Programme Specification: Undergraduate

For students starting in Academic Year 2018/2019

1. Course Summary

Names of programme(s) and award title(s)	iBSc (Hons) Natural Sciences: Intercalated Bachelor Degree in Natural Sciences (Biochemistry) Intercalated Bachelor Degree in Natural Sciences (Neuroscience) Intercalated Bachelor Degree in Natural Sciences (Studies in Biomedical Sciences)
Award type	Intercalated
Mode of study	Full time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 6
Duration	1 year
Location of study	Keele University – main campus
Accreditation (if applicable)	Not applicable
Regulator	Higher Education Funding Council for England (HEFCE)
Tuition Fees	**UK/EU students:** Fee for 2017/18 is £9,250* **International students:** Fee for 2017/18 is £15,480**
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.*

2. What is an Intercalated degree programme?

Keele School of Medicine students can opt to take a year out of their undergraduate medical studies in order to study a subject area in greater depth, before returning to complete the medical course; this is called an intercalated degree. Undergraduates may suspend their medical degree for a period of 12 months to undertake either a Bachelor's degree after Year 2 or Bachelor's/Master's degree after Year 4.

** 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/*

An intercalated degree provides an opportunity to acquire a better understanding of basic biomedical sciences, medical humanities, research methodologies and to pursue an additional qualification in a medicine-related subject that interests you. This may help you make informed choices about specialisation later on in your career, and increase your chances of successfully gaining employment within the healthcare system, particularly if you wish to pursue a medical academic career. Other benefits could include the improvement of long-term career prospects, as you will have had the opportunity to gain key research skills, publish scientific papers, and make presentations at scientific conferences.

3. Overview of the Programme

Intercalation offers several benefits for a medical career including an opportunity to (i) study a subject of interest in greater depth; (ii) acquire a better understanding of basic principles and key issues in biomedical sciences, laboratory and clinical research based experimental methodologies and analytical tools; (iii) gain an additional qualification in a medicine-related subject to enhance student CVs; (iv) make informed choices about specialisation later in a medical career; (v) potentially increase the chance of successfully gaining employment within the healthcare system, particularly for those wishing to pursue a medical academic career; (vi) potentially improve long-term career prospects by gaining key scientific skills, publishing scientific papers, and making presentations at scientific conferences; (vii) engage with students and researchers from a diverse range of disciplines, thereby expanding the student's scientific perspective.

The iBSc programme in Natural Sciences has been developed with a view to offering Bachelor's intercalation routes to medical intercalators, as no such option currently exists within Keele, within biomedical disciplines. The iBSc has been tailored using a combination of existing courses (and Level 6 modules) that will form 'named routes' within the iBSc; a student will study the core and optional modules for their chosen named route. Intercalating students must successfully complete 120 credits (Level 6) in their chosen route to be awarded the Intercalated Bachelor Degree in Natural Sciences (Named route). Entry into individual modules will need to be agreed in consultation with the respective module leader to ensure that the module pre-requisites are satisfied, and the medical students have the necessary knowledge base and/or research skills to complete the module.

The name of the award will then be styled iBSc [Named route] as listed below. Detailed programme specifications for each programme can be found on the Keele Quality Assurance website http://www.keele.ac.uk/qa/programmespecifications/. Please check the website for the most current versions of programme option.

Intercalated Bachelor Degree in Natural Sciences [Biochemistry]
Intercalated Bachelor Degree in Natural Sciences [Neuroscience]
Intercalated Bachelor Degree in Natural Sciences [Studies in Biomedical Sciences]

N.B. The award of iBSc Studies in Biomedical Sciences is not accredited by the Institute of Biomedical Science.

4. Aims of the Programme

The broad aims of the programme are to:

- Provide you with core knowledge, understanding and skills relevant to a range of biomedical disciplines.
- Cultivate interest in the biosciences, within a caring and intellectually stimulating environment.
- Explore selected areas of human biology including human health and disease.
- Develop systematic and scientific understanding, and facilitate the progressive development of critical thinking and independent learning, and to apply these skills to specialist subject areas.
- Develop critical use of relevant literature, interpret data and text, evaluate evidence, abstract and synthesise information and make critical judgements.
- Transfer knowledge of current theories and research in selected areas of human biology.

- Transfer knowledge of relevant scientific terminology and its correct usage.
- Where relevant, provide training in the use a range of laboratory techniques, design, conduct, analyse, report and evaluate experiments, recognise philosophical and ethical issues relevant to the subject and work safely and responsibly in the laboratory, with awareness of standard procedures.
- Where relevant, train you to process and present data using appropriate techniques, work effectively with a range of types of information technology, communicate effectively by written, spoken and graphical means.
- Train you to clearly understand the relevance of scientific research for improving the quality of life in health and disease.
- Develop a range of graduate attributes that transfer across different disciplines and provide a solid foundation for both further study after graduation and a range of careers.
- 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.

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)

(i) Intercalated Bachelor Degree in Natural Sciences [Biochemistry]

Subject knowledge and understanding

Successful students will be able to demonstrate knowledge and understanding of:

- U3 Selected areas of the core curriculum listed above, or other non-core topics including: clinical pathology, advances in medicine, human parasitology
- U4 The methods by which biochemical data are obtained, including analytical and preparative laboratory techniques
- U5 The scientific method, formulation and testing of hypothesis, and understanding that biochemical knowledge is complex, contested and subject to continuous scientific advance
- U6 The terminology and nomenclature of the discipline
- U7 Current developments in biochemistry and molecular biology including areas of ethical or public concern

Subject specific skills

Successful students will be able to:

- S1 use a range of techniques for the acquisition and analysis of information relevant to the subject
- S2 use a range of laboratory techniques
- S3 apply biochemical understanding to familiar and unfamiliar problems
- S4 design, conduct, analyse, report and evaluate biochemical experiments
- S5 recognise philosophical and ethical issues relevant to the subject
- S6 work safely and responsibly in the laboratory with awareness of standard procedures

Intellectual skills

Successful students will be able to:

- I1 assess the merits of contrasting theories and explanations
- I2 analyse and solve problems
- I3 make reasoned decisions
- I4 make critical interpretations of data and text
- I5 evaluate evidence and make critical judgements
- I6 abstract and synthesise information
- I7 develop a reasoned argument
- I8 take responsibility for their own learning and reflect upon that learning

Key or transferable skills (including employability skills)

Successful students will be able to:

- E1 develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity
- E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources
- E3 process and present data using appropriate techniques
- E4 work effectively with a range of types of information technology
- E5 communicate effectively by written, spoken and graphical means using appropriate techniques
- E6 study independently and have organisational skills
- E7 work alone or with others to achieve an objective
- E8 motivate themselves and sustain that motivation over an extended period of time

(ii) Intercalated Bachelor Degree in Natural Sciences [Neuroscience]

Subject knowledge and understanding

Successful students will be able to demonstrate knowledge and understanding of:

- U1 selected areas of neuroscience including brain anatomy and function
- U2 neural function from the single cell level to simple neural networks
- U3 current theories and research in selected areas of neuroscience
- U4 relevant scientific terminology
- U5 the relevance of neuroscience to medical problems and improving the quality of life

Subject specific skills

Successful students will be able to:

- S1 use a range of techniques for the acquisition and analysis of information relevant to the subject
- S2 use a range of laboratory techniques
- S3 apply subject specific understanding to familiar and unfamiliar problems
- S4 design, conduct, analyse, report and evaluate experiments
- S5 recognise philosophical and ethical issues relevant to the subject
- S6 work safely and responsibly in the laboratory or the field, with awareness of standard procedures

Intellectual skills

Successful students will be able to:

- I1 assess the merits of contrasting theories and explanations
- I2 analyse and solve problems
- I3 make reasoned decisions

- I4 make critical interpretations of data and text
- I5 evaluate evidence and make critical judgements
- I6 abstract and synthesise information
- I7 develop a reasoned argument
- I8 take responsibility for their own learning and reflect upon that learning

Key or transferable skills (including employability skills)

Successful students will be able to:

- E1 develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity
- E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources
- E3 process and present data using appropriate techniques
- E4 work effectively with a range of types of information technology
- E5 communicate effectively by written, spoken and graphical means using appropriate techniques
- E6 study independently and have organisational skills
- E7 work alone or with others to achieve an objective
- E8 motivate themselves and sustain that motivation over an extended period of time

(iii) Intercalated Bachelor Degree in Natural Sciences [Studies in Biomedical Sciences]

Subject knowledge and understanding

Successful students will be able to demonstrate knowledge and understanding of:

- U1 integrate knowledge of the core science and specialist subject areas through study of the biology of disease
- U2 demonstrate knowledge and understanding of the methods by which biomedical data are obtained, including analytical and preparative laboratory techniques
- U3 demonstrate a critical understanding of the scientific method, formulation and testing of hypotheses and understanding that scientific knowledge is complex, contested and subject to continuous advance
- U4 use appropriately the terminology and nomenclature of the discipline
- U5 demonstrate awareness of current developments in Biomedical Science including areas of ethical or public concern
- U6 demonstrate the ability to mine, manipulate and interpret data from small molecule and macromolecular databases
- U7 the interdisciplinary nature of science and the validity of different points of view

Practical skills

Successful students will be able to:

- P1 use a range of laboratory techniques for the acquisition and analysis of information relevant to the subject
- P2 design, conduct, analyse, report and evaluate biomedical experiments
- P3 work safely and responsibly in the laboratory with awareness of standard procedures, COSHH and good laboratory practice (GLP)
- P4 apply biomedical understanding to familiar and unfamiliar problems
- P5 apply scientific method, planning and analytical skills to carry out a research project
- P6 recognise philosophical and ethical issues relevant to the subject

Intellectual skills

Successful students will be able to:

- I1 Assess the merits of contrasting theories and explanations and develop reasoned arguments
- I2 Identify, analyse and solve problems, whether familiar or unfamiliar, individually and/or co-operatively
- I3 Make reasoned decisions
- I4 Evaluate evidence and make critical judgements
- I5 Abstract and synthesise information and make critical interpretations of data and text
- I6 Take responsibility for their own learning and reflect upon that learning
- I7 construct grammatically correct documents in an appropriate academic style, using and referencing relevant ideas and evidence
- I8 understand the importance of academic and research integrity

Key or transferable skills (including employability skills)

Successful students will be able to:

- E1 develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity
- E2 acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources: textual, numerical, verbal and graphical
- E3 prepare, process and present data using appropriate qualitative and quantitative techniques: statistical programmes, spreadsheets and programmes for presenting data visually
- E4 use the internet and other electronic resources effectively and critically, as a means of communication and a source of information
- E5 communicate effectively by written, spoken and graphical means using appropriate techniques and scientific language
- E6 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
- E7 develop skills necessary for self-managed and lifelong learning, including working independently, organisational, enterprise and knowledge transfer skills
- E8 motivate themselves and sustain that motivation over an extended period of time
- E9 cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism, whether intentional or not

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 named route taken. 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 from a clinical or research-based area
- **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

- **Practical sessions in laboratories** are important and involve the study of processes relevant to neuroscience, biomedical sciences or biochemistry (dependent on the named route) and provide training in 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. Some tutorials and seminars consist largely of student presentations and some 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
- For those who choose to take the **dissertation** module in neuroscience or biochemistry (dependent on named route), the opportunity to undertake a piece of independent study supervised and supported by a member of staff
- The **Experimental project** module in neuroscience, biochemistry or biomedical sciences (dependent on named route) provides the opportunity to undertake a piece of independent experimental research supervised and supported by a member of staff. The independent project may be experimental, non-experimental or dissertation based

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.

7. Teaching Staff

The current teaching staff are mainly from the Faculty of Natural Sciences and some teaching staff from the School of Medicine, the University Hospital of North Staffordshire and the Guy Hilton Research Centre also contribute to the Programme. Most staff are active in research.

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.

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 two 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.

A summary of the credit requirements per year is as follows:

Route	Compulsory	Optional		Electives	
		Min	Max	Min	Max
Biochemistry	60	60	60	0	0
Neuroscience	120	0	0	0	0
Biomedical Sciences	60	60	60	0	0

For a student to be awarded the iBSc, they will be required to undertake the appropriate modules, and to satisfactorily meet the assessment outcomes, as specified in their named routes' programme specifications.

See below details for:

Intercalated Bachelor Degree in Natural Sciences [Biochemistry]
Intercalated Bachelor Degree in Natural Sciences [Neuroscience]
Intercalated Bachelor Degree in Natural Sciences [Studies in Biomedical Sciences]

Module lists

(i) Intercalated Bachelor Degree in Natural Sciences [Biochemistry] – Current Course Lead Dr Sheila Hope, s.a.hope@keele.ac.uk

(Level 6)

Compulsory modules	Credits	Optional modules	Credits
Life Sciences Double Experimental Project (with Research Skills Assessment)	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	Medical Glycobiology *(available from 2019)*	15
		Biology of Disease	15
		Developmental Biology	15

(ii) Intercalated Bachelor Degree in Natural Sciences [Neuroscience] - Current Course Lead Dr Michael Evans, m.g.evans@keele.ac.uk

(Level 6)

Compulsory modules	Credits	Optional modules	Credits
Behavioural Neuroscience	15	None	
Brain Disease	15		
Special Senses	15		
Current Research Topics in Neuroscience	15		
Regeneration and Repair in the Nervous System	15		
Life Sciences Double Experimental Project (with Research Skills Assessment)	30		
Life Sciences Non-Experimental Project Or Life Sciences Dissertation	15 15		

(iii) Intercalated Bachelor Degree in Natural Sciences - Studies in Biomedical Sciences - Current Course lead Dr Anne Loweth, a.c.loweth@keele.ac.uk

(Level 6)

Compulsory modules	**Credits**	**Optional modules** *N.B. Students choose 4 modules from the optional choices*	**Credits**
Biology of Disease	15	Structural Biology & Macromolecular Function	15
Bioinformatics & Science Communication	15	Brain Disease	15
Life Sciences Double Experimental Project (with research skills assessment)	30	Advances in Medicine	15
		Human Parasitology	15
		Case Studies in Biomedical Science	15
		Clinical Pathology	15
		Developmental Biology	15
		Biomedical Engineering	15
		Cancer Biology	15

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

Learning Outcomes

(i) Intercalated Bachelor Degree in Natural Sciences [Biochemistry]

Subject Knowledge and Understanding		
Learning Outcome (all at Level 6: the stated outcomes are achieved by taking any of the modules offered as either programme cores or programme approved electives) *Successful students will be able to demonstrate knowledge & understanding of:*	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
U3 At Level 6, selected areas of the core curriculum listed above, or other non- core topics including: clinical pathology, advances in medicine, human parasitology	Advances in Medicine, Human Parasitology, Structural Biology & Macromolecular, Biology of Disease	Essays, paper comprehension, posters, oral presentations, end of module examinations, dissertations
U4 The methods by which biochemical data are obtained, including analytical and preparative laboratory techniques	All modules	Multiple-choice class tests and examinations, lab reports, project reports
U5 The scientific method, formulation and testing of hypothesis, and understanding that biochemical knowledge is complex, contested and subject to continuous scientific advance	All modules	Essays, laboratory reports, examinations, project reports
U6 The terminology and	All modules	Essays, reports, examinations,

nomenclature of the discipline		project reports
U7 Current developments in biochemistry and molecular biology including areas of ethical or public concern	All modules	Essays, reports, examinations, project reports, literature reviews
S1 use a range of techniques for the acquisition and analysis of information relevant to the subject	All modules with practical sessions, particularly project modules	Laboratory reports, laboratory performance, data analysis exercises, project reports
S2 use a range of laboratory techniques	All modules with practical sessions and experimental projects	Laboratory reports, laboratory performance, data analysis exercises, project reports
S3 apply biochemical understanding to familiar and unfamiliar problems	All modules	Essays, project reports
S4 design, conduct, analyse, report and evaluate biochemical experiments	All modules with practical sessions and project modules	Laboratory reports, laboratory performance, data analysis exercises, project reports
S5 recognise philosophical and ethical issues relevant to the subject	All modules, particularly project modules	Essays, multiple choice tests, case studies, ethical review of project, computer exercise (blog)
S6 work safely and responsibly in the laboratory with awareness of standard procedures	All modules with practical sessions and experimental projects	Laboratory reports, project reports
I1 assess the merits of contrasting theories and explanations	All modules	Essays, reports, examinations, project reports, literature review
I2 analyse and solve problems	All modules with practical sessions and project modules	Laboratory reports, project reports
I3 make reasoned decisions	All modules	Essays, project reports
I4 make critical interpretations of data and text	Experimental Project and taught modules	Essays, data analysis exercises, project reports
I5 evaluate evidence and make critical judgements	Experimental Project and taught modules	Essays, data analysis exercises, project reports
I6 abstract and synthesise information	Experimental Project and taught modules	Essays, project reports
I7 develop a reasoned argument	Taught modules and project modules	Essays and project reports
I8 take responsibility for their own learning and reflect upon that learning	All modules	Laboratory performance
E1 develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity	All modules	Essays, experimental projects, laboratory performance
E2 acquire, analyse, synthesise, summarise and present information	All modules, particularly project modules	Essays, project reports, posters, oral presentations, literature

and ideas from a wide range of sources		reviews
E3 process and present data using appropriate techniques	All modules with practical sessions, particularly project modules	Project reports, data analysis exercises, laboratory reports
E4 work effectively with a range of types of information technology	Many modules, particularly project modules	Presentations, data analysis exercises, project reports, bioinformatics report
E5 communicate effectively by written, spoken and graphical means using appropriate techniques	All modules, particularly project modules	Essays, reports, presentations, project reports
E6 study independently and have organisational skills	All modules, particularly project modules	Essays, project reports
E7 work alone or with others to achieve an objective	All modules, particularly project modules	Essays, presentations, project reports
E8 motivate themselves and sustain that motivation over an extended period of time	All modules, particularly Experimental Project	Laboratory performance, experimental project

(ii) Intercalated Bachelor Degree in Natural Sciences [Neuroscience]

Knowledge and understanding		
Level Outcome	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
U1 selected areas of neuroscience including brain anatomy and function	All modules	All assessments
U2 neural function from the single cell level to simple neural networks	All modules	All assessments
U3 current theories and research in selected areas of neuroscience	All modules	All assessments
U4 relevant scientific terminology	All modules	All assessments
U5 the relevance of neuroscience to medical problems and improving the quality of life	All modules	Essays, reports, examinations, project reports, dissertations
Subject-specific skills		
Level Outcome	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
S1. Use a range of techniques for the acquisition and analysis of information relevant to the subject	All modules with practical sessions	Laboratory reports, laboratory performance, data analysis exercises, project reports, dissertations
S2. Use a range of laboratory	All modules with practical sessions	Laboratory reports, laboratory performance, data analysis

techniques		exercises, project reports, dissertations
S3. Apply subject-specific understanding to familiar and unfamiliar problems	All modules	Essays, project reports, dissertations
S4. Design, conduct, analyse, report and evaluate experiments	All modules with practical sessions	Laboratory reports, laboratory performance, data analysis exercises, project reports, dissertations
S5. Recognise philosophical and ethical issues relevant to the subject	ISPs	Dissertations, essays, multiple choice tests
S6. Work safely and responsibly in the laboratory, with awareness of standard procedures	All modules with practical sessions	Laboratory reports, project reports
Intellectual skills		
Outcome Successful students will be able to:	**Module**	**Assessment**
I1. Assess the merits of contrasting theories and explanations	All modules	Essays, reports, examinations, project reports, dissertations
I2. Analyse and solve problems	All modules with a practical component	Laboratory reports, project reports, dissertations
I3. Make reasoned decisions	All modules	Essays, project reports, dissertations
I4. Make critical interpretations of data and text	All modules	Essays, data analysis exercises. Project reports, dissertations
I5. Evaluate evidence and make critical judgements	All modules	Essays, data analysis exercises, project reports, dissertations
I6. Abstract and synthesise information	All modules	Essays, project reports, dissertations
I7. Develop a reasoned argument	All modules	Essays, project reports, dissertations
I8. Take responsibility for their own learning and reflect upon that learning	All modules	Laboratory performance, Personal Development Planning
Employability skills		
Level Outcome	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
E1. Develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity	All modules	Essays, dissertations, experimental projects. Laboratory performance

E2. Acquire, analyse, synthesise, summarise and present information and ideas from a wide range of sources	All modules, particularly ISPs	Essays, dissertations
E3. Process and present data using appropriate techniques	All modules with practical sessions, particularly Experimental Project	Project reports, data analysis exercises, laboratory reports
E4. Work effectively with a range of types of information technology	All modules	Presentations, data analysis exercises, project reports
E5. Communicate effectively by written, spoken and graphical means using appropriate techniques	All modules	Essays, reports, presentations, project reports, dissertations
E6. Study independently and have organisational skills	All modules, particularly level 6 ISPs	Essays, dissertations, project reports
E7. Work alone or with others to achieve an objective	All modules	Essays, dissertations, project reports
E8. Motivate themselves and sustain that motivation over an extended period of time	All modules	Laboratory performance, dissertation, experimental project

(iii) Intercalated Bachelor Degree in Natural Sciences [Studies in Biomedical Sciences]

Level Outcome	**Module in which this is delivered**	**Principal forms of assessment (of the Level Outcome) used**
Knowledge and understanding		
Successful students will:		
U1 integrate knowledge of the core science and specialist subject areas through study of the biology of disease	All modules	Essays, reports, examinations, project reports, dissertation
U2 demonstrate knowledge and understanding of the methods by which biomedical data are obtained, including analytical and preparative laboratory techniques	All modules	Essays, reports, examinations, project reports, dissertation
U3 demonstrate a critical understanding of the scientific method, formulation and testing of hypotheses and understanding that scientific knowledge is complex, contested and subject to continuous advance	All modules, particularly the project module	Essays, reports, examinations, project report, dissertation
U4 use appropriately the terminology and nomenclature of the discipline	All modules	All assessments
U5 be aware of current developments in Biomedical Science including areas of	All modules	Essays, reports, examinations, project report

	ethical or public concern		
U6	be able to demonstrate the ability to mine, manipulate and interpret data from small molecule and macromolecular databases	Acquisition, Analysis and Communication of Information	Bioinformatics report
U7	develop an appreciation of the interdisciplinary nature of science and of the validity of different points of view	All modules, particularly the project module and dissertation	Literature reviews, project reports
Practical skills			
Successful students will be able to:			
P1	use a range of laboratory techniques for the acquisition and analysis of information relevant to the subject	Research project	Laboratory performance, data analysis, project report
P2	design, conduct, analyse, report and evaluate biomedical experiments	All modules with practical sessions and project/placement modules	Laboratory reports, laboratory performance, data analysis exercises, project reports
P3	work safely and responsibly in the laboratory with awareness of standard procedures, COSHH and good laboratory practice (GLP)	Research project	Project report
P4	apply biomedical understanding to familiar and unfamiliar problems	All modules	Laboratory performance, data analysis, project report, dissertation
P5	apply scientific method, planning and analytical skills to carry out a research project	Research project	Project report
P6	recognise philosophical and ethical issues relevant to the subject	All modules, particularly Case Studies in Biomedical Science	Essays, examinations, project report, dissertations, poster presentation,
Intellectual skills			
Successful students will be able to:			
I1	assess the merits of contrasting theories and explanations and develop reasoned arguments	All modules	Essays, examinations, project report, dissertation
I2	identify, analyse and solve problems, whether familiar or unfamiliar, individually and/or co-operatively	Research project, Biology of Disease, Case Studies in Biomedical Science	Project report, dissertation, essays, poster presentation
I3	make reasoned decisions	All modules	Essays, project report, dissertation
I4	evaluate evidence and make critical judgements	Research project, Biology of Disease and taught modules,	Essays, data analysis, project report, dissertation
I5	abstract and synthesise information and make critical interpretations of data and text	Research project, Biology of Disease and taught modules	Essays, data analysis, project report, dissertation
I6	take responsibility for their own	Research project, Biology of	Essays, project report, dissertation,

learning and reflect upon that learning	Disease	laboratory performance, Personal Development Planning
I7 Construct grammatically correct documents in an appropriate academic style, using and referencing relevant ideas and evidence	All modules where there are written assessments	All assessments
I8 Understand the importance of academic and research integrity	All modules especially those with associated laboratory work	All written work especially project report
Employability skills		
Successful students will be able to:		
E1. develop and sustain effective approaches to learning and study, including time management, flexibility, 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 and graphical	All modules, particularly Case Studies in Biomedical Science, research project, Biology of Disease	Essays, dissertation, oral and poster presentations
E3. Prepare, process and present data using appropriate qualitative and quantitative techniques: statistical programmes, spreadsheets and programmes for presenting data visually	Research project	Project report, data analysis exercise
E4. use the internet and other electronic sources, effectively and critically, as a means of communication and a source of information	Many modules, particularly Research project	Presentations, data analysis, project reports
E5. communicate effectively by written, spoken and graphical means using appropriate techniques	All modules	Essays, presentations, project report, dissertation
E6. 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	Several modules will have some element of group work, particularly Case Studies in Biomedical Science	Tutorial engagement
E7.develop skills necessary for self-managed and lifelong learning, including working independently, organisational, enterprise and knowledge transfer skills	All modules, particularly Biology of Disease, Case Studies in Biomedical Science	Essays, dissertation, project report
E8. motivate themselves and sustain that motivation over an	All modules, particularly Biology of Disease, research project	Dissertation, experimental project

extended period of time		
E9. Cite and reference work in an appropriate manner, ensuring academic integrity and the avoidance of plagiarism whether intentional or not	All modules	All assessments where outside sources are used

9. Final and intermediate awards

The single exit route for this programme will be the award of an Intercalated BSc (Hons) in Natural Sciences (Named Route) in one of the listed biomedical disciplines requiring successful completion of 120 credits at Level 6.

10. How is the Programme assessed?

The wide variety of assessment methods used within Natural Sciences 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 Natural Sciences:

(i) Intercalated Bachelor Degree in Natural Sciences - Biochemistry

- **Unseen examinations** in different formats test students' knowledge and understanding of biochemistry. Examinations may consist of essay, short answer and/or multiple choice questions, paper comprehension
- **Essays** including those based on case study material and literature reviews (such as non- experimental project) 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
- **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
- **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 course and develop the skills necessary to enable students to present and analyse their results
- **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
- **Non-experimental projects** test non-laboratory research skills including those as described above for essays and literature reviews and also data analysis, bioinformatics etc.
- **Oral and poster presentations** and reports assess 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
- **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

(ii) Intercalated Bachelor Degree in Natural Sciences - Neuroscience

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 from a clinical or research-based area
- **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
- **Practicals** in laboratories are particularly important and involve the study of processes relevant to neuroscience 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. Some tutorials and seminars consist largely of student presentations and some 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
- For those who choose to take the **dissertation** module in Neuroscience in their final year, the opportunity to undertake a piece of independent study supervised and supported by a member of staff
- For those who choose to take the **experimental project module**, 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 tutors 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 neuroscience and its component subjects such as physiology and genetics
- Seminars, tutorials and online discussions provide opportunities for students to ask questions about the subject, 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 insight into the practical aspect of neuroscience and use a range of relevant scientific 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

(iii) Intercalated Bachelor Degree in Natural Sciences - Studies in Biomedical Sciences

The function of the assessments listed in the table above is to test students' achievement of the learning outcomes. For example:

- **Unseen examinations** in different formats test students' knowledge and understanding of biology. Examinations may consist of essay, short answer and/or multiple choice questions.
- **Essays**, including those based on case study material, 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.

- **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.
- **Dissertations** are critical reviews of other scholars' work and 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.
- **Experimental projects** test students' knowledge of research methodologies and their ability to carry them out. They also enable students to demonstrate their ability to formulate research questions, design experiments, carry them out and analyse the results.
- **Oral and poster presentations** and reports assess 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.
- **Critical reflection** is an increasingly important skill, used more and more in the workplace, particularly the health care professions, to underpin Continuing Professional Development. It strengthens individuals' abilities to learn from experience by requiring them to think carefully and write about what and how they have learnt in a given experience, and how it would inform their future practice

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 3 (Level 6) Biochemistry**	**Year 3 (Level 6) Neuroscience**	**Year 3 (Level 6) Biomedical Sciences**
Scheduled learning and teaching activities	12%	14%	12%
Guided independent Study	88%	86%	88%

12. Accreditation

This programme does not have accreditation from an external body.

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/

The following course specific regulations should be noted:

- 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.
- 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.
- 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.

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

240 credits of an MBChB programme for UK applicants (120 each at levels 4 and 5), or equivalent for international applicants. Proof of permission to intercalate **must** be provided from the parent medical school. In the case of applicants from the Keele Medical School, this will follow a formal interview process with the intercalated degree committee.

15. How are students supported on the programme?

For all programmes:

- 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.
- 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 Centre for Learning and Student Support.

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

16. Learning Resources

For Intercalated Bachelor Degree in Natural Sciences [Biochemistry, Neuroscience and Studies in Biomedical Sciences]:

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 at a cost of £3.3 million and have places for a total of 210 students. 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 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

Placement opportunities and work abroad schemes are not available to intercalators. Other opportunities 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

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 additional costs for this undergraduate programme.

19. Quality management and enhancement

For Intercalated Bachelor Degree in Natural Sciences [Biochemistry, Neuroscience, Studies in Biomedical Sciences]

The Programme Directors are responsible for the overall direction of learning and teaching on the Programme, supported by the Year Tutors and the Teaching Team, which consists of student representatives (StARs) plus all members of staff teaching on the Principal Programmes of the course. The quality and standards of learning are subject to a continuous process of monitoring, review and enhancement.

Intercalated Bachelor Degree in Natural Sciences [all routes]

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

- The Learning and Teaching Committee of the relevant School is responsible for reviewing and monitoring quality management and enhancement procedures and activities across the School.

- Individual modules and the Principal Programmes 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 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 Principal Programmes 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 on the Principal Programmes 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 Intercalated Bachelor's Degrees in Natural Sciences Programmes described in this document has been drawn up with reference to, and in accordance with the guidance set out in, the following documents:

a. UK Quality Code for Higher Education, Quality Assurance Agency for Higher Education:
http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code

b. QAA Subject Benchmark Statement: Biosciences (2015)
http://www.qaa.ac.uk/en/Publications/Documents/SBS-Biosciences-15.pdf

c. Keele University Regulations and Guidance for Students and Staff: http://www.keele.ac.uk/regulations

For the Intercalated Bachelor Degree in Natural Sciences Studies in Biomedical Sciences, the following documents have been additionally used:

d. QAA Subject Benchmark Statement: Biomedical Science (2007)
http://www.qaa.ac.uk/en/Publications/Documents/Subject-benchmark-statement-Biomedical-science.pdf

e. Accreditation Guidance Documentation of the Institute of Biomedical Science

f. Feedback from employers and other stakeholders

g. Quality Assurance Agency Code of Practice on work-based and placement learning, 2007

h. Health and Care Professions Council Standards of Education & Training, 2009

i. Health and Care Professions Council Standards of Proficiency – Biomedical Scientists, 2012

j. Health and Care Professions Council Standards of Conduct, Performance & Ethics, 2012

21. Document Version History

Date of first approved version (v1.0): 12th December 2017

Revision history

Version number[1]	Author	Date	Summary of and rationale for changes

[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)