Course Information Document: Undergraduate

For students starting in Academic Year 2017/2018

1. Course Summary

Names of programme(s) and award title(s)	BSc (Hons) Natural Sciences BSc (Hons) Natural Sciences with International Year (see Annex A for details)
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 with International 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 £15,250** The fee for the international year abroad is calculated at 15% of the standard year fee
Additional Costs	Refer to section 16

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 a Single Honours programme?

The Single Honours programme described in this document allows you to focus more or less exclusively on Natural Sciences. In keeping with Keele's commitment to breadth in the curriculum, the programme also gives you the opportunity to take some modules outside Natural Sciences, in other disciplines and in modern foreign

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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.

The Natural Sciences programme described in this document is highly interdisciplinary, drawing on the expertise of scientists in the fields of Biosciences, Mathematics, Psychology, Forensic Science, Chemistry, Physics, Computer Science, Environmental Science, Earth Science, and Physical Geography. It is in keeping with Keele's commitment to offer a broad undergraduate degree programme, whilst providing opportunity for students to develop increased specialisation, or to maintain a broad science-based portfolio, within the structure of a Single Honours programme. Thus it enables students to gain, and be able to demonstrate, a distinctive range of graduate attributes.

3. Overview of the Programme

The BSc (Hons) degree programme in Natural Sciences provides you with the opportunity to combine your interests in three science-based subjects, within the structure of a Single Honours degree programme. It aims to provide students with the scientific skills and expertise required to tackle many of the world's most pressing scientific and societal problems. The course at Keele draws on the expertise of scientists from within the Schools of Life Sciences; Chemical and Physical Sciences; Geography Geology, and the Environment; Psychology; and Computing and Mathematics, but also has close links with Keele's BA Liberal Arts programme providing students with opportunity for cross-faculty, interdisciplinary debates about topical world issues. The first year gives students a sound basis and understanding of their selected core science subjects; whilst in later years students can choose to specialize in their preferred scientific discipline, or to maintain a broad science-based portfolio. The degree structure is designed to cater for students who wish to continue to study three science subjects at degree level and who are open minded, creative, inquiring and excited by the challenge of solving complex problems. It aims to produce graduates who have the interdisciplinary background, communication and problem-solving skills to address complex scientific problems in a changing world.

4. Aims of the Programme

The broad aims of the programme are to:

- provide students with a sound scientific understanding of their selected 'core' science disciplines and the ability to apply this knowledge to help solve complex problems;
- gain a wide-range of laboratory and field-based skills, as appropriate to the student's chosen core science subjects, including the ability to carry out independent research;
- integrate scientific knowledge, and an awareness of social, economic and ethical issues, to address some of the World's most pressing societal concerns such as understanding the origins of the Universe, avoiding antibiotic drug resistance, mitigating climate change and providing long term food security;
- develop to a high professional standard, a broad range of employability skills including problem-solving, team work, independent research, communication and presentation skills.

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
- Key or transferable skills (including employability skills)

Subject knowledge and understanding

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

- the benefits of an interdisciplinary approach to science

- the role Natural Scientists can play in the resolution of major challenges facing society
- interdisciplinary perspectives on world/societal issues

Subject specific skills

Successful students will be able to:

- effectively search and critically review the academic literature relating to a current interdisciplinary debate/discourse
- recognise and make choices between the different methodological approaches to interdisciplinary research
- frame research questions, aims and objectives, and design effective and achievable research/experimental projects
- apply their knowledge, skills and experience to an aspect of current scientific research, through the use of established analytical scientific methods, literature review, data collection and interpretation
- use a variety of evidence-based approaches to solve problems
- apply reflection and critical skills to a wide range of issues
- work with others to discover creative, innovative solutions to complex issues

Key or transferable skills (including employability skills)

Successful students will be able to:

- locate, evaluate and make effective use of a wide range of university-level information sources
- communicate clearly and effectively using appropriate scientific language and conventions in both written and oral forms
- communicate complex ideas to lay audiences in a variety of forms
- communicate reflective and critical ideas through advanced written and oral presentation skills

The full range of intended learning outcomes that will be achieved by students taking the Natural Sciences degree programme will be highly dependent upon which combination of sciences* that they choose to study as 'core' and 'supporting'. Individual module specifications should be consulted for information on knowledge and understanding and skills obtained from optional modules within the degree programme, and for those modules taken as a supporting science.

*The exact combination of subjects which can be taken as core and supporting is dependent upon timetabling restrictions (see Section 8).

The Keele Approach to Education

The Natural Sciences programme is strongly aligned with the key themes within 'The Keele Approach to Education' - sustainability, internationalisation and employability. The programme ensures that all students have the opportunities to fully develop the capabilities (graduate attributes) of 'The Keele Approach to Education'.

Sustainability

The sustainability of our society is at the core of research and teaching in the Natural Sciences. In addition to providing the opportunity for students to develop a deep understanding of the environmental aspects of sustainability, through studying Environmental Science, Earth Science or Physical Geography, students also gain an appreciation of the social, economic and ethical aspects of scientific research. The programme aims to provide students with the skills and aptitude for working positively towards a sustainable future in their careers and lives as both students and graduates. Keele has a leading reputation in environmental and sustainability teaching and research and Natural Sciences students have myriad opportunities to be part of Keele's exciting sustainability vision, through both paid and volunteer opportunities.

Internationalisation

Topical world issues, and the means of tackling these issues, are both global and local in nature. The Natural Sciences programme uses case studies and examples of research from around the world to develop an appreciation of the different challenges faced in different parts of the world. Students are encouraged to develop a global outlook, to develop a sensitive understanding and awareness of how the resources such as the environment can be sustainably managed in different global contexts. Specific opportunities beyond the taught content include overseas field courses, research opportunities abroad with partner institutions and organisations, and study abroad opportunities in a wide range of countries from Europe, to South Africa.

Employability

We place a strong emphasis throughout the Natural Sciences programme on the 'application' of scientific skills to addressing topical, interdisciplinary issues and creating future solutions. In addition to a subject specific emphasis on employability within the core sciences studied, throughout the Natural Sciences programme students are able to develop a wide range of generic employability skills from working effectively in teams, to effective written and oral communication skills.

Interdisciplinarity

Keele has always been distinctive in its interdisciplinary approach to learning. The Natural Sciences programme continues this tradition with a highly interdisciplinary programme drawing on the expertise of scientists in the fields of Bioscience, Mathematics, Psychology, Forensic Science, Chemistry, Physics, Computer Science, Environmental Science, Earth Science and Physical Geography. The programme also provides opportunities for interdisciplinary discussion and debates through interaction with students on the BA Liberal Arts programme.

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:

- Lectures
- Tutorials
- Laboratory Classes
- Problem-solving classes and workshops
- Screencasts
- Pre-laboratory and post-laboratory exercises
- Research projects
- IT instruction (spreadsheets, word-processing, chemical structure drawing, databases, textbook resources, information retrieval and literature searching)
- Group work
- Seminars with pre- and post-seminar discussions
- Interdisciplinary debates (links with BA Liberal Arts students)
- Self and peer-assessment for learning
- Information literacy activities
- Computer-aided learning (simulations and animations, online activities and exercises)
- Case studies
- Use of e-learning/the Keele Learning Environment (KLE)

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

As Natural Sciences is such an interdisciplinary subject, staff from across the Faculty of Natural Sciences make contributions to the degree programme. The teaching and research profiles of the staff that deliver and support the Natural Sciences programme can be found at:

School of Geography, Geology and the Environment: **http://www.keele.ac.uk/gge/people/**

School of Chemical and Physical Sciences: **http://www.keele.ac.uk/chemistry/staff/**

School of Life Sciences: **http://www.keele.ac.uk/lifesci/people/**

School of Computing and Mathematics: **https://www.keele.ac.uk/scm/**

School of Psychology: **https://www.keele.ac.uk/psychology/**

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 four types of module delivered as part of this programme. They are:

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

BSc Natural Sciences is a highly interdisciplinary degree programme and the exact structure of any one students' programme will be dependent upon the specific science-based subjects that they choose to study. All Natural Sciences students take the following core modules which are bespoke to the BSc Natural Sciences degree programme:

Year-1	NAT-10001: Science and Society (15-credits)
Year-2	NAT-20001: Research Skills for Natural Scientists (15-credits)
Year-3	NAT-30001: Grand Challenges in Society (15-credits)
	NAT-30002: Natural Sciences Research Project (30-credits)

In addition, students studying Natural Sciences take two science subjects as 'core' (45-credits per subject) plus one science subject as a 'supporting' science (15-credits) in Years 1 and 2. In Year 3, students choose option modules, subject to pre-requisites, from the range available within their chosen 'core' science subjects. Some, but not all, supporting subjects enable students to continue to study that supporting science into Year-3 (15 credits only). The exact combination of subjects available to students is dependent upon timetabling restrictions and shown in Table 1.

Core Science 1 (45 credits)	**Core Science 2 (45 credits)**	**Possible 'Supporting Subjects' (students choose one) (15 credits)**
Chemistry	Biosciences	*Geology OR Environmental Science OR Forensic Science*
Chemistry	Environmental Science	*Biosciences*
Chemistry	Earth Sciences	*Biosciences*
Chemistry	Forensic Science	*Biosciences*
Physical Geography	Biosciences	*Geology OR Environmental Science OR Forensic Science*
Physical Geography	Forensic Science	*Biosciences*
Physical Geography	Earth Sciences	*Biosciences*
Physical Geography	Environmental Science	*Biosciences*
Biosciences	Forensic Science	*Computer Science OR Psychology OR Physical Geography*
Biosciences	Earth Sciences	*Computer Science OR Psychology OR Physical Geography*
Biosciences	Environmental Science	*Computer Science OR Psychology OR Physical Geography*
Mathematics	Physics	*Computer Science OR Psychology OR Physical Geography*
Mathematics	Biosciences	*Computer Science OR Psychology OR Physical Geography*
Mathematics	Chemistry	*Biosciences*
Mathematics	Physical Geography	*Biosciences*

Table 1: Possible core and supporting science subject combinations available as part of the BSc Natural Sciences degree programme at Years 1 and 2. In Year-3 students choose option modules, subject to pre-requisites and timetabling restrictions, from the range available within their chosen core science subjects.

The table below provides a summary of the structure and content of the Natural Science programme for those subjects which can be taken as core. Further information about specific modules can be found online.

School / subject	Year 1 (Level 4)	Year 2 (Level 5)	Year 3 (Level 6) options
SCPS - Astrophysics	PHY-10024: Nature of Matter (C) PHY-10020: Oscillations & Waves (C) PHY-10023: Electricity & Stellar Structure (C)	PHY-20027: Optics & Thermodynamics (C) PHY-20002: Stellar astrophysics (C) PHY-20026: Statistical mechanics and solid state physics (C)	PHY-30012: Electromagnetism (Sem 1) (C) Plus options including PHY-30023: Particles, Accelerators & Particle Physics (Sem 1) and PHY-30001: Cosmology (Sem 2)
SCPS – Physics	PHY-10024: Nature of Matter (C) PHY-10020: Oscillations & Waves (C) PHY-10023: Electricity & Stellar Structure (C)	PHY-20027: Optics & Thermodynamics (C) PHY-20009: Nuclear & particle physics (C) PHY-20026: Statistical mechanics and solid state physics (C)	PHY-30012: Electromagnetism (Sem 1) (C) Plus options including PHY-30023: Particles, Accelerators & Particle Physics (Sem 1) and PHY-30001: Cosmology (Sem 2)
SCPS – Chemistry	CHE-10047: Chemical concepts & structure (C) CHE-10050: Chemical properties & reactions (C) CHE-10057 Practical and Professional Chemistry Skills for Natural Sciences (C)	*<u>Core/Materials Chemistry pathway:</u>* *CHE-20051: Organic Synthesis and Characterisation (Natural Sciences) (C)* *CHE-20028: Physical and Inorganic Chemistry (C)* *CHE-20031: Structural Inorganic Chemistry (C)* *<u>Medicinal Chemistry pathway:</u>* *CHE-20051: Organic Synthesis and Characterisation (Natural Sciences) (C* *CHE-20027: Medicinal and Biological Chemistry 1 (C)* *CHE-20031: Structural and Inorganic Chemistry (C)* *Note choice of pathway at Level-5 has implications for the pathway (and modules) students can take at Level-6.*	*<u>Core/Materials Chemistry pathway:</u>* *<u>Students choose from:</u>* *CHE-30037: Topics in Chemistry* *CHE-30038: Chemical Kinetics, Photochemistry & Inorganic Reaction Mechanisms* *CHE-30039: Advanced Inorganic Chemistry* *CHE-30042: Inorganic, Physical and Solid State Chemistry* *CHE-30043: Materials Chemistry and Catalysis* *<u>Medicinal Chemistry pathway:</u>* *<u>Students choose from:</u>* *CHE-30038: Chemical Kinetics, Photochemistry & Inorganic Reaction Mechanisms* *CHE-30039: Advanced Organic Chemistry* *CHE-30044: Topics in Medicinal Chemistry* *CHE-30047: Medicinal and Biological Chemistry 2*

SGGE – Earth Sciences	ESC-10036 Planet Earth (C) ESC-10047: Data Visualisation (C) ESC-10048: the Earth System (C)	ESC-20054: Forensic and Historical Geoscience (C) ESC-20036: Palaeoclimate and Quaternary Studies (C) ESC-20037: Geoscience and Society (C)	ESC-30009: Natural Hazards (O) ESC-30036: Exploration Geophysics (O) ESC-30018: Global Environmental Change (O) ESC-30006: Glaciers and Glacial Geomorphology (O) ESC-30022: Hydrological and Engineering Geology (O) ESC-30020: Water Resources (O) ESC-30027: Coastal Environments (O)
SGGE – Environmental Science	ESC-10045: Introductory Geology for the Environmental Sciences (C) LSC-10033: Ecology & the Environment *(not available to students taking Biosciences)* (OC) CHE10044 Introductory Environmental Chemistry *(not available to students taking Chemistry)* (OC) ESC-10043: Greening Business: Employability and Sustainability (C)	ESC-20017: Human Impacts on the Environment (C) ESC-20079: Research Skills (C) (30-credits)**	ESC-30045: Contemporary Topics in Environmental Science (O) ESC-30040: Clean Technology (O) LSC-30043: Conservation Biology (LSC-10033 prerequisite) (O) ESC-30018: Global Environmental Change (O) ESC-30020: Water Resources (O) ESC-30027: Coastal Environments (O)
SGGE - Forensic Sci	CHE-10039:Forensic Science Principles (C) CHE-10037:Forensic Analysis (C) CHE-10042:Forensic identification (C)	CHE-20011: Spectroscopy and advanced analysis (C) CHE-20010: Criminalistic methods (C) CHE-20012: Drugs of abuse (OC) **Option:** May take CHE-20021: Forensic Genetics (Sem 1) (OC) in place of CHE-20012 (Sem 2) but then cannot do CHE-30010 at level-6	CHE-30010:Forensic toxicology *(CHE-20012 prerequisite)* (O) CHE-30033:Evaluation of evidence (O) CHE-30024 Forensic Geoscience (O) CHE-30035 Topics in Forensic Analysis (O)

SGGE – Physical Geography	ESC-10039: Fundamentals of Physical Geography (C) ESC-10041: People and Environment (C) ESC-10032: Global warming or a new ice age? (C)	ESC-20050: Dynamic Geographies *(15 credit, Physical Geography options only)* (C) ESC-20030: Regional Landsystems (C) GEG-20018: Concepts and Debates *(Physical Geography route)* (C)	ESC-30006: Glaciers & Glacial Geomorphology (O) ESC-30018: Global Environmental Change (O) ESC-30020: Water Resources (O) ESC-30027: Coastal Environments (O)
SCM - Mathematics	MAT-10046: Calculus (C) (30-credits) MAT-10045: Introduction to Algebra (C)	MAT-20008: Differential Equations (C) MAT-20016: Mathematical Modelling (C) MAT-20025: Abstract Algebra (C)	Students choose from (all optional modules): MAT-30002: Nonlinear Differential Equations MAT-30003: Partial Differential Equations MAT-30022: Number Theory MAT-30029: Professional Mathematics All optional modules MAT-30001: Graph Theory MAT-30014: Medical Statistics MAT-30023: Mathematical Biology
SLS – Biosciences	Students choose any three from: *LSC-10031: Cell & Molecular Biology** *LSC-10040: Introduction to Human Physiology** *LSC-10037: Diversity of Life* *LSC-10039: Human Physiology and Pathology* *LSC-10032: Genetics and Evolution* *LSC-10033: Ecology and Environment* **Modules share timetabling space so cannot be taken together*	*Students choose any three from:* *LSC-20071: Animal Adaptations* *LSC-20077: Neurodevelopment* *LSC-20055: Life at the Extremes[+]* *LSC-20056: Research and Analytical Skills* *LSC-20052 Nutrition and Energy Balance**** *LSC-20076: Learning and Memory**** ****Modules share timetabling space so cannot be taken together*	*<u>Students choose from (all optional modules):</u>* *LSC-30001: Behavioural Neurobiology* *LSC-30003: Applied Insect Ecology* *LSC-30020: Neurobiological Basis of Brain Disease* *LSC-30036: Human Parasiology* *LSC-30043 Conservation Biology[2]* *LSC-30006: Applied Fish Biology* *LSC-30017: Trees in their Environment* *LSC-30030: Human Evolution* *LSC-30039: Regeneration and Repair of the Nervous System* *LSC-30053: Special Senses* *[1] Will become 30052 Behavioural Neuroscience in 2018/19* *[2] Has a perquisite of either LSC-10033 or LSC-20055*

C = core module for students taking that subject as a core science
OC = optional core module, students must choose one of these options if taking that subject as a core science
O = optional module, available to students taking that subject as a core science
For modules which are available as part of more than one core science, students will only gain credits for that module in one of their core sciences (i.e., the module cannot be counted more than once).

**This module is associated with a week-long residential field course, which usually takes place during the Easter vacation of Year-2.

+ This module is associated with an 8-day residential field course which usually takes place during the summer vacation between Years 2 and 3 of the programme.

The location of field courses is subject to change depending on factors such as staff availability, staff changes, staff expertise, costs, student numbers, other factors outside of our control (earthquakes, volcanic eruptions etc.).

The following table lists the subjects which can be taken as a **supporting science** and the specific modules students will be required to take:

School/subject	Year 1 (Level 4)	Year 2 (Level 5)	Year 3 (Level 6) options
Biosciences	LSC-10033: Ecology and the Environment	*LSC-20055: Life at the Extremes**	
Computer Science	CSC-10024: Programming 1	CSC-20023: Computational Intelligence 1	CSC-30020: Computational Intelligence 2
Psychology	PSY-10017: Biological and Cognitive Psychology	PSY-20005: Biological Psychology, Perception and Cognition	
Earth Sciences	ESC-10045: Introductory Geology for the Environmental Sciences	ESC-20037: Geoscience and Society	ESC-30009: Natural Hazards
Environmental Science	ESC-10053: Greening Business	ESC-20017: Human Impacts on the Environment	ESC-30040: Clean Technology
Forensic Science	CHE-10039: Forensic Science Principles CHE-10042: Forensic Identification**	CHE-20021: Forensic Genetics** CHE-20010: Criminalistic Methods	

Physical Geography	ESC-10039: Fundamentals of Physical Geography	ESC-20030: Regional Landsystems	ESC-30018: Global Environmental Change ESC-30009: Glaciers and Glacial Geomorphology ESC-30028: Coastal Environments ESC-30020: Water Resources

*This module is associated with an 8-day residential field course which usually takes place during the summer vacation between Years 2 and 3 of the programme. The location of field courses is subject to change depending on factors such as staff availability, staff changes, staff expertise, costs, student numbers, other factors outside of our control (earthquakes, volcanic eruptions etc).

*Only available to students taking Biosciences as a 'core' science

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

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.
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

Natural Sciences 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 Natural Sciences with International Year. Students who do not complete, or fail the international year, will be transferred to the three-year BSc Natural Sciences programme.

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:

- **Unseen closed and open book 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.

- **Assessed Problem Sheets** assess the student's skills in solving numerical and other problems within the discipline by drawing on their scientific understanding and knowledge, and experience of experimental techniques

- **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 (including appropriate scholarly 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.

- **Technical reports** are formal, structured summaries of work that test students' understanding of the practical aspects of the programme and develop the skills necessary to enable students to present and analyse their results.

- **Information retrieval exercises** require students to locate and analyse information of different types from the internet, various databases, scientific publications and textbooks. The information is then presented in a prescribed written format.

- **IT assignments and computer-based exercises** (e.g. spreadsheets exercises) – various activities designed to assess students ability to use software to retrieve, analyse and present scientific data in a variety of formats.

- **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.

- **Field course notebook and portfolios** assess work that has been carried out in the field, and typically include field notebooks, research proposals, short quizzes and both oral and written presentations. The specific assessment portfolio will vary according to the field course destination and subject focus.

- **Short reports** for which students are required to write up their own account of small group studies and discussions on particular topics.

- **Research projects and reports** test student's knowledge of different research methodologies and the limits and provisional nature of knowledge. They also enable students to demonstrate their ability to formulate research questions and to answer them using appropriate methods.

- **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.

- **Video/screencast presentations** require students to produce a short video or screencast on a given topic and assess students' knowledge and understanding, and ability to communicate what they know orally and visually, and to reflect on these processes as part of their own personal development.

- **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.

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	37%	35%	24%
Guided independent Study	63%	65%	76%
Placements	0%	0%	0%

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/

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
Natural Sciences	AAB Including 2 Science A Levels. Science subjects could include Biology, Chemistry, Environmental Science, Geography, Geology, Maths or Physics. Please note some Core Sciences also have specific Science subject requirements e.g. Chemistry will require A Level Chemistry. A Pass in Science Practical will be required if applicant is taking A level Biology, Chemistry or Physics (England)** ** Science practical only required from applicants taking reformed A level Biology, Chemistry or Physics in England.	General Studies and Critical Thinking	34 points to include 2 Higher level Science subjects at 6 or above. Science subjects could include Biology, Chemistry, Environmental Science, Geography, Geology, Maths or Physics. Please note Core Sciences also have specific Science subject requirements e.g. Chemistry will require Higher Level Chemistry.	DDD You must also have taken sufficient Science credits, please contact us for advice.	Obtain Access to Higher Education Diploma with 39 Level 3 credits at Distinction and 6 Level 3 credits at Merit or above. You must also have taken sufficient Science credits, please contact us for advice.	Maths @ B (or 6), English Lang @ C (or 4)

NB: in addition there are subject specific requirements depending on your chosen core science subjects

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/qa/accreditationofpriorlearning/

15. Other learning opportunities

Study abroad (semester)

Students on the Natural Sciences 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.

Fieldwork

Fieldwork is an essential part of a scientist's training in Biosciences, Earth Science, Physical Geography and Environmental Science, providing both the opportunity to acquire and practice field-based skills, to develop skills of observation and recording and to work as effective members of a team.

Keele is ideally located to be able to integrate a large component of field work into its environmental science programmes with a wide range of habitats in easy reach, including the Keele campus itself with its lake system and extensive woodlands, in addition to the mining and industrial heritage of the local area providing ideal opportunities for the study of the impact of these activities on the environment.

16. Additional costs

Field Course Costs – School of Geography, Geology and the Environment

The University provides significant financial support for the compulsory fieldwork elements of the degree programme and the costs of travel and accommodation for compulsory field courses are fully paid for by the University up to and including Year 2.

In the third year students undertake an independent research project, which **MAY** include fieldwork. Students are responsible for organising their own transport and accommodation as well as paying any costs incurred whilst carrying out this fieldwork. These costs are extremely variable as they are dependent on where the student chooses to carry out their project. Costs are minimal if the project work is undertaken in the students' local area.

Field course costs – School of Life Sciences (LSC-10055: Life at the Extremes):

There is an 8 day Field-course accommodated at Bangor University during the summer vacation between the first and second years (module LSC-20055). The School meets the cost of this, but the student will be expected to pay for their own travel to Bangor. The compulsory residential field course is subsidised by the School of Life Sciences and you pay no fees to attend. You are required to cover your own transport costs to and from Bangor University and maintenance costs during the field course (for example food, appropriate clothing, etc.).

IMPORTANT: Students are expected to have adequate clothing for field trips. We reserve the right to change the venues of field courses due to both cost and academic considerations. Some field courses are fully or partly catered for. Others are self-catered and students are expected to purchase meals (e.g. lunch and/or evening meal).

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

17. Document Version History

Version history	Date	Notes
Date first created	October 2016	
Revision history	V2.0: 07/17	To reflect major programme modifications to address timetabling and progression issues; and to reflect changes made to modules in Schools which impact on the Natural Sciences degree programme. [Major change: reissued]
Date approved	10 July 2017	

Annex A

BSc (Hons) Natural Sciences with International Year

International Year Programme

Students registered for Single Honours Natural Sciences may either be admitted for or apply to transfer during their period of study at Level 5 to the Single Honours 'Natural Sciences 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 BSc (Hons) Natural Sciences 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 'BSc (Hons) Natural Sciences 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:

a. Describe, discuss and reflect upon the cultural and international differences and similarities of different learning environments
b. Discuss the benefits and challenges of global citizenship and internationalisation
c. Explain how their perspective on their academic discipline has been influenced by locating it within

an international setting.

In addition, students who complete 'BSc (Hons) Natural Sciences with International Year' will be able to:

i) apply their experiences abroad to the specific Graduate Attributes associated with their Natural Sciences degree programme;
ii) integrate, apply and develop interdisciplinary principles and perspectives to solve global-scale problems.

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 'BSc (Hons) Natural Sciences 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 Natural Sciences 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.

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