change at any time, and prospective applicants are therefore advised to seek confirmation of any factors which might affect their decision to follow a specific programme. In turn, Royal Holloway will inform applicants and students as soon as is practicable of any substantial changes which might affect their studies.

Learning outcomes

Teaching and learning in the programme are closely informed by current developments (including practical aspects) in the subject and by the active research of staff, particularly in the areas of clinical biochemistry, molecular biology and molecular genetics, microbial genetics, neuroscience, cancer, parasitology, immunology, and gene therapy. In general terms the programme provides opportunities for students to develop and demonstrate these learning outcomes:

Knowledge and understanding

- a sound knowledge and understanding of those subjects essential for the scientific investigation and understanding of human disease, viz biochemistry, cell biology, chemistry, genetics, molecular biology, physiology and anatomy, and pharmacology;
- a critical understanding of the molecular and cellular basis of human diseases, their diagnosis, treatment and the development of novel therapeutic strategies;
- a knowledge of the application of biochemistry, cell biology, molecular biology and molecular genetics to understanding the molecular basis and diagnosis of a range of diseases;
- knowledge of philosophical and ethical issues arising from some of the current developments in the biosciences;
- understanding cutting edge developments in a range of areas specific to the subject;
- knowledge and engagement with philosophical and ethical issues arising from some of the current developments in the biosciences;
- well-developed strategies for updating, maintaining and enhancing their knowledge of the Biomedical Sciences.

Skills and other attributes

- the ability to employ and evaluate suitable experimental methods for the investigation of relevant areas of biomedical science;
- a range of laboratory techniques of key importance in Biomedical Science;
- working safely in a scientific laboratory, with awareness of standard safety protocols;
- the ability to apply relevant numerical skills, including statistics, to biological data;
- the ability to access information from a wide range of sources in order to maintain and enhance knowledge of the Biosciences and to communicate that information clearly in oral and written forms;
- assessing the merits of contrasting subject-specific theories, paradigms, concepts and principles;
- applying subject-specific knowledge and understanding to address familiar and unfamiliar problems;
- the ability to plan, design, execute and present an independent piece of research in the final year through a theoretical or practical project in molecular biosciences, including the production of the final report;
- taking personal responsibility for learning, and developing habits of reflection on that learning;*
- identifying, retrieving (including the use of online computer searches), sorting and exchanging information;*
- abstracting and synthesising information, and developing a reasoned argument;*
- critically interpreting and evaluating experimental data and relevant literature, analysing and solving problems, and decision-making;*
- written communication and verbal presentation;*

- information technology (including spreadsheets, databases, word processing, email and WWW);*
- interpersonal skills, including working in groups/teams and recognising and respecting the viewpoints of others;*
- CV and career preparation.*

* transferable skills

Back to top

Teaching, learning and assessment

The overall strategy is to provide a progressive approach to biological concepts and systems of increasing complexity that underpin Biomedical Science and that are directly relevant to the understanding and treatment of human disease. This strategy is realised through a range of teaching methods that aid learning and stimulate interest. Specific knowledge of the molecular, cellular and biochemical basis of diseases, their diagnosis and treatment are developed through a range of specialist final stage courses dealing with particular types of disease, e.g. the molecular basis of inherited disease, the biochemical diagnosis of disease, neurological disorders (cell and molecular neuroscience). Teaching is mostly by means of lectures, laboratory classes, computer exercises, 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 students the opportunity to design, execute and evaluate their own experiments. Students 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 courses 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. Students have to prepare their own risk assessment prior to commencing their final year project work.

Training in intellectual and key transferable skills is embodied throughout the programme and forms a strong element of the tutorial and study session programmes. All students are required to meet basic standards in information technology, for which training is provided by the College Computer Centre.

Assessment is typically by formal examinations at the end of each year, laboratory assignments and other coursework, oral and poster presentations, an independent research project and the independent literature report. Full details of the assessments for individual courses can be obtained from the School.

Back to top

Details of the programme structure(s)

Please note that not all courses run each year. A full list of courses including optional courses for the current academic year can be obtained from the School.

Stage one:

Full-time students must take:
BS1030 Chemistry for Life Scientists (1 unit)
BS1060 Living Systems: Cell Biology and Physiology (1 unit)
BS1070 Genetics and Microbiology (1 unit)
BS1090 Biochemistry: the Molecular Basis of Life (1 unit)

Part-time students must take:

Stage one (a)

BS1030 Chemistry for Life Scientists (1 unit)
BS1090 Biochemistry: the Molecular Basis of Life (1 unit)

Stage one (b)

BS1060 Living Systems: Cell Biology and Physiology (1 unit)
BS1070 Genetics and Microbiology (1 unit)

Stage two:

Full-time students must take:
BS2050 Essential Human Physiology in Health and Disease (½ unit)
BS2510 Bioenergetics, Biosynthesis and Metabolic Regulation (½ unit)
BS2520 Protein Structure and Function (½ unit)
BS2530 Molecular Biology (½ unit)
BS2540 Cell and Molecular Immunology (½ unit)
BS2550 Hormonal and Neuronal Signalling (½ unit)
BS2560 Pharmacology and Toxicology (½ unit)

and choose one option from the following stage two units:
BS2040 Cell Biology (½ unit)
BS2060 Developmental Biology (½ unit)

Part-time students must take:

Stage two (a)

BS2050 Essential Human Physiology in Health and Disease (½ unit)
BS2510 Bioenergetics, Biosynthesis and Metabolic Regulation (½ unit)
BS2520 Protein Structure and Function (½ unit)
and choose one option from the stage two units above.

Stage two (b)

BS2530 Molecular Biology (½ unit)
BS2540 Cell and Molecular Immunology (½ unit)
BS2550 Hormonal and Neuronal Signalling (½ unit)
BS2560 Pharmacology and Toxicology (½ unit)

Stage three:

Full-time students must take:
BS3010 Individual Research Project (1 unit)
BS3570 Human Embryology and Endocrinology (½ unit)
BS3580 Cell and Molecular Neuroscience (½ unit)
BS3590 Molecular Bases of Inherited Disease (½ unit)
BS3600 Clinical Diagnosis of Disease (½ unit)

and two options from the following:
BS3020 Special Study: Dissertation (½ unit)
BS3030 Biology of Parasitic Diseases (½ unit)
BS3510 Molecular and Medical Microbiology (½ unit)
BS3530 Advanced Molecular Biology (½ unit)
BS3540 Cell and Molecular Biology of Cancer (½ unit)
BS3560 Proteomics, Genomics and Bioinformatics (½ unit)

Part-time students must take:

Stage three (a)

BS3010 Individual Research Project (1 unit)
BS3570 Human Embryology and Endocrinology(½ unit)
BS3580 Cell and Molecular Neuroscience (½ unit)

Stage three (b)

BS3590 Molecular Bases of Inherited Disease (½ unit)
BS3600 Clinical Diagnosis of Disease (½ unit)
and choose options equal to the value of one unit from the stage three courses listed above.

Stage three course options available at St. Georges University of London (SGUL) and Kingston University (KU)

Students attaining an average of over 50% in their second year may include choices for their optional third year courses from the units listed below:

SGUL courses:

BS3609X Human Genetics (Gene 0400*) (½ unit)
BS3609X Cloning, Stem Cell Research and Regenerative medicine (Gene 0402*) (½ unit)
BS3607X Development and Disease (Anat 1807*) (1 unit)

* SGUL course code

KU courses:
BS3610X Medical Microbiology (LS3010^) (½ unit)
BS3620X Haematology (LS3020^) (½ unit)
BS3630X Clinical Immunology (LS3310^) (½ unit)
BS3640X Clinical Chemistry (LS3040^) (½ unit)
BS3650X Cellular Pathology (LS3350^) (½ unit)

^ KU course code

Back to top

Progression and award requirements
The progression and award requirements are essentially the same across all Honours Degree programmes at Royal Holloway. Students must pass units to the value of at least three units on each stage of the programme. On some programmes there may be a requirement to pass specific courses in order to progress to the next stage, or to qualify for a particular degree title (see programme structure above). Students are considered for the award and classified on the basis of a weighted average. This is calculated from marks gained in courses taken in stages two and three, and gives twice the weighting to marks gained in stage three. In order to qualify for the award of a Biomedical Sciences degree, students must gain a weighted average of at least 35% and complete the core units specified above.

Back to top

Student support and guidance
- Personal Advisers: All students are allocated a Personal Adviser who meets with them regularly through the programme. The Personal Adviser's role is to advise on academic, pastoral and welfare issues, but with referral of students for professional help, e.g. counselling, if required. Students work closely with their Personal Advisers in tutorial groups of around 7, primarily throughout the teaching terms.
- The Director of Teaching and Programme Directors provide a back-up system of academic, pastoral and welfare advice.
- Provision of study skills sessions both during the induction week and at appropriate times throughout the academic year for introduction to a range of specific study skills.
- All staff are available and accessible through an open-door policy or by operating a defined office hours system.
- Representation on the Student-Staff Committee.
- Staff-undergraduate ratio of 1:15 (2009/10).
- Detailed student handbook and course resources.
- A collection of articles and books supporting teaching and learning housed in the School Office.
- Extensive supporting materials and learning resources in College libraries, computer centre and School website and Moodle.
- Dedicated School teaching laboratories are housed in the School of Biological Sciences (Bourne) Building.
- The School of Biological Sciences has 2 Educational Support Office network members.
- College Careers Service and School Careers Liaison Officer, supplemented by a dedicated careers area.
- Access to all College and University support services, including Student Counselling Service, Health Centre and the Education Support Unit for students with special needs.

Back to top

Admission requirements
The Department's standard conditional offer is available on the Course Catalogue web page. However, the Department also has considerable flexibility in its admissions and offers policy and strongly encourages applications from non-standard applicants. Students whose first language is not English may also be asked for a qualification in English Language at an appropriate level. It may also be helpful to contact the Admissions Office for specific guidance on the entrance requirements for particular programmes.

Back to top

Further learning and career opportunities
Graduates from Biological Sciences degree programmes have successfully progressed into a wide range of professions, while many have continued onto Postgraduate studies. For further details please refer to the Careers Service.

Back to top

Indicators of quality and standards
Royal Holloway's position as one of the UK's leading research-intensive institutions was confirmed by the results of the most recent Research Assessment Exercise (RAE 2008) conducted by the Higher Education Funding Council (HEFCE). The new scoring system for the RAE 2008 measures research quality in four categories, with the top score of 4* indicating quality that is world-leading and of the highest standards in terms of originality, significance and rigour. 60% of the College's research profile is rated as world-leading or internationally excellent outperforming the national average of 50%. The College is ranked 16th in the UK for research of 4* standard and 18th for 3* and 4* research. The School of Biological Sciences was ranked joint 3rd in the top 10 universities in the country in terms of proportion of 3* and 4* research, with 70% of its research profile being of 3* and 4* standard.

Back to top

List of programmes
All the programmes are taught by staff at Royal Holloway, University of London, or by video-streaming from our SWan alliance partner institutions and lead to awards of the University of London. Programmes in Biological Sciences are not subject to accreditation by a professional body. The QAA subject benchmark statement in Biosciences describes the general features which one might expect from Honours Degree programmes in the subject, and can therefore be used as a point of reference when reading this document (see www.qaa.ac.uk). UCAS codes are given in parentheses (see www.ucas.ac.uk). Programme specifications are available for all of the Honours Degree programmes.

Single Honours Degree programmes in Biological Sciences

BSc Biomedical Sciences (B990 formerly C790)	Available Full Time or Part Time

Back to top