

Programme Specification: Undergraduate

For students starting in Academic Year 2018/2019

1. Course Summary

Names of programme(s) and award title(s)	BSc (Hons) Biochemistry BSc (Hons) Biochemistry with International Year (see Annex A for details) BSc (Hons) Biochemistry with Work Placement Year BSc (Hons) Studies in Biochemistry BSc (Hons) Studies in Biochemistry with International Year BSc (Hons) Studies in Biochemistry with Work Placement Year
Award type	Single Honours
Mode of study	Full time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 6
Duration	3 years 4 years if an Applied Life Sciences Placement or International Year is included
Location of study	Keele University – main campus
Accreditation (if applicable)	All routes, excluding the ‘Studies in’ routes, are accredited by the Royal Society of Biology – for further details see Section 12
Regulator	Office for Students (OfS)
Tuition Fees	UK/EU students: Fee for 2018/19 is £9,250* International students: Fee for 2018/19 is £15,480** The fee for the international year abroad is calculated at 15% of the standard year fee The fee for the placement year is calculated at 20% of the standard year fee
Additional Costs	Refer to section 18

How this information might change: Please read the important information at <http://www.keele.ac.uk/student-agreement/>. This explains how and why we may need to make changes to the information provided in this document and to help you understand how we will communicate with you if this happens.

* These fees are regulated by Government. We reserve the right to increase fees in subsequent years of study in response to changes in government policy and/or changes to the law. If permitted by such change in policy or law, we may increase your fees by an inflationary amount or such other measure as required by government policy or the law. Please refer to the accompanying Student Terms & Conditions. Further information on fees can be found at <http://www.keele.ac.uk/studentfunding/tuitionfees/>

** We reserve the right to increase fees in subsequent years of study by an inflationary amount. Please refer to the accompanying Student Terms & Conditions for full details. Further information on fees can be found at <http://www.keele.ac.uk/studentfunding/tuitionfees/>

2. What is a Single Honours programme?

The Single Honours programme described in this document allows you to focus more or less exclusively on Biochemistry. In keeping with Keele's commitment to breadth in the curriculum, the programme also gives you the opportunity to take some modules outside biochemistry, in other disciplines and in modern foreign languages as part of a 360-credit Honours degree. Thus it enables you to gain, and be able to demonstrate, a distinctive range of graduate attributes.

3. Overview of the Programme

The Keele Biochemistry programme provides a broad and varied coverage of modern biochemistry, offering the chance to investigate the most exciting areas of 21st Century life science and medical research and it allows students to tailor their degree course to their interests and ambitions. Studying life at the molecular level offers the opportunity to investigate the core topics in the life sciences today, from unlocking the secrets of the human genome to the individually tailored molecular therapies of the future. The Keele Biochemistry programme places particular emphasis on human and mammalian biochemistry, especially as it relates to health and disease. Staff provide a friendly and supportive environment. Training is also provided in the employability skills that will help you to reach your potential in your chosen career, whether or not this is in biochemistry. To maintain the broad educational remit that has been a distinctive feature of Keele's academic philosophy since it was founded in 1953, we have included the option for you to include a free elective module at Levels 4 and 5 (years 1 and 2), should you choose to do so.

Distinctive features of the course include:

- A contemporary curriculum, with a focus on biochemistry and molecular biology in health and disease, which has been designed to meet requirements for Royal Society of Biology Accreditation;
- Inclusion of some innovative and relevant assessments, designed to foster creativity
- A laboratory programme delivered in well-equipped modern laboratories and a wide range of final year research projects;
- The Student Undergraduate Conference gives students the opportunity to present their own research in the context of a realistic research conference experience
- Students may apply to take an Applied Life Sciences Placement between level 5 and level 6
- Students may include study abroad either as a semester abroad at level 5 or an International Year between level 5 and level 6;
- Students have the opportunity to study a language alongside their programme

4. Aims of the Programme

The broad aims of the programme are to enable you to:

- provide you with core knowledge, understanding and skills relevant to biochemistry;
- produce skilled and motivated graduates who are suitably prepared for further study or for employment within or outside their field
- cultivate interest in the biosciences, particularly at the cellular and molecular level, within a caring and intellectually stimulating environment;
- promote the development of a range of employability skills, for use in all areas where numeracy and an objective, scientific approach to problem-solving are valued.

- promote the development of independent research skills to enable you to undertake relevant postgraduate study

5. What you will learn

The intended learning outcomes of the programme (what students should know, understand and be able to do at the end of the programme), can be described under the following headings:

- Subject knowledge and understanding
- Subject specific skills
- Intellectual Skills
- Key or transferable skills (including employability skills)

Subject knowledge and understanding

Successful students will be able to:

- U1 understand and explain the chemistry that underlies biochemical reactions and the techniques used to investigate them
- U2 understand the chemical and thermodynamic principles underlying biological catalysis and the role of enzymes and other proteins in determining the function and fate of cells and organisms.
- U3 have a critical understanding of essential features of cell metabolism and its control, including topics such as energy and signal transduction, photosynthesis and respiration
- U4 understand the principles that determine the three-dimensional structure of biological macromolecules (including nucleic acids and proteins) and be able to explain detailed examples of how structure enables function
- U5 acquire a critical understanding of the molecular basis of genetics and be able to explain some detailed examples
- U6 have critical knowledge and understanding of gene expression, with a detailed knowledge of specific examples; the structure, arrangement, expression, and regulation of genes; and relevant experimental methods
- U7 be familiar with a wide range of cells (both prokaryotic and eukaryotic) and parasitic entities and be able to explain critically how their properties suit them for their biological function, and how they could be investigated experimentally
- U8 have a critical understanding of the innate and adaptive immune system
- U9 devise and evaluate suitable experimental methods for the investigation of relevant areas of biochemistry and molecular biology
- U10 be aware of current developments in biochemistry and molecular biology including areas of ethical or public concern
- U11 demonstrate and ability to mine, manipulate and interpret data from small molecule and macromolecular databases.

Subject specific skills

Successful students will be able to:

- S1 read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, quality of information, and its interpretation and application

- S2 employ a variety of methods of study (including bioinformatics) in investigating, acquiring, recording and analysing information relevant to the subject
- S3 prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually
- S4 use and attain competence in a range of laboratory techniques
- S5 design, conduct, analyse, report and evaluate biochemical experiments, acknowledging an awareness of the validity, accuracy, calibration, precision and reproducibility of results.
- S6 work safely and responsibly in the laboratory with awareness of standard procedures such as risk assessment, ethical approval of research, relevant health and safety regulations, issues relating to animal welfare and procedures for obtaining informed consent
- S7 recognise philosophical and ethical issues relevant to the subject
- S8 develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view.

Intellectual skills

Successful students will be able to:

- I1 assess the merits of contrasting theories, paradigms, concepts or principles
- I2 think independently, set tasks and solve problems by a variety of methods
- I3 make reasoned decisions and develop reasoned arguments
- I4 obtain and interpret several lines of subject-specific evidence to formulate and test hypotheses
- I5 make critical interpretations, evaluations and judgements of data and text
- I6 analyse, synthesise and summarise information critically, including published research or reports
- I7 apply biochemical understanding to familiar and unfamiliar problems, and emphasise the interdisciplinary nature of science and the validity of different points of view
- I8 take responsibility for their own learning and reflect upon that learning
- I9 construct grammatically correct documents in an appropriate academic style using and referencing relevant ideas and evidence.
- I10 understand the importance of academic and research integrity

Key or transferable skills (including employability skills)

Successful students will be able to:

- E1 develop an adaptable, flexible, sustainable and effective approach to study and work, including time management, creativity and intellectual integrity
- E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources: textual, numerical, verbal, graphical
- E3 prepare, process, interpret and present data using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually

- E4 use the internet and other electronic sources critically as a means of communication and a source of information
- E5 cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism whether intentional or not
- E6 communicate effectively to a variety of audiences by written, spoken and graphical means using appropriate techniques and scientific language
- E7 develop skills necessary for self-managed and lifelong learning, including working independently, organisational, enterprise and knowledge transfer skills
- E8 work with others to identify and achieve collaborative goals and responsibilities and perform in a respectful manner that is accepting of the viewpoints and opinions of others and evaluates the roles and development of team members
- E9 motivate themselves and sustain that motivation over an extended period of time
- E10 identify and work towards targets for personal, academic and career development

Keele Graduate attributes

Engagement with this programme will enable you to develop your intellectual, personal and professional capabilities. At Keele, we call these our ten Graduate Attributes and they include independent thinking, synthesizing information, creative problem solving, communicating clearly, and appreciating the social, environmental and global implications of your studies and activities. Our educational programme and learning environment is designed to help you to become a well-rounded graduate who is capable of making a positive and valued contribution in a complex and rapidly changing world, whichever spheres of life you engage in after your studies are completed.

Further information about the Keele Graduate Attributes can be found here: <http://www.keele.ac.uk/journey/>

6. How is the Programme taught?

Learning and teaching methods used on the programme vary according to the subject matter and level of the module. They include the following:

- **Traditional lectures** where the lecturer provides students with a framework for reading and independent study. Some lecture classes may feature guest speakers working in biochemistry or biomedical fields
- **Interactive learning** in large classes where students have the opportunity to work together in smaller groups, interact with the lecturer and reflect on their own learning. Interactive lectures may involve the use of voting systems or involve students in answering quick quizzes or writing short summaries
- **Practicals** in laboratories are particularly important and weekly laboratory classes are designed to train you in the skills needed for a career in biochemistry and provide training in a wide range of research techniques
- **Tutorials** and seminars in small groups of students where key issues can be discussed in more depth. Students are expected to play a full part and, occasionally, to lead these discussions. In particular, problem based learning (PBL) is a student-centred style, based on case studies, that is incorporated into two compulsory modules. Some tutorials and seminars consist largely of student presentations and many are based on scientific papers studied in advance
- **Independent study** based on directed reading from text books, research papers and research reviews
- **Web-based learning** using the University's virtual learning environment (KLE). The KLE is used to give students easy access to a wide range of resources and research tools, and as a platform for online

discussions and quizzes

- **Life Sciences Double Experimental Project** (with research skills assessment) (gives students the opportunity to undertake a piece of independent experimental research supervised and supported by a member of staff)

Apart from these formal activities, students are also provided with regular opportunities to talk through particular areas of difficulty, and any special learning needs they may have, with their Personal Tutors or module lecturers on a one-to-one basis.

These learning and teaching methods enable students to achieve the learning outcomes of the programme in a variety of ways. For example:

- Lectures and independent study allow students to gain knowledge and understanding of molecular mechanisms and the complexity of cellular processes
- Seminars, tutorials and online discussions provide opportunities for students to ask questions about, and suggest answers to biochemical questions, and to present their own ideas to members of staff and other students using an appropriate medium of communication
- Interactive lectures, seminars, tutorials and web-based activities encourage students to reflect on their own learning and take responsibility for its development by addressing areas of difficulty, perhaps by discussing them with their fellow students or by getting additional help from a member of staff
- Laboratory practicals allow students to generate, analyse and interpret biochemical data and use a range of techniques
- Undertaking an experimental project with the support of an experienced researcher allows students to formulate relevant research questions and devise, carry out and analyse experiments to answer them

7. Teaching Staff

Currently our core teaching staff comprises of academic staff and a senior demonstrator who play the most significant roles in the delivery of the programme. However, many of the remaining academic staff from the School of Life Sciences, are also involved to some extent in teaching e.g. in project supervision or delivery of option modules. Teaching staff from the School of Pharmacy, School of Medicine and the University Hospitals of North Midlands also contribute to various aspects the Programme. Most staff are active in bioscience research and qualified to PhD level or equivalent professional level. As part of probationary requirements, new staff must complete a postgraduate certificate in teaching at HE level, which is recognised by SEDA. Several Life Sciences' staff members have been awarded Keele's prestigious Excellence in Teaching and Learning awards and several were awarded a KeeleSU Education Award for personal tutoring.

There is a growing culture of higher education research and several members of staff are active this field, with members of staff having already completed an MA in Teaching and Learning and several others in the process of doing so. In recent years several teaching innovation projects have been run by Life Sciences staff and several new projects have been proposed. Members of the School of Life Sciences hold recognised or accredited teaching qualifications and a number are Fellows or Associates of the Higher Education Academy (HEA) and a number are Senior Fellows of the HEA.

The University will attempt to minimise changes to our core teaching teams, however, delivery of the programme depends on having a sufficient number of staff with the relevant expertise to ensure that the programme is taught to the appropriate academic standard.

Staff turnover, for example where key members of staff leave, fall ill or go on research leave, may result in changes to the programme's content. The University will endeavour to ensure that any impact on students is limited if such changes occur. For details of current staff in the School of Life Sciences (not of all whom will be involved in teaching biochemistry modules) please see <https://www.keele.ac.uk/lifesci/people/>

8. What is the Structure of the Programme?

The academic year runs from September to June and is divided into two semesters. The number of weeks of teaching will vary from course to course, but you can generally expect to attend scheduled teaching sessions between the end of September and mid-December, and from mid-January to the end of April.

Our degree courses are organised into modules. Each module is usually a self-contained unit of study and each is usually assessed separately with the award of credits on the basis of 1 credit = 10 hours of student effort. An outline of the structure of the programme is provided in the tables below.

There are three types of module delivered as part of your programme. They are:

- Compulsory modules – a module that you are required to study on this course;
- Optional modules – these allow you some limited choice of what to study from a list of modules;
- Elective modules – a free choice of modules that count towards the overall credit requirement but not the number of subject-related credits.

A summary of the credit requirements per year is as follows, with a minimum of 90 subject credits (compulsory plus optional) required for each year.

Year	Compulsory	Optional		Electives	
		Min	Max	Min	Max
1	105	0	15	0	15
2	105	0	15	0	15
3	75	45	45	0	0

Module lists

Year 1 (Level 4)

Compulsory modules	Credits	Optional modules	Credits
Biochemistry	30	Plants: Sex Drugs and Alcohol	15
Molecular Cell Biology	30		
Professional Skills for Biochemists	30		
Chemistry for Bioscience	15		

Year 2 (Level 5)

Compulsory modules	Credits	Optional modules	Credits
Gene & Protein Engineering	15	Human Genetics	15
Molecular, Cellular & Structural Immunology	15		
Microbes, Viruses and Parasites	15		
Metabolism in Health and Disease	15		
Cell Signalling	15		
Drug Design	15		
Research and Analytical Skills	15		

Year 3 (Level 6)

Compulsory modules	Credits	Optional modules	Credits

Life Sciences Double Experimental Project (with Research Skills Assessment) ¹ OR Double Applied Life Sciences Placement ²	30	Advances in Medicine	15
		Human Parasitology	15
		Structural Biology & Macromolecular Function	15
Bioinformatics and Science Communication	15	Cancer Biology	15
Case Studies in Biotechnology	15	Biology of Disease	15
Medical Glycobiology	15		

¹If a student fails the Life Sciences double experimental project module (or the alternative Double Applied Life Science placement module) but has it condoned, then they will not be eligible for an RSB accredited degree, but shall instead be eligible for the award BSc Studies in Biochemistry

² The Double Applied Life Sciences Placement module may replace Life Sciences Double Experimental Project (with research skills assessment) if the nature of the placement is deemed suitable and the work carried out meets the criteria of the research project module.

For further information on the content of modules currently offered, including the list of elective modules, please visit: www.keele.ac.uk/recordsandexams/az

Learning Outcomes

The table below sets out what students learn in each year of the Programme, the modules in which that learning takes place, and the main ways in which students are assessed on their learning. In Year 1 (Level 4) and Year 2 (Level 5) these learning outcomes are achieved in the compulsory modules which all students are required to take. Some of these outcomes may also be achieved or reinforced in elective modules together with other outcomes not stated here. In Year 3 (Level 6) the stated outcomes are achieved by taking any of the modules offered in each semester.

Year 1 (Level 4)

Subject Knowledge and Understanding		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
U1 be able to understand and explain the chemistry that underlies biochemical reactions and the techniques used to investigate them	Biochemistry Professional skills in biochemistry Chemistry for Bioscience	Lab reports (staff and peer assessed), essays, portfolio, short answer tests, end of module examination
U2 understand the chemical and thermodynamic principles underlying biological catalysis and the role of enzymes and other proteins in determining the function and fate of cells and organisms.	Biochemistry Professional skills in biochemistry Chemistry for Bioscience	Lab reports (staff and peer assessed), essays, short answer tests, end of module examination
U3 have a critical understanding of essential features of cell metabolism and its control, including topics such as energy and signal transduction, photosynthesis	Biochemistry Professional skills in biochemistry Molecular Cell Biology	Lab reports (staff and peer assessed), essays, short answer tests, end of module examination

and respiration	Plants: Sex, Drugs and Alcohol	
U4 understand the principles that determine the three-dimensional structure of biological macromolecules (including nucleic acids and proteins) and be able to explain detailed examples of how structure enables function	Biochemistry Molecular Cell Biology	Lab reports (staff and peer assessed), essays, short answer tests, end of module examination,
U5 acquire a critical understanding of the molecular basis of genetics and be able to explain some detailed examples	Molecular Cell Biology	Short answer tests, end of module examination
U6 have critical knowledge and understanding of gene expression, with a detailed knowledge of specific examples; the structure, arrangement, expression, and regulation of genes; and relevant experimental methods	Molecular Cell Biology	Blog, end of module examination
U7 be familiar with a wide range of cells (both prokaryotic and eukaryotic) and parasitic entities and be able to explain critically how their properties suit them for their biological function, and how they could be investigated experimentally	Molecular Cell Biology Professional Skills for Biochemists	Posters, short answer questions, case study
U9 be able to devise and evaluate suitable experimental methods for the investigation of relevant areas of biochemistry and molecular biology	Biochemistry Professional Skills for Biochemists	Practical Exam, assay kit design, portfolio (SOPs and reflective accounts)
U10 be aware of current developments in biochemistry and molecular biology including areas of ethical or public concern	Molecular Cell Biology	Blog

Subject Specific Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
S1 read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, quality of information, and its interpretation and application	Professional Skills for Biochemists	Study skills reflection, case study participation

S2 employ a variety of methods of study (including bioinformatics) in investigating, acquiring, recording and analysing information relevant to the subject	All modules with a practical component	Lab reports, practical exam
S3 prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	All modules with a practical component	Lab reports, poster, practical exam, lab books.
S4 use and attain competence in a range of laboratory techniques	All modules with a practical component, but particularly Biochemistry Molecular Cell Biology Professional Skills for Biochemists	Lab reports, poster, practical exam, lab books.
S5 design, conduct, analyse, report and evaluate biochemical experiments, acknowledging an awareness of the validity, accuracy, calibration, precision and reproducibility of results.	All modules with a practical component, but particularly Biochemistry Molecular Cell Biology Professional Skills for Biochemists	Lab reports, poster, practical exam, lab books.
S6 work safely and responsibly in the laboratory with awareness of standard procedures such as risk assessment, ethical approval of research, relevant health and safety regulations, issues relating to animal welfare and procedures for obtaining informed consent	All modules with a practical component, but particularly Professional Skills for Biochemists Biochemistry Molecular Cell Biology	Lab reports, portfolio (including COSHH form, SOPs etc)
S7 recognise philosophical and ethical issues relevant to the subject	Molecular Cell Biology	Computer exercise (blog),
S8 develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view.	All modules	Lab reports, case study, end of module exam

Intellectual Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
I1 assess the merits of contrasting theories, paradigms, concepts or	All modules	Essays, end of module examination, literature review

principles		
I2 think independently, set tasks and solve problems by a variety of methods	All modules	All assessments
I3 make reasoned decisions and develop reasoned arguments	Professional Skills for Biochemists	Case study participation
I4 obtain and interpret several lines of subject-specific evidence to formulate and test hypotheses	Molecular Cell Biology Professional Skills for Biochemists	Microbiology poster Case study participation
I6 analyse, synthesise and summarise information critically, including published research or reports	Most modules at an introductory level Professional Skills for Biochemists	Case study participation
I7 apply biochemical I understanding to familiar and unfamiliar problems, and emphasise the interdisciplinary nature of science and the validity of different points of view	Most modules, in particular Professional Skills for Biochemists	Essays, end of module examination, case study participation
I8 take responsibility for their own learning and reflect upon that learning	All modules, Personal Development Planning with personal tutor, engaging with feedback	All assessments
I9 construct grammatically correct documents in an appropriate academic style using and referencing relevant ideas and evidence.	All modules where there are written assessments, especially those where different writing styles are developed- Professional Skills for Biochemists	Communication skills portfolio, Case study
I10 understand the importance of academic and research integrity	All modules especially those with associated laboratory work	All written work, especially lab reports and project reports

Key or Transferable Skills (graduate attributes)		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
E1 develop an adaptable, flexible, sustainable and effective approach to study and work, including time management, creativity and intellectual integrity	All modules	All assessments, especially case study and assay kit design
E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources: textual, numerical, verbal, graphical	All modules	All assessments

E3 prepare, process, interpret and present data using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	All modules with a practical component	Posters, lab reports
E4 use the internet and other electronic sources critically as a means of communication and a source of information	All modules	All assessments
E5 cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism whether intentional or not	All modules	All written course-work
E6 communicate effectively to a variety of audiences by written, spoken and graphical means using appropriate techniques and scientific language	Professional Skills for Biochemists Molecular Cell Biology	Communications Skills portfolio (poster, talk, blog) Portfolio (SOPs, reflective pieces)
E7 develop skills necessary for self-managed and lifelong learning, including working independently, organisational, enterprise and knowledge transfer skills	All modules, particularly those with a practical component.	Most assessments
E8 work with others to identify and achieve collaborative goals and responsibilities and perform in a respectful manner that is accepting of the viewpoints and opinions of others and evaluates the roles and development of team members	Professional Skills for Biochemists	Group project, Case study participation.
E9 motivate themselves and sustain that motivation over an extended period of time	All modules Professional Skills for Biochemists	Group project
E10 identify and work towards targets for personal, academic and career development	All modules and via personal tutor system	All assessments

Year 2 (Level 5)

Subject Knowledge and Understanding		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
U1 be able to understand and explain the chemistry that underlies biochemical reactions and the techniques used to investigate them	Drug Design Metabolism in Health and Disease	Lab reports, essays, short answer tests, end of module examination

U2 understand the chemical and thermodynamic principles underlying biological catalysis and the role of enzymes and other proteins in determining the function and fate of cells and organisms.	Metabolism in Health and Disease Cell Signalling	Lab reports, poster, end of module examination
U3 have a critical understanding of essential features of cell metabolism and its control, including topics such as energy and signal transduction, photosynthesis and respiration	Metabolism in Health and Disease Cell Signalling	Lab reports, poster, end of module examination
U4 understand the principles that determine the three-dimensional structure of biological macromolecules (including nucleic acids and proteins) and be able to explain detailed examples of how structure enables function	Molecular, Cellular & Structural Immunology Drug Design	Lab reports, short answer tests, end of module examination, literature comparison
U5 acquire a critical understanding of the molecular basis of genetics and be able to explain some detailed examples	Human Genetics Gene and Protein Engineering	Lab reports (staff and peer assessed), essays, short answer tests, end of module examination
U6 have critical knowledge and understanding of gene expression, with a detailed knowledge of specific examples; the structure, arrangement, expression, and regulation of genes; and relevant experimental methods	Gene & Protein Engineering Molecular, Cellular & Structural Immunology	Lab reports (staff and peer assessed), essays, short answer tests, blogs, end of module examination
U7 be familiar with a wide range of cells (both prokaryotic and eukaryotic) and parasitic entities and be able to explain critically how their properties suit them for their biological function, and how they could be investigated experimentally	Microbes, Viruses & Parasites	Book chapter, information leaflet, end of module exam
U8 have a critical understanding of the innate and adaptive immune system	Molecular, Cellular & Structural Immunology Microbes, Viruses & Parasites	Lab report, end of module examination
U9 be able to devise and evaluate suitable experimental methods for the investigation of relevant areas of biochemistry and molecular	All modules with practical elements, but particularly	Lab skills assessment, lab reports, project reports

biology	Research & Analytical Skills Metabolism in Health and Disease	
U10 be aware of current developments in biochemistry and molecular biology including areas of ethical or public concern	Gene & Protein Engineering, Human Genetics	Computer exercises (wiki), essays, end of module examination
U11 be able to demonstrate and ability to mine, manipulate and interpret data from small molecule and macromolecular databases.	Research & Analytical Skills Drug Design	Computer exercises

Subject Specific Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
S1 read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, quality of information, and its interpretation and application	All modules	Essays, literature review, paper comprehension
S2 employ a variety of methods of study (including bioinformatics) in investigating, acquiring, recording and analysing information relevant to the subject	All modules with a practical component	Project reports, lab reports, posters
S3 prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	All modules with a practical component, in particular Research & Analytical Skills	Lab reports
S4 use and attain competence in a range of laboratory techniques	Cell Signalling Metabolism in Health and Disease Gene and Protein Engineering Molecular, Cellular & Structural Immunology	Lab reports
S5 design, conduct, analyse, report and evaluate biochemical experiments, acknowledging an awareness of the validity, accuracy, calibration, precision and reproducibility of results.	All modules with a practical component in particular Metabolism in Health and Disease	Lab reports, project reports, lab skills assessment

S6 work safely and responsibly in the laboratory with awareness of standard procedures such as risk assessment, ethical approval of research, relevant health and safety regulations, issues relating to animal welfare and procedures for obtaining informed consent	All modules with a practical component	Lab reports
S7 recognise philosophical and ethical issues relevant to the subject	Most modules, particularly Human Genetics Gene and Protein Engineering	Essay, end of module examination,
S8 develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view.	All modules, particularly Drug Design	End of module examination

Intellectual Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
I1 assess the merits of contrasting theories, paradigms, concepts or principles	All modules	Essays, end of module examination, literature review
I2 think independently, set tasks and solve problems by a variety of methods	All modules	All assessments
I4 obtain and interpret several lines of subject-specific evidence to formulate and test hypotheses	Metabolism in Health and Disease	Poster, lab reports
I5 make critical interpretations, evaluations and judgements of data and text	All modules and in particular, Metabolism in Health and Disease	Poster, project reports, essays
I6 analyse, synthesise and summarise information critically, including published research or reports	Most modules, in particular Microbes, Viruses and Parasites	Textbook chapter, patient information leaflet
I7 apply biochemical I understanding to familiar and unfamiliar problems, and emphasise the interdisciplinary nature of science and the validity of different points of view	Drug Design Human Genetics	End of module examination, essay
I8 take responsibility for their own learning and reflect upon that learning	All modules, Personal Development Planning with personal tutor,	All assessments

	engaging with feedback	
I9 construct grammatically correct documents in an appropriate academic style using and referencing relevant ideas and evidence.	All modules where there are written assessments, especially those where different writing styles are developed Microbes, Viruses and Parasites	All assessments
I10 understand the importance of academic and research integrity	All modules especially those with associated laboratory work	All written work, especially lab reports and essays

Key or Transferable Skills (graduate attributes)		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
E1 develop an adaptable, flexible, sustainable and effective approach to study and work, including time management, creativity and intellectual integrity	All modules	All assessments, especially patient information leaflet, book chapter
E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources: textual, numerical, verbal, graphical	All modules	Lab reports, posters, book chapter, drug report
E3 prepare, process, interpret and present data using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	All modules, especially Metabolism in Health and Disease Research and Analytical Skills	All written work, especially lab reports, statistics report
E4 use the internet and other electronic sources critically as a means of communication and a source of information	All modules	All assessments
E5 cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism whether intentional or not	All modules	Lab reports, project reports, oral and poster presentations, essays, literature reviews
E6 communicate effectively to a variety of audiences by written, spoken and graphical means using appropriate techniques and scientific language	Microbes, Viruses and Parasites	Book chapter, patient information leaflet
E7 develop skills necessary for self-managed and lifelong learning, including working independently,	All modules, particularly those with a practical component.	Lab reports

organisational, enterprise and knowledge transfer skills		
E8 work with others to identify and achieve collaborative goals and responsibilities and perform in a respectful manner that is accepting of the viewpoints and opinions of others and evaluates the roles and development of team members	Microbes, Viruses and Parasites Drug Design	Book chapter, group poster
E9 motivate themselves and sustain that motivation over an extended period of time	Metabolism in Health and Disease mini project	Report and poster
E10 identify and work towards targets for personal, academic and career development	All modules and via personal tutor system	All assessments

Year 3 (Level 6)

Subject Knowledge and Understanding		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
U1 be able to understand and explain the chemistry that underlies biochemical reactions and the techniques used to investigate them	Case Studies in Biotechnology Medical Glycobiology	Editorial, end of module exam
U3 have a critical understanding of essential features of cell metabolism and its control, including topics such as energy and signal transduction, photosynthesis and respiration	Cancer Biology Biology of Disease (some topics)	Literature review, end of module examination
U4 understand the principles that determine the three-dimensional structure of biological macromolecules (including nucleic acids and proteins) and be able to explain detailed examples of how structure enables function	Medical Glycobiology Structural Biology & Macromolecular Function	end of module examination, literature comparison, wiki page
U5 acquire a critical understanding of the molecular basis of genetics and be able to explain some detailed examples	Case Studies in Biotechnology Advances in Medicine Cancer Biology Biology of Disease (some topics)	Literature review, end of module examination
U6 have critical knowledge and understanding of gene expression, with a detailed knowledge of	Advances in Medicine	End of module examination, literature reviews

specific examples; the structure, arrangement, expression, and regulation of genes; and relevant experimental methods	Cancer Biology Biology of Disease (some topics)	
U7 be familiar with a wide range of cells (both prokaryotic and eukaryotic) and parasitic entities and be able to explain critically how their properties suit them for their biological function, and how they could be investigated experimentally	Human Parasitology Biology of Disease (some topics)	Extended essay (dissertation), end of module exam
U8 have a critical understanding of the innate and adaptive immune system	Medical Glycobiology Structural Biology & Macromolecular Function	Lab reports, essays, literature comparison, end of module examination
U9 be able to devise and evaluate suitable experimental methods for the investigation of relevant areas of biochemistry and molecular biology	Life Sciences Experimental Research Project	Project report
U10 be aware of current developments in biochemistry and molecular biology including areas of ethical or public concern	Human Parasitology Advances in Medicine Case studies in Biotechnology	End of module exam, poster, editorial.
U11 be able to demonstrate and ability to mine, manipulate and interpret data from small molecule and macromolecular databases.	Bioinformatics and Science Communication	Bioinformatics report

Subject Specific Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
S1 read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, quality of information, and its interpretation and application	All modules, especially Bioinformatics and Science Communication Case Studies in Biotechnology	Paper comprehension exam, editorial, mini-journal
S2 employ a variety of methods of study (including bioinformatics) in investigating, acquiring, recording and analysing information relevant	Life Sciences Double Experimental Project / Applied Life Sciences Placement	Computer exercises (bioinformatics), project reports,

to the subject	Bioinformatics and Science Communication	
S3 prepare, process, interpret and present data, using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	Life Sciences Double Experimental Project / Applied Life Sciences Placement Bioinformatics and Science Communication	Project Report, Bioinformatics Report
S4 use and attain competence in a range of laboratory techniques	Life Sciences Double Experimental Project / Applied Life Sciences Placement	Lab skills assessment
S5 design, conduct, analyse, report and evaluate biochemical experiments, acknowledging an awareness of the validity, accuracy, calibration, precision and reproducibility of results.	Life Sciences Double Experimental Project / Applied Life Sciences Placement	Lab skills assessment, Lab report
S6 work safely and responsibly in the laboratory with awareness of standard procedures such as risk assessment, ethical approval of research, relevant health and safety regulations, issues relating to animal welfare and procedures for obtaining informed consent	Life Sciences Double Experimental Project / Applied Life Sciences Placement	Lab skills assessment, COSHH form, ethics review form
S7 recognise philosophical and ethical issues relevant to the subject	Most modules Life Sciences Double Experimental Project / Applied Life Sciences Placement Case studies in Biotechnology	Ethics review form
S8 develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view.	All modules Case Studies in Biotechnology	Literature reviews, project reports, mini-journal

Intellectual Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
I1 assess the merits of contrasting theories, paradigms, concepts or principles	All modules	Essays, end of module examination, literature review
I2 think independently, set tasks and solve problems by a variety of methods	All modules especially Life Sciences Double Experimental	All assessments, especially lab skills assessment

	Project / Applied Life Sciences Placement	
13 make reasoned decisions and develop reasoned arguments	All modules but particularly Biology of Disease Life Sciences Double Experimental Project / Applied Life Sciences Placement	Essays, dissertation, literature comparison, project report, end of module examination
14 obtain and interpret several lines of subject-specific evidence to formulate and test hypotheses	Life Sciences Double Experimental Project / Applied Life Sciences Placement	Poster, project reports, oral presentation
15 make critical interpretations, evaluations and judgements of data and text	All modules and in particular, Case Studies in Biotechnology Life Sciences Double Experimental Project / Applied Life Sciences Placement Biology of Disease	Poster, project reports, essays
16 analyse, synthesise and summarise information critically, including published research or reports	Most modules, in particular, Structural Biology & Macromolecular Function Case Studies in Biotechnology Life Sciences Double Experimental Project / Applied Life Sciences Placement Biology of Disease	Essays, dissertations, literature comparison, project reports, editorial.
17 apply biochemical I understanding to familiar and unfamiliar problems, and emphasise the interdisciplinary nature of science and the validity of different points of view	Most modules, in particular Case Studies in Biotechnology	Essay, end of module exams, editorial, reviews
18 take responsibility for their own learning and reflect upon that learning	All modules, Personal Development Planning with personal tutor, engaging with feedback	All assessments
19 construct grammatically correct documents in an appropriate academic style using and referencing relevant ideas and evidence.	All modules where there are written assessments, especially those where different writing styles are developed (Case Studies in Biochemistry, Microbes, Viruses	All assessments

	and Parasites, Case Studies in Biotechnology)	
I10 understand the importance of academic and research integrity	All modules especially Life Sciences Double Experimental Project / Applied Life Sciences Placement	All written work, especially project reports

Key or Transferable Skills (graduate attributes)		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will be able to:</i>		
E1 develop an adaptable, flexible, sustainable and effective approach to study and work, including time management, creativity and intellectual integrity	All modules	All assessments
E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources: textual, numerical, verbal, graphical	All modules	All assessments
E3 prepare, process, interpret and present data using appropriate qualitative and quantitative techniques, statistical programmes, spreadsheets and programs for presenting data visually	All modules, in particular Life Sciences Double Experimental Project / Applied Life Sciences Placement Bioinformatics and Science Communication	All written work, especially lab reports and project reports
E4 use the internet and other electronic sources critically as a means of communication and a source of information	All modules	All written assessments
E5 cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism whether intentional or not	All modules	All written work, especially literature reviews and project reports
E6 communicate effectively to a variety of audiences by written, spoken and graphical means using appropriate techniques and scientific language	Most modules, in particular Bioinformatics and Science Communication Life Sciences Double Experimental Project / Applied Life Sciences Placement	Project reports, oral and poster presentations

E7 develop skills necessary for self-managed and lifelong learning, including working independently, organisational, enterprise and knowledge transfer skills	All modules, particularly Life Sciences Double Experimental Project / Applied Life Sciences Placement	
E8 work with others to identify and achieve collaborative goals and responsibilities and perform in a respectful manner that is accepting of the viewpoints and opinions of others and evaluates the roles and development of team members	Most modules will have some element of group work in particular Case Studies in Biotechnology	Case study work (not formally assessed)
E9 motivate themselves and sustain that motivation over an extended period of time	All modules, but Life Sciences Double Experimental Project / Applied Life Sciences Placement	Oral and poster presentations, project reports
E10 identify and work towards targets for personal, academic and career development	All modules and via personal tutor system	All assessments KUSP/ILM portfolio

9. Final and intermediate awards

Credits required for each level of academic award are as follows:

Honours Degree	360 credits	You will require at least 120 credits at levels 4, 5 and 6 You must accumulate at least 270 credits in Biochemistry (out of 360 credits overall), with at least 90 credits in each of the three years of study, to graduate with a named single honours degree in Biochemistry.
Diploma in Higher Education	240 credits	You will require at least 120 credits at level 4 or higher and at least 120 credits at level 5 or higher
Certificate in Higher Education	120 credits	You will require at least 120 credits at level 4 or higher

Biochemistry with International Year: in addition to the above students must pass a module covering the international year in order to graduate with a named degree in Biochemistry with International Year. Students who do not complete, or fail the international year, will be transferred to the three-year Biochemistry programme.

10. How is the Programme assessed?

The wide variety of assessment methods used within Biochemistry at Keele reflects the broad range of knowledge and skills that are developed as you progress through the degree programme. Teaching staff pay particular attention to specifying clear assessment criteria and providing timely, regular and constructive feedback that helps to clarify things you did not understand and helps you to improve your performance. The following list is representative of the variety of assessment methods used within Biochemistry:

- **Unseen examinations** in different formats test students' knowledge and understanding of the subject. Examinations may consist of essay, short answer and/or multiple choice questions, and paper comprehension.
- **Essays** allow you to demonstrate your ability to articulate ideas clearly using argument and reasoning skills and with close reference to the contexts and critical concepts covered in the modules. Essays also develop and demonstrate research and presentation skills. Essays including those based on case study material and literature reviews also test the quality and application of subject knowledge. In addition they allow students to demonstrate their ability to carry out basic bibliographic research and to communicate their ideas effectively in writing in an appropriate scholarly style using the Harvard system of referencing.
- **Laboratory reports** – structured proformas and full lab reports are formal summaries of work carried out in the laboratory and test students' understanding of the practical aspects of the programme and develop the skills necessary to enable students to present and analyse their results.
- **Class tests** taken either conventionally or online via the Keele Learning Environment (KLE) assess students' subject knowledge and their ability to apply it in a more structured and focused way.
- **Computer exercises** might include contributing to wikis or blogs or using bioinformatics tools.
- **Group activities** might include working on a collaborative project such as compiling a book chapter.
- **Dissertations** enable students to explore in depth an area of particular interest through a substantial piece of focused research and writing, and test their ability to formulate and answer research questions.
- **Experimental projects** test students' knowledge of research methodologies and their ability to carry them out (experimental project only). They also enable students to demonstrate their ability to formulate research questions, design experiments, carry them out, accurately record their data and analyse the results. The project report will demonstrate that the students can place their research in context with the literature and present their results in a concise format.
- **Oral and poster presentations** and reports assess individual students' subject knowledge and understanding. They also test their ability to work effectively as members of a team, to communicate what they know orally and visually, and to reflect on these processes as part of their own personal development.
- **Portfolios** may consist of a range of different pieces of work but routinely include a requirement that students provide some evidence of critical reflection on the development of their own learning.
- **Peer assessment:** In some cases students will be involved in marking other students' work, usually with a prescriptive marking guide. This helps students to appreciate where marks are gained and lost and gives them the opportunity to see the common mistakes made by other students.
- **Reviews** of other scholars' work test students' ability to identify and summarise the key points of a text and to evaluate the quality of arguments and the evidence used to support them. In the case of work based on empirical research, reviews also assess students' knowledge of research methodologies and their ability to make critical judgements about the appropriateness of different strategies for collecting and analysing data.

Marks are awarded for summative assessments designed to assess your achievement of learning outcomes. You will also be assessed formatively to enable you to monitor your own progress and to assist staff in identifying and addressing any specific learning needs. Feedback, including guidance on how you can improve the quality of your work, is also provided on all summative assessments within three working weeks of submission, unless there are compelling circumstances that make this impossible, and more informally in the course of tutorial and seminar discussions.

11. Contact Time and Expected Workload

This contact time measure is intended to provide you with an indication of the type of activity you are likely to undertake during this programme. The data is compiled based on module choices and learning patterns of students on similar programmes in previous years. Every effort is made to ensure this data is a realistic representation of what you are likely to experience, but changes to programmes, teaching methods and assessment methods mean this data is representative and not specific.

Undergraduate courses at Keele contain an element of module choice; therefore, individual students will experience a different mix of contact time and assessment types dependent upon their own individual choice of modules. The figures below are an example of activities that a student may expect on your chosen course by year/stage of study. Contact time includes scheduled activities such as: lecture, seminar, tutorial, project supervision, demonstration, practical classes and labs, supervised time in labs/workshop, fieldwork and external visits. The figures are based on 1,200 hours of student effort each year for full-time students.

Activity	Year 1 (Level 4)	Year 2 (Level 5)	Year 3 (Level 6)
Scheduled learning and teaching activities	28%	27%	12%
Guided independent Study	72%	73%	88%
Placements	0%	0%	0%

12. Accreditation

The programme is accredited by the Royal Society of Biology.

Students should note that to be awarded Royal Society of Biology accreditation they must achieve a minimum standard of 40% in the Life Sciences Double Experimental Project with research skills assessment (or equivalent placement module). Students that condone this module may still be eligible for the award Studies in Biochemistry

13. Regulations

The University Regulations form the framework for learning, teaching and assessment and other aspects of the student experience. Further information about the University Regulations can be found at: <http://www.keele.ac.uk/student-agreement/>

Course Regulations

1. Laboratory, lecture and tutorial classes

1.1 Wearing a laboratory coat is compulsory in all classes held in laboratories. Students will not be allowed to attend the laboratory class without a laboratory coat.

1.2 Students must wear appropriate clothing in the laboratories, including sensible footwear. Closed shoes and low heels should be worn. This is to avoid tripping and to protect the feet in the case of spillages. Long hair must be tied back. Students who are inappropriately dressed may, at the discretion of the member of staff in charge, be excluded from the class and recorded as being absent without good cause.

1.3 Students who arrive late to laboratory classes may, at the discretion of the member of staff in charge, be excluded from the class and recorded as being absent without good cause.

1.4 Students who display serious misconduct in any class may, at the discretion of the member of staff in charge, be excluded from the class and recorded as being absent without good cause. Serious misconduct involves wilful damage to property, injury or threat to persons, or persistent disruption of teaching.

1.5 The unauthorised use of mobile phones or headphones is not permitted in any class.

1.6 Students are not permitted to record, video or photograph taught sessions or meetings with staff, except with the permission in advance of the staff concerned. Permission will be given where this is part of an

approved disability adjustment. Any permission to record, video or photograph is for personal use only and all recordings, videos or photographs remain the property of the presenter and Keele University.

2. Health and Safety

Students are required to read and follow the procedures in the School of Life Sciences Safety Handbook, which is available from the Life Science Noticeboard on the KLE.

3. Attendance requirements

3.1 Attendance at tutorials, seminars, workshops and laboratory sessions on this programme is compulsory. Failure to attend a class without good cause will result in an informal warning. Failure to attend any subsequent classes without good cause will lead to the issuing of a formal University warning in accordance with Regulation 1A9 and could result in the requirement to withdraw from the university. Attendance at lectures is expected, but is not compulsory.

3.2 Self-certification of illness as a reason for absence from compulsory classes will be accepted for no more than two periods of absence, each covering no more than 7 days, per semester. Any subsequent absence for reasons of illness must be accompanied by a doctor's note.

4. Royal Society of Biology Accreditation

4.1 Students must achieve a pass standard in the Life Sciences Double Experimental Project with research skills assessment (or, subject to agreement, Double Applied Life Sciences Placement) to attain an accredited degree. For students who do not fulfil the conditions of this regulation, the degree award will be 'Studies in Biochemistry', the degree will not be accredited by the Royal Society of Biology.

5 Work Placements, Exchange Periods and Study Abroad

5.1 A student who has completed a semester abroad will not normally be eligible to transfer onto the International Year option.

14. What are the typical admission requirements for the programme?

Subject	A-level	Subjects not included	International Baccalaureate	BTEC	Access to Higher Education Diploma	GCSE requirements
Biochemistry	<p>ABB</p> <p>To include 2 Science subjects (Biology, Chemistry, Physics, Maths, Human Biology, Geology, Geography, Statistics, Environmental Science and Psychology).</p> <p>Where A level chemistry is absent, AS-level Chemistry at grade C required.</p>	None	34 to include Higher Level Chemistry at 6 or another Higher Level Science subject at 6 and Standard Level Chemistry at 5.	DDM in a Science based subject	<p>Obtain Access to HE Diploma with 30 L3 credits at Distinction and 15 L3 credits at Merit.</p> <p>You must also have taken sufficient Science credits, please contact us for advice.</p>	<p>Maths at C (or 4)</p> <p>English Language at C (or 4)</p>

Applicants who are not currently undertaking any formal study or who have been out of formal education for more than 3 years and are not qualified to A-level or BTEC standard may be offered entry to the University's Foundation Year Programme.

Applicants for whom English is not a first language must provide evidence of a recognised qualification in English language. The minimum score for entry to the Programme is Academic IELTS 6.0 or equivalent.

Please note: All non-native English speaking students are required to undertake a diagnostic English language assessment on arrival at Keele, to determine whether English language support may help them succeed with their studies. An English language module may be compulsory for some students during their first year at Keele.

Accreditation of Prior Learning (APL) is considered on a case-by-case basis and those interested should contact the Programme Director. The University's guidelines on this can be found here:

<http://www.keele.ac.uk/ga/accreditationofpriorlearning/>

15. How are students supported on the programme?

Support for student learning on the Programme is provided in the following ways:

- Module tutors are responsible for providing support for learning on the modules. They also give whole class or individual feedback on formative assessments, where appropriate, and provide individual feedback on in-course assessments and more general feedback on examinations. Every module is supported by a page on KLE, providing supplementary materials, which may include lecture notes, reading lists, module information, assessment guidance and revision materials.
- Tutors and demonstrators provide help and advice to students in laboratory sessions and project supervisors and research staff provide support during project work.
- Every student is allocated to a personal tutor who is responsible for reviewing and advising on students' academic progress in Biochemistry and on any electives they might be taking. Personal tutors also provide advice on module choices.
- Personal tutors also act as a first point of contact for students on non-academic issues that may affect their learning and can refer students on to a range of specialist health, welfare and financial services co-ordinated by the University's Student Services.
- If students are on placement, they will have a Keele-based supervisor in addition to their workplace supervisor who will visit them during their placement and support them during the write-up phase of their project.

All members of teaching staff on the Biochemistry Programme are available to see students during office hours, if available (open door policy), and by appointment.

16. Learning Resources

Biochemistry lectures are delivered in modern teaching rooms across the University, almost all of which are equipped with computers, internet access and electronic whiteboards or projection equipment. Rooms may be arranged either in traditional lecture format or more informally to allow students to work together in small groups.

Practical sessions are held in dedicated teaching laboratories within the School of Life Sciences. These were completely refitted in 2006 and the £11 million new extension to the Huxley Building providing additional teaching laboratory space was opened in 2017/18 Academic Year.

For final year projects, students will be working in research laboratories primarily in the Huxley Building, Guy Hilton Research Centre or Lennard Jones Building.

The learning resources available to students on the Programme include:

- The extensive collection of books and journals relevant to undergraduate study held in the University Library. Much of this material is also accessible online to Keele students from anywhere in the world with a University username and password.
- A smaller collection of biochemical publications and materials are held in the Undergraduate Resource Room in the School of Life Sciences. The Resource Room is open at regular times during teaching periods and the resources are specifically related to the needs of students on Principal Programmes in the School of Life Sciences. There are also networked computers and a printer in this room which can be used in addition to the University computing facilities (in the Lennard Jones Building and Library)
- The Keele Learning Environment (KLE) which provides easy access to a wide range of learning resources including lecture notes, electronic materials available in a repository maintained by the University Library and other resources – video, audio and text-based – accessible from external providers via the internet.

17. Other learning opportunities

Study abroad (semester)

Students on the Biochemistry programme have the potential opportunity to spend a semester abroad in their second year studying at one of Keele's international partner universities.

Exactly which countries are available depends on the student's choice of degree subjects. An indicative list of countries is on the website (<http://www.keele.ac.uk/studyabroad/partneruniversities/>); however this does not guarantee the availability of study in a specific country as this is subject to the University's application process for studying abroad.

No additional tuition fees are payable for a single semester studying abroad but students do have to bear the costs of travelling to and from their destination university, accommodation, food and personal costs. Depending on the destination they are studying at additional costs may include visas, study permits, residence permits, and compulsory health checks. Students should expect the total costs of studying abroad to be greater than if they study in the UK, information is made available from the Global Education Team throughout the process, as costs will vary depending on destination

Whilst students are studying abroad any Student Finance eligibility will continue, where applicable students may be eligible for specific travel or disability grants. Students studying in Erasmus+ destinations may be eligible for grants as part of this programme. Students studying outside of this programme may be eligible for income dependent bursaries at Keele.

Students travel on a comprehensive Keele University insurance plan, for which there are currently no additional charges. Some governments and/or universities require additional compulsory health coverage plans; costs for this will be advised during the application process.

Study Abroad (International Year)

A summary of the International Year, which is a potential option for students after completion of year 2 (Level 5), is provided at Annex A.

Work placement

Students registered for Biochemistry programmes may apply to undertake a work placement between levels 5 and 6. This forms part of the Applied Life Sciences Placement module at Level 6.

Students wishing to carry out a work placement in the UK will be responsible for organising their own placement, with the support of the placement tutor. This allows students to choose when and where to carry out their work placement, taking into consideration the potential living and travel expenses incurred and the

effect on other opportunities available to earn money. Students are encouraged to consider the potential costs incurred in carrying out the work placements at the time of setting these up. Some placements attract a stipend or salary, which should be discussed with the potential employer before accepting the placement. They are also liable for University fees (at a reduced rate) whilst on placement. Further guidance and support on these considerations is available from the module tutors.

Some Work placements are available at our partner research institutes throughout continental Europe. These placements have in the past attract a stipend from the European Union under the ERASMUS, but the situation re Brexit is not clear, and you should consider whether any amount offered will cover the costs of accommodation, travel and subsistence before accepting the placement. The ERASMUS tutor in the School of Life Sciences will give any guidance and support required.

Other opportunities

There may also be opportunities to undertake a final year project abroad via a partner institute in Malaysia (see: noticeboards in the School of Life Sciences for details) or via an external agency such as Operation Wallacea (<http://opwall.com/>). Both these options will have cost implications.

There are a number of schemes available from e.g. the Wellcome Trust that provide bursaries for students to gain laboratory experience in the summer vacation between their 2nd and 3rd years. Staff in Life Sciences have hosted these bursaries in the past and students who are interested can approach staff, who will have to submit an application on the students' behalf to the funding bodies (usually in January or February). Staff may also be willing to host students in their laboratories during the summer vacation on a voluntary basis.

Other learning opportunities for Biochemistry students vary from year to year but include the opportunity to hear from, and talk to, a range of guest speakers and presenters including researchers from around the world. Some of these activities are timetabled as part of taught modules, others are organised separately but are widely advertised and undergraduate students are always welcome to attend.

18. Additional costs

Activity	Estimated cost
Field courses - compulsory	£N/A
Field courses – optional	£N/A
Equipment Text books (mainly require in levels 4 and 5) Calculator and writing materials	£250
Travel	£N/A
Other additional costs Replacement lab coat if allocated one is lost	£12
Total estimated additional costs	£262

These costs have been forecast by the University as accurately as possible but may be subject to change as a result of factors outside of our control (for example, increase in costs for external services). Forecast costs are reviewed on an annual basis to ensure they remain representative. Where additional costs are in direct control of the University we will ensure increases do not exceed 5%.

As to be expected there will be additional costs for inter-library loans and potential overdue library fines, print and graduation.

We do not anticipate any further costs for this undergraduate programme.

19. Quality management and enhancement

The quality and standards of learning in Biochemistry are subject to a continuous process of monitoring, review and enhancement.

- The Learning and Teaching Committee of the School of Life Sciences is responsible for reviewing and monitoring quality management and enhancement procedures and activities across the School.
- Individual modules and the Biochemistry Programme as a whole are reviewed and enhanced every year in the annual programme review which takes place at the end of the academic year and as part of the University's Curriculum Annual Review and Development (CARD) process.
- The programmes are run in accordance with the University's Quality Assurance procedures and are subject to periodic reviews under the Internal Quality Audit (IQA) process.

Student evaluation of, and feedback on, the quality of learning on every Biochemistry module takes place every year using a variety of different methods:

- The results of student evaluations of all modules are reported to module leaders and reviewed by the Programme Committee as part of the Curriculum Annual Review and Development (CARD) process.
- Findings related to the Biochemistry Programme from the annual National Student Survey (NSS), and from regular surveys of the student experience conducted by the University, are subjected to careful analysis and a planned response at programme and School level.
- Feedback received from representatives of students in all three years of the Biochemistry Programme is considered and acted on at regular meetings of the Student Staff Voice Committee.

The University appoints senior members of academic staff from other universities to act as external examiners on all programmes. They are responsible for:

- Approving examination questions
- Confirming all marks which contribute to a student's degree
- Reviewing and giving advice on the structure and content of the programme and assessment procedures

Information about current external examiner(s) can be found here:

<http://www.keele.ac.uk/qa/externalexaminers/currentexternalexaminers/>

20. The principles of programme design

The Biochemistry Programme described in this document has been drawn up with reference to, and in accordance with the guidance set out in, the following documents:

- UK Quality Code for Higher Education, Quality Assurance Agency for Higher Education: <http://www.qaa.ac.uk/quality-code>
- QAA Subject Benchmark Statement: Biosciences (2015) http://www.qaa.ac.uk/docs/qaa/subject-benchmark-statements/sbs-biosciences-15.pdf?sfvrsn=4eef781_24
- Royal Society of Biology Degree Accreditation Handbook: https://www.rsb.org.uk/images/Degree_Accreditation_Handbook_July16.pdf
- Keele University Regulations and Guidance for Students and Staff: <http://www.keele.ac.uk/regulations>

21. Document Version History

Date of first approved version (v1.0):

Revision history

Version number ¹	Author	Date	Summary of and rationale for changes
V1.1	Sheila Hope	Sep 2017	Minor changes as requested by FLTC. Changed references

¹ 1.1, 1.2 etc. are used for minor changes and 2.0, 3.0 etc. for major changes (as defined in the University's Guidance on processes supporting curriculum changes)

			to industrial placement to work placement; completed additional costs table; removed references to electives on module table and the indication of the number of modules students choose.
V2.0	David Watson	May 2019	Removal of Developmental Biology as an optional module at level 6 (this module has not been a popular option amongst the cohort and other optional modules are better aligned with the subject area); Medical Glycobiology moved from 'optional' to 'core', as part of on-going developments of the single honours programme in-line with RSB accreditation requirements for an enhanced chemistry theme in the course (content of this module more closely reflects this aspect of the course than other level 6 optional modules)

Annex A

Biochemistry with International Year

International Year Programme

Students registered for Single Honours Biochemistry may either be admitted for or apply to transfer during their period of study at Level 5 to the Single Honours 'Biochemistry with International Year'. Students accepted onto this programme will have an extra year of study (the International Year) at an international partner institution after they have completed Year 2 (Level 5) at Keele.

Students who successfully complete both the second year (Level 5) and the International Year will be permitted to progress to Level 6. Students who fail to satisfy the examiners in respect of the International Year will normally revert to the Single Honours 'Biochemistry with International Year' and progress to Level 6 on that basis. The failure will be recorded on the student's final transcript.

Study at Level 4, Level 5 and Level 6 will be as per the main body of this document. The additional detail contained in this annex will pertain solely to students registered for 'Biochemistry with International Year'.

International Year Programme Aims

In addition to the programme aims specified in the main body of this document, the international year programme of study aims to provide students with:

1. Personal development as a student and a researcher with an appreciation of the international dimension of their subject
2. Experience of a different culture, academically, professionally and socially

Entry Requirements for the International Year

Students may apply to the 4-year programme during Level 5. Admission to the International Year is subject to successful application, interview and references from appropriate staff.

The criteria to be applied are:

- Academic Performance (an average of 60% across all modules at Level 5 is normally required)
- General Aptitude (to be demonstrated by application for study abroad, interview during the 2nd semester of year 2 (Level 5), and by recommendation of the student's personal tutor, 1st and 2nd year tutors and programme director)

Student Support

Students will be supported whilst on the International Year via the following methods:

- Phone or Skype conversations with Study Abroad tutor, in line with recommended Personal Tutoring meeting points.
- Support from the University's Global Education Team

Learning Outcomes

In addition to the learning outcomes specified in the main text of the Programme Specification, students who complete a Keele undergraduate programme with International Year will be able to:

- i) Describe, discuss and reflect upon the cultural and international differences and similarities of different learning environments
- ii) Discuss the benefits and challenges of global citizenship and internationalisation
- iii) Explain how their perspective on their academic discipline has been influenced by locating it

within an international setting.

In addition, students who complete 'Biochemistry with International Year' will be able to:

- iv) Use independent research skills to identify relevant information resources on a range of subjects related, or complementary, to Biochemistry.
- v) Demonstrate the use of critical thinking skills, augmented by creativity and curiosity, in discussing the application of their International Year studies to Biochemistry.

These learning outcomes will all be assessed by the submission of a satisfactory individual learning agreement, the successful completion of assessments at the partner institution and the submission of the reflective portfolio element of the international year module.

Course Regulations

Students registered for the 'Biochemistry with International Year' are subject to the course specific regulations (if any) and the University regulations. In addition, during the International Year, the following regulations will apply:

Students undertaking the International Year must complete 120 credits, which must comprise *at least 40%* in the student's discipline area.

This may impact on your choice of modules to study, for example you will have to choose certain modules to ensure you have the discipline specific credits required.

Students are barred from studying any Biochemistry module with significant overlap to Level 6 modules to be studied on their return. Significant overlap with Level 5 modules previously studied should also be avoided.

Additional costs for the International Year

Tuition fees for students on the International Year will be charged at 15% of the annual tuition fees for that year of study, as set out in Section 1. The International Year can be included in your Student Finance allocation, to find out more about your personal eligibility see: www.gov.uk

Students will have to bear the costs of travelling to and from their destination university, accommodation, food and personal costs. Depending on the destination they are studying at additional costs may include visas, study permits, residence permits, and compulsory health checks. Students should expect the total costs of studying abroad be greater than if they study in the UK, information is made available from the Global Education Team throughout the process, as costs will vary depending on destination.

Students studying in Erasmus+ destinations may be eligible for grants as part of this programme. Students studying outside of this programme may be eligible income dependent bursaries at Keele.

Students travel on a comprehensive Keele University insurance plan, for which there are currently no additional charges. Some Governments and/or universities require additional compulsory health coverage plans; costs for this will be advised during the application process.