

Programme Specification: Undergraduate

For students starting in Academic Year 2017/2018

1. Course Summary

Names of programme(s) and award title(s)	M.Geoscience - Geoscience Route Master in Geoscience M.Geoscience - Geoscience Route with International Year (see Annex A for details)
Award type	Integrated Masters
Mode of study	Full time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 7
Duration	4 years 5 years with International Year
Location of study	Keele University – main campus
Accreditation (if applicable)	M.Geoscience is accredited by the Geological Society of London. For further details see section 12
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 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 Integrated Masters Programme?

Integrated master's awards - which are common in science, mathematics and engineering - are delivered through a programme that combines study at the level of a bachelor's degree with honours with study at master's level. As such, a student graduates with a master's degree after a single four-year programme of study.

** 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/>*

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The Integrated Masters programme described in this document builds upon the three year Single Honours programme by adding a fourth year in which students study modules in Geoscience at an advanced level.

3. Overview of the Programme

M.Geoscience is a four-year undergraduate Integrated Masters course primarily designed for those considering a career in Earth Science. The course aims to provide an in-depth experience of many important geoscience topics along with training in research techniques, laboratory methods, computing techniques and other transferable skills. In particular, modules studied in the third and fourth years prepare students for work in industry, commerce or academia. The M.Geoscience degree programme may be taken by students studying Geology with any natural sciences subject at Levels 4 & 5, or by those students taking Single Honours Geoscience (See separate programme specifications). Discipline-specific modules at Levels 6 & 7 are complemented by research-driven modules, and enhanced subject-specific skills.

4. Aims of the Programme

The broad aims of the programme are to:

- enable students to specialise in geology/geoscience via a four-year Integrated Masters programme to obtain a more in-depth experience of the subject, as well as gaining additional experience in independent research project work and key skills.
- provide a broad-based introduction to Geoscience at Level 4 that does not require previous knowledge of geology/geosciences topics, and to utilise the material covered at Level 4 to lay the foundations for detailed study of geological concepts at Levels 5, 6 & 7.
- provide an understanding of the structure and composition of the Earth and other planets.
- provide an integrated approach to understanding the present and past interactions between the physical, chemical and biological processes operating in the Earth's core, mantle, crust, and surface.
- provide an appreciation of the history of the Earth over geological time scales.
- promote an awareness of the dual context of the subject in society, as well as providing knowledge and understanding of both the exploitation and the conservation of the Earth's resources.
- provide an appreciation of the scientific fundamentals in the geosciences and an adequate knowledge base for a career in research or industry.
- provide Masters-level training in research, laboratory and computing techniques and to instil a comprehensive understanding of techniques applicable to their own research and advanced scholarship.
- emphasise the development of field, laboratory, presentational, writing and information technology skills to prepare graduates for independent work in their professional careers.
- provide a fully integrated fieldwork programme, including overseas field courses and a Masters level investigative- and equipment-based field course.
- provide appropriate monitoring schemes and feedback for students on their progress.
- provide a wide choice of subject options and all-round education.

5. What you will learn

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

- Subject knowledge and understanding
- Subject specific skills

- Intellectual skills
- Key or transferable skills (including employability skills)

Subject knowledge and understanding

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

- the terminology, nomenclature and classification of rocks, minerals, fossils and geological structures
- geological processes and how they integrate to shape the natural world at different temporal and spatial scales
- the structure and composition of the Earth and other planets
- geological time, including the principles of stratigraphy, the stratigraphic column, dating techniques, rates of Earth processes and major events in Earth history
- the evolution of life on Earth as revealed by the fossil record
- major geoscience paradigms, including Uniformitarianism, the extent of geological time and Plate Tectonics
- the need for both a multi-disciplinary and interdisciplinary approach to the development of knowledge in the geosciences
- the different components of the Earth System and how they interact to change the physical world and their impact on society
- different methods used in the observation, analysis, interpretation and representation of geological and geophysical information
- how the geology of a field study area can be used to illustrate and deepen understanding of the geological evolution of a wider region
- modern environments and processes, and use of this knowledge to interpret aspects of the geological record
- issues concerning the exploration, availability and sustainability of natural resources
- geological aspects of human impacts on the physical environment
- natural hazards and their impacts on society
- applications of Geology/Geoscience to the development of knowledge, wealth creation and improving quality of life

Subject specific skills

Successful students will be able to:

- identify a wide range of igneous, sedimentary and metamorphic rocks, as well as a wide range of minerals, fossils and geological structures
- implement three-dimensional analysis with particular reference to the subsurface distribution and relationships of rocks observed at the surface
- collect and record geological and geophysical information in the field, including the production and interpretation of geological maps
- plan, design and execute an independent piece of project work in the geological sciences, including acquisition and recording of geological data in the field, followed by the processing, interpretation and presentation of this data, and the production of a final report
- make safe and effective use of a range of field equipment commonly used by the geoscience profession and develop an understanding of the scope and limitations of such equipment.
- undertake effective fieldwork with due regard for safety, risk assessment, rights of access, relevant health and safety regulations and sensitivity to the impact of investigations on the environment
- work safely in a scientific laboratory, with awareness of standard methods and procedures and with due regard for risk assessment and relevant health and safety regulations
- prepare effective maps and diagrams using a range of appropriate technologies
- employ a variety of technical and laboratory-based methods for the collection and analysis of geological and geophysical information

- combine and interpret different types of geological and geophysical evidence using quantitative and qualitative approaches
- appreciate the issues of sample selection, accuracy, precision and uncertainty during collection, recording and analysis of geoscience data in the field and laboratory
- use powers of observation, analysis and imagination to make decisions in the light of uncertainty

Intellectual skills

Successful students will be able to:

- recognise and use subject-specific theories, concepts and principles to make reasoned decisions and solve problems
- analyse, synthesise and summarise data and information critically, including prior research
- collect and integrate several lines of evidence to formulate and test hypotheses, and make critical judgements
- apply knowledge and understanding to address familiar and unfamiliar problems
- assess the merits of contrasting theories, explanations and policies
- recognise the moral and ethical issues of investigations and appreciate the need for professional codes of conduct
- develop an adaptable and flexible approach to study and work
- identify and work towards targets for personal, academic and career development
- take responsibility for their own learning and develop a habit of reflection upon that learning

Key or transferable skills (including employability skills)

Successful students will be able to:

- develop and sustain effective approaches to learning and study, including time management, flexibility, creativity and intellectual integrity
- communicate effectively to a variety of audiences in written, verbal and graphical forms
- work with numerical data using appropriate qualitative and quantitative techniques, as well as computer software packages
- work effectively with a variety of types of information technology to analyse and present information and data, as well as solve numerical problems
- use the internet as a means of communication and a source of information
- demonstrate competence in spatial awareness and observation
- conduct field and laboratory studies
- reference work in an appropriate manner
- work with information handling and retrieval systems using data from a wide range of sources
- work effectively both as an individual and as part of a group or team, recognising and respecting the viewpoints of others
- sustain motivation to work towards a goal over an extended period of time
- recognise responsibilities as a local, national and international citizen

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.

- Geoscience is inherently interdisciplinary with the core subject combining with physics, chemistry, biology and physical geography through geophysics, geochemistry, palaeontology and surface processes.

- The future of major energy resources such as oil, gas, coal, nuclear as well as geothermal and mineral resources are central to the sustainability of the planet. Solutions to issues such as radioactive waste disposal and carbon dioxide sequestration are predominantly geological.
- Geoscience is, by definition, the science of the whole Earth. It is transnational and international as a discipline, inherently requiring an international perspective. All students attend at least one overseas field course with options to attend others, including undertaking their independent mapping project abroad.
- Geoscience is a vocational discipline with first two years of the course providing the fundamental knowledge and skills in the subject and option modules in the final year providing pathways into specific employment areas such as mining, oil industry, geophysics, geotechnical engineering, hydrogeology and micropalaeontology among others. Geology career planning and CV writing skills are embedded into one of the Level 5 modules.

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

6. How is the Programme taught?

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

- Lectures
- Workshops
- Practical classes
- Field courses
- Individual progress interviews, including profiling/personal development planning (PDP)
- Directed reading
- Group presentations and linked discussion
- Independent study and project work
- Use of e-learning/the Keele Learning Environment (KLE)

A module typically comprises two one-hour lectures and a three-hour practical class per week. The directed reading and lecture slides available in advance on the KLE help you prepare for lectures and the practical classes reinforce concepts learned in lectures through problem solving and practical application of geological techniques. Some classes are taught in workshop format integrating both lecture and practical material. Fieldwork provides a deep, immersive learning experience that puts geological processes and their products into their four dimensional context. The independent mapping project provides the opportunity to bring together and demonstrate proficiency in all areas of geology.

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

Our core teaching staff have expertise and interests in all major areas of earth sciences as well as complementary vocational disciplines such as computing. In addition, members of the Geography and Environmental lecturing staff also contribute to the Geology degree programmes.

All current academic members of staff are active researchers and many have a distinguished track record in publication, the generation of grant income, industrial collaboration and journal editorship. Several staff have particular interests in the development of geoscience education and/or have played an active role in the promotion of UK geoscience activities (e.g. via membership of Geological Society committees). Members of staff are Fellows of the Higher Education Academy and many have professional qualifications such as Fellow of the Geological Society (F.G.S.), Chartered Geologist (C.Geol), European Geologist (EurGeol), Fellow of the Royal

Astronomical Society (F.R.A.S.), as well as others. Members of staff have also won both group and individual Keele Teaching and Learning Excellence Awards.

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.

Geoscience is a four-year undergraduate Integrated Masters course. Geology is taken in Levels 4 and 5 in combination with either Astrophysics, Biology, Chemistry, Computer Science, Physical Geography, Information Systems, Medicinal Chemistry, Neuroscience, Physics or Psychology. Alternatively, Single Honours Geoscience may be taken in Levels 4 and 5. Only geoscience-specific modules are taken at Levels 6 and 7.

Year 1 (Level 4)

It is assumed that students have no previous geological knowledge and therefore the Programme starts from basics. The programme provides a broad-based introduction to geological topics at Levels 4 & 5 with emphasis on the characteristics of rocks, minerals and fossils, together with the processes that govern their formation and development. The way in which rocks are deformed and how geophysics is used to discover the internal structure of the Earth are also studied. The interpretation and construction of geological maps is an essential component of the course. Additional geoscience modules cover the Earth System, data interpretation and environmental chemistry.

All modules take place over a single semester (12 weeks) and typically consist of two lectures and one 3-hour practical class or a four-hour workshop per week. In addition, several field courses (see below) and coverage of key/employability skills are embedded within the modules. Students following the single honours route have a free choice of one of the Free-Standing Elective modules offered by all Faculties within the University, including a modern language or our Dinosaur Planet module. An elective module is offered at Level 4 in order to enhance the interdisciplinary nature of the Geoscience degree course and to provide compatibility with part of the University’s philosophy for undergraduate education, which is broadly based rather than over specialised.

Core modules	Credits	Elective modules	Credits
Introduction to Mineralogy and Petrology (includes fieldwork)	15	Free Standing Elective module (free choice)	15
Geology: Time and Space (includes fieldwork)	15		

Geology: Planet Earth	15		
Introduction to Sedimentology and Palaeontology (includes fieldwork)	15		
Geoscience Data Interpretation, Analysis and Visualisation	15		
The Earth System	15		
Introductory Environmental Chemistry	15		

Field Classes (all compulsory):		
<u>Destination</u>	<u>Duration</u>	<u>Aims and Objectives</u>
Natural History Museum, London	1 day	To cover aspects of palaeontology and the curation of specimens via a 'behind the scenes' look at selected parts of the NHM geological collections.
Wenlock Edge, Shropshire	1 day	To cover palaeontology and palaeoecology, and structural measurements.
Ercall Quarries, Shropshire	1 day	To cover lithology identification, measuring structures and introductory geological mapping.
Pembrokeshire, South Wales	7 days, Residential	To cover identification of lithologies, structures, fossils, etc. and make detailed notes/diagrams in field notebooks; sedimentary logging; report writing.
Llangollen, North Wales	2 days	To cover basic geological mapping skills with emphasis on feature mapping techniques; identification of lithologies with emphasis on carbonate sedimentology.

Year 2 (Level 5)

During Level 5 particular attention is paid to first hand observation, recording and interpretation of geological, geophysical and geochemical phenomena in the field and laboratory. By the end of the level you will have been given a complete grounding in geoscience that will allow you to carry out your own independent studies.

Core modules	Credits	Elective modules	Credits
Igneous and Metamorphic Petrology	15		
Reconstructing Past Environments (includes fieldwork)	15		
Advanced Structural Geology and Geological Mapping Training	15		
Geoscience Field Techniques	15		
Geochemistry	15		
Forensic and Historical Geoscience	15		
Palaeoclimatology and Quaternary Studies (includes fieldwork)	15		
Geoscience and Society (includes fieldwork)	15		

<u>Destination</u>	<u>Duration</u>	<u>Aims and Objectives</u>
Snowdonia, North Wales	7 days, Residential	To cover all aspects of geological mapping, including aerial photograph interpretation, safety/hazard assessment procedures, report writing, navigation skills, etc.
Western USA	12 days,	

OR Almeria, Southern Spain	Residential 7 days, Residential	To integrate strands of geoscience studied at levels 4 and 5, and relate them to the evolution of a major geotectonic province.
N. Wales	2 days	Glacial features and processes, and mapping and sedimentological analysis of recent deposits (part of module ESC-20036).
Staffordshire	1 day	Geoconservation management issues (part of the Geoscience and Society module).
Mam Tor, Peak District	1 day	Sedimentary logging and palaeoenvironmental interpretation (part of the Reconstructing Past Environments module).
Shap, Lake District	1 day	Study of igneous and metamorphic rocks

Year 3 (Level 6)

This year starts during the summer vacation when students carry out an independent field project, which normally takes 5 weeks. During the autumn semester students prepare a dissertation based upon this field project. In addition, there is a choice of option modules/programme approved electives from a wide range of geological subject areas. In addition, Geoscience students can select some Physical Geography option modules.

The method and approach to teaching changes emphasis from staff-centred instruction at Levels 4 & 5 to more student-oriented activities, with components of several modules based upon independent or team-based project work. There is also a change from modules based upon pure aspects of geological study to more applied aspects. It is intended that students should select their option modules according to their interests and career aspirations. Much of the content of these Level 6 option modules is based on research at the forefront of the discipline and helps to strengthen links between teaching and research.

Core modules	Credits	Optional Core / Programme Approved Elective modules	Credits
Economic Geology (includes fieldwork – see below)	15	Structure and Geodynamics (includes fieldwork)	15
Advanced Petrology and Structural Geology Field Course	15	Natural Hazards	15
Independent Fieldwork Project - ISP	30	Hydrological and Engineering Geology	15
Advanced Topics in Sedimentology (includes fieldwork)	15	Micropalaeontology: Principles and Applications (includes fieldwork)	15
		Exploration Geophysics for the Hydrocarbon Industry	15
		<i>M.Geoscience students can select a maximum of two of the following Physical Geography programme approved electives:</i>	15
		Glaciers and Glacial Geomorphology	15
		Global Environmental Change	15
		Water Resources	15
		Coastal Environments	15

Field classes:			
Module	Destination	Duration	Aims and Objectives
Independent Field Project	Various	35 days	To undertake independent geological fieldwork and synthesise the results into a technical report.
Structure and	Watchet,	2 days,	To study extension and inversion tectonics; to collect and analyse structural data; aerial

Geodynamics	Somerset	residential	photograph mapping and structural analysis.
Micropalaeontology: Principles and Applications	Dee Estuary	1 day	To collect micropalaeontology specimens for SEM and TEM analysis.
Economic Geology	Ecton Mine	1 day	To study ore body formation, and mining and production methods.
Advanced Petrology and Structural Geology Field Course	Isle of Mull, W. Scotland	7 days, residential	To study igneous and metamorphic rocks in the field, as well as the consideration of petrological and structural processes, orogen construction, terrane accretion, and crustal evolution.
Advanced Topics in Sedimentology	North-East England	2 days, residential	To investigate the Carboniferous sedimentology and stratigraphy of the northern Pennines.

Year 4 (Level 7)

The emphasis at level 7 is upon the development of research and vocational skills. All students are expected to undertake an extended (MGeoscience-specific) research project in an area related to the geosciences, compulsory data analysis and literature synthesis modules, and a selection of more specialised options. All modules are at Level 7 standard.

Core modules	Credits	Optional Core / Programme Approved Elective modules	Credits
Literature Synthesis	15	MGeoscience: Natural Hazards	15
Research Project	45	MGeoscience: Glaciers and Glacial Geomorphology	15
Spatial Geoscience Data Analysis (includes fieldwork)	15	MGeoscience: Global Environmental Change	15
Petroleum Geology	15	MGeoscience: Water Resources	15
		MGeoscience: Hydrological and Engineering Geology	15
		MGeoscience: Micropalaeontology: Principles and Applications (includes fieldwork)	15
		MGeoscience: Structure and Geodynamics (includes fieldwork)	15
		MGeoscience: Exploration Geophysics for the Hydrocarbon Industry	15
		MGeoscience: Coastal Environments	15

Field classes:			
Module	Destination	Duration	Aims and Objectives
Research Project	Various	0 – 14 days	Depending upon the nature of the project selected, fieldwork may be carried out for data collection.
Spatial Geoscience Data Analysis	Lake District	5 days Residential	To carry out an integrated geological/geophysical investigation.
Micropalaeontology: Principles and Applications	Dee Estuary	1 day	To collect micropalaeontology specimens for SEM and TEM analysis.
Structure and Geodynamics	Watchet,	2 days,	To study extension and inversion tectonics; to collect and analyse structural data; aerial

	Somerset	residential	photograph mapping and structural analysis.
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NB: The field courses for 2014/15 are listed above but our field courses are kept under constant review and the number, destination and duration of field courses may be subject to change for reasons of cost, staff availability, accreditation, student feedback and annual course review process, student demand and other external factors that may be beyond our control.

For further information on the content of modules currently offered please visit:

www.keele.ac.uk/recordsandexams/az

Learning Outcomes

Year 1 (Level 4)

Subject Knowledge and Understanding		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<p><i>Successful students will be able to demonstrate knowledge & understanding of:</i></p> <p>Know underlying concepts and principles in Geology, and be able to evaluate and interpret these.</p> <p>Can present, evaluate, and interpret Geological information.</p> <p>Can use basic geological theories and concepts to develop arguments, make judgements, and evaluate different approaches to solving problems.</p> <p>Can communicate results accurately and reliably, with structured and coherent arguments.</p>	All Level 4 modules	Laboratory notebook; maps, exercises and reports from field courses; unseen two hour exam; KLE assessments covering on-line workshop material, notably referencing, collusion and plagiarism.

Year 2 (Level 5)

Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<p><i>Successful students will be able to:</i></p> <p>Know and critically understand well-established geological principles, their development, limits of knowledge, influence on analyses and interpretations.</p> <p>Know the main methods of Geological enquiry.</p> <p>Can apply underlying geological concepts and principles beyond first context.</p>	All Level 5 modules	Practical class worksheets and practical test; Data acquisition and interpretation, and completion of technical report based on field excursions; Two-hour unseen examination

Can critically evaluate different approaches to solving geological problems. Can use range of key and established geological techniques for critical analysis.		
Can communicate effectively to specialist and non-specialist audiences.	Advanced Structural Geology and Geological Mapping Training Geoscience Field Techniques	Data acquisition and interpretation (e.g. production of maps), and technical reports based on field excursions; Poster/teamwork exercise on the geology of the field course study area
Have skills to exercise personal responsibility and decision-making.	Advanced Structural Geology and Geological Mapping Training Geoscience Field Techniques	Field notebook; Data acquisition and interpretation, and report based on field excursions
Can use literature searching and literature synthesis skills	Geoscience Field Techniques	Literature review
Enhance awareness of procedures for personal career development.	Geoscience Field Techniques	Assignment on applying for a job as a geoscientist, including drafting a CV and covering letter.

Year 3 (Level 6)

Intellectual Skills		
Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<p><i>Successful students will be able to:</i></p> <p>Has systematic understanding of key aspects of Geology and has acquired coherent and detailed knowledge, some at or informed by the forefront of defined aspects of subject.</p> <p>Has conceptual understanding that enables the student to devise and sustain arguments, solve problems, using ideas and techniques, some of which are at the forefront of the subject.</p> <p>Can describe and comment upon particular aspects of current geological research or advanced scholarship.</p> <p>Can critically evaluate geological arguments, assumptions, abstract concepts and data (may be incomplete), to make judgements,</p>	All Level 6 modules	Practical class based exercises; Practical test; Production of report, including supporting materials (e.g. maps, sedimentary logs, etc.); Two hour unseen examination; Field-course related assignments.

to frame questions to achieve a solution or identify a range of solutions to a problem. Has learning skills to undertake further professional (or equivalent) training.		
Can communicate information, ideas, problems, and solutions to both specialist and non-specialist audiences.	Independent Field Project Natural Hazards Economic Geology Hydrological and Engineering Geology Advanced Petrology and Structural Geology Field Course (Geoscience) Volcanic and Magmatic Processes (Geology)	Production of report, including supporting materials (e.g. maps, sedimentary logs, etc.); Poster Presentation; Individual and group-based oral presentation
Have the skills to exercise initiative and decision-making in complex and unpredictable contexts.	Independent Field Project	Practical class based exercises; Production of report, including supporting materials (e.g. maps, sedimentary logs, etc.); Field-course related assignments
Can deploy established techniques of geological analysis and enquiry to review, consolidate, extend and apply own knowledge and understanding, and to initiate and carry out projects.	Independent Field Project Exploration Geophysics for the Hydrocarbon Industry Advanced Topics in Sedimentology Hydrological and Engineering Geology Advanced Petrology and Structural Geology Field Course Advanced Petrology and Structural Geology Field Course (Geoscience) Volcanic and Magmatic Processes (Geology)	Production of report, including supporting materials (e.g. maps, sedimentary logs, etc.); Field-course related assignments; Field notebook

Year 4 (Level 7)

Learning Outcome	Module in which this is delivered	Principal forms of assessment (of the Level Outcome) used
<i>Successful students will have the opportunity to develop:</i>		
Has systematic understanding of knowledge, and a critical awareness of current problems and/or new insights in Geoscience, much of which is at, or informed	All Level 7 modules	Examinations, reports, oral and poster presentations, practical class assignments, development of web site.

by, the forefront of the subject or area of professional practice.		
Has comprehensive understanding of techniques applicable to own research / advanced scholarship, and has conceptual understanding to evaluate critically current research and advanced scholarship in the discipline.	Research Project Research in Context Research Report	Production of report in the format of a published article; poster presentation
Shows self-direction and originality in tackling and solving problems, and acts autonomously in planning and implementing tasks at a professional or equivalent level.	All Level 7 modules	Reports, oral and poster presentations, practical class assignments, development of web site, field course assignments.

9. Final and intermediate awards

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

M.Geoscience	480 credits	You will require at least 120 credits at levels 4, 5, 6 and 7
BSc Single Honours Geoscience	360 credits	You will require at least 120 credits at levels 4, 5 and 6 or above. You must accumulate at least 255 credits in Geoscience (out of 360 credits overall), with at least 60 credits in each of the three years of study, to graduate with a named single honours degree in Geoscience.
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

M.Geoscience 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 M.Geoscience with International Year. Students who do not complete, or fail the international year, will be transferred to the four-year Geoscience programme.

10. How is the Programme assessed?

Assessments within the Geoscience programme are classified into three broad categories:

- **Formative Assessments** take place during the running of each module. These are designed to inform students of their progress in the modules taken. They are not used as a part of students' formal assessment mark for the module
- **Summative Assessments** are used to return a formal assessment mark to Academic Services. They are normally derived from an examination at the end of the module and continuous assessment of course work throughout the module. Summative assessment marks from Levels 5 and 6 count towards the final degree score; the Level 5 marks being weighted half that of Level 6. Performance in these assessments is made known to students each semester and should be discussed with their Personal Tutor
- **Qualifying Assessments** are assessments that have to be passed above a certain threshold mark in order to pass the whole module. These are typically core fieldwork components to a module but may include other vital topics such as understanding of field safety issues

Most of the assessment in Geoscience is a combination of both formative, to provide you with feedback to improve your skills for later assessments, as well as summative, to contribute towards your overall mark, and some assessments may be qualifying as well. Some of your coursework, however, particularly in the early part of modules, may be formative only to prepare you for later summative work. Some modules are assessed via examinations and coursework, some by a combination of examination, coursework and fieldwork, others by coursework or field work alone.

The wide variety of assessment methods used within Geology and Geoscience 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 Geology and Geoscience:

- **Unseen closed and open book examinations** in different formats test your knowledge and understanding of the subject. Examinations may consist of essay, short answer and/or multiple choice questions
- **Technical Reports** allow you to demonstrate your ability to articulate ideas clearly and concisely in a format used in the geological industry. Technical reports also develop and demonstrate research and presentation skills (including appropriate scholarly referencing)
- **Laboratory reports** – structured proformas and full laboratory reports are formal summaries of work carried out in the geological laboratory and test your understanding of the practical aspects of the programme and develop the skills necessary to enable you to present and analyse your results
- **Class tests** taken either in the geological laboratory or online via the Keele Learning Environment (KLE) assess your subject knowledge and your ability to apply it in a more structured and focused way
- **Dissertations** enable you to explore in depth an area of particular interest through a substantial piece of focused research and writing, and demonstrate a deeper understanding of geological issues
- **Field course exercises** allow you to demonstrate your understanding of geological features encountered in the field. This might include the contents of your field notebook, field sketches, geological logs and maps
- **Oral and poster presentations and reports** assess your subject knowledge and understanding and your ability to articulate this orally and graphically. Group work also tests your ability to work effectively as members of a team, and to reflect on these processes as part of your own personal development
- **Literature Syntheses** of other scholars' work test your 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. They also help you provide a background context for your research project work
- **Portfolios** may consist of a range of different pieces of work but on a common theme to allow you to demonstrate your knowledge and understanding via a number of different formats

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)	Year 4 (Level 6)
Scheduled learning and teaching activities	43%	46%	33%	23%
Guided independent Study	57%	54%	67%	77%
Placements	0%	0%	0%	0%

12. Accreditation

M.Geoscience is accredited by the Geological Society of London www.geolsoc.org.uk, which is the world's oldest Geoscience society that was founded in 1807 by Royal Charter and is the UK national society for geoscience.

The Geological Society of London has accredited the Geoscience degree programme in 2014 with reaccreditation due in 2019. The Geological Society, the world's oldest Geoscience Society, was founded in 1807 by Royal Charter and is the UK national society for geoscience. It exists to promote the geosciences and the professional interests of UK geoscientists. The main aim of the accreditation scheme is to ensure that geology/geoscience degree courses are underpinned by well-maintained internal standards that satisfy the academic requirements of Fellowship of the Society and Chartered Geologist status. Students who successfully complete an accredited degree course will normally qualify for admission to Fellowship of the Society and for the award of Chartered Geologist status after a specified period of professional development and relevant experience.

Students who successfully complete an accredited degree course will normally qualify for admission to Fellowship of the Society and for the award of Chartered Geologist status after a specified period of professional development and relevant experience. The course is due for reaccreditation in 2019.

There are no additional requirements for accreditation as these are covered by core modules of your degree.

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.

M.Geoscience Regulations

Geoscience has professional accreditation and at this time there are no additional course regulations relating to accreditation. However, should these be required by the regulating body in the future, we might have to add course regulations to maintain our accreditation. Should this be required we will inform you of any changes at the earliest opportunity.

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

Geoscience (MGeoscience)	ABC / BBB A level Biology, Chemistry, Environmental Science, Geography, Geology, Maths, Physics or related science discipline at grade B or above. 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	32 points to include Higher Level Biology, Chemistry, Physics or Geography at 6 or above.	DDM You must have taken sufficient Science units, please contact us for advice.	Obtain Access to Higher Education Diploma with 30 Level 3 credits at Distinction and 15 Level 3 credits at Merit. You must also have taken sufficient Science credits, please contact us for advice.	Maths @ C (or 4) English Lang @ C (or 4)
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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. How are students supported on the programme?

Open Door Policy: Geology & Geoscience members of staff operate an 'Open Door Policy' where if we are free our office door will be open. If you want to have a chat about anything related to our courses, just knock and come in.

Personal /Geology Tutors: All Geoscience students are allocated a Personal Tutor for the duration of their studies as part of the University's Personal Tutor system. Those Geology students who are allocated a Personal Tutor from another subject are also assigned a Subject Tutor from the Geology teaching staff so that they have a contact person within the subject. The role of the Personal/Geology Tutor is to meet formally with their tutees several times a year to discuss progress and performance and to offer support and advice. Students can make arrangements to see their Personal/Geology Tutor at any time.

Assessment & Feedback: On-going formative feedback on work is provided in practical classes and on fieldwork by discussion with members of staff or postgraduate demonstrators. Feedback on formative and summative assessments is provided in many formats, as electronic or written comments (as appropriate to the type of work submitted), or verbally either as general comments to a group or individual. You can consult your Personal Tutor about feedback on your exams or consult module leaders regarding course content.

Use of e-learning/the Keele Learning Environment (KLE): All modules belonging to the Geoscience programmes are supported by learning materials that are accessible to students via the KLE.

Option Module Choice: General advice is given at the end of Level 5 (Year 2) on your choice of Level 6 Level 7 option modules. You can then talk to either your Personal Tutor and/or the Course Director about how your choice of modules would match your career aspirations.

Health and Safety: All students admitted to the course are expected to read the Geography, Geology and the Environment (GGE) Safety Handbook. Students are required to sign an agreement that they have read this Handbook, and that they will abide by the rules and regulations governing the efficient working, safety and welfare of all members both within the University and in the field. The GGE Safety handbook can be accessed from: www.keele.ac.uk/gge/handbooks/

Career Choice: The Course Director is the designated careers tutor. You can consult them at any time regarding questions you might have regarding future careers. Career development skills such as CV writing and applying for jobs are embedded within one of the Level 5 modules.

Students with disabilities: Students with disabilities or medical problems, who are admitted onto the Geoscience degree programme, will meet with a member of the University's Disability Services department, the Geoscience Course Director and the GGE Disability Officer at the very start of the course in order to discuss any special requirements. Procedures will then be implemented according to the nature of the student's disability or medical problem. These procedures can range, for example, from allowing extra examination time for students diagnosed as dyslexic, to allocating additional staff or demonstrators to field classes to help students with mobility problems.

Further information: It is essential that students consult the course web site at regular intervals for definitive versions of the Geoscience handbooks, on-line course materials, and programme and module specifications. This resource can be accessed at www.keele.ac.uk/gge/students/geoscience/

On-line learning and teaching materials related to individual modules are available on the Keele Learning Environment, which can be accessed from students.keele.ac.uk/ (Keele access only).

16. Learning Resources

The Geography, Geology and the Environment section of the School has its own building (the William Smith Building) that contains well-equipped laboratories and lecture theatres to cater for all geology/geoscience teaching. This concentration of teaching into one building enables students to identify with a specific base within the University.

M.Geoscience students have their own masters laboratory to work in during their Level 7 studies, including a dedicated personal computer. The foyer provides pleasant surroundings for students to meet and socialise with their peers. The Office is open continuously during the week from 9 am to 5 pm to answer student queries and deal with administrative tasks.

17. Other learning opportunities

Study abroad (semester)

Students on the Geoscience 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 geologist's training and is intended to supplement and complement formal class teaching and develop the skills of observing and recording. It also establishes professional, social and cultural links outside the institution and develops an external dimension to the School's courses. The Geoscience programme includes field excursions to classic geological areas within the British Isles, as well as overseas field courses to enable students to study the evolution of fundamentally different geological regimes. Due to the dual honours structure of Keele, field courses typically have to take place at weekends or during vacation time. An outline of the Geoscience field course programme is provided in section 5 of this document.

18. Additional costs

M.Geoscience Programme Costs

Field Course Costs

We offer a degree pathway where there are no charges to students for travel and accommodation taking field courses as a core part of their programme. The University pays for these costs. At Level 5 (second year), you have the option of attending the Almeria field course for free, or paying the extra cost of going to Utah above the level to which the Almeria field course is subsidised (approximately £850 in 2015/16). The potential additional cost is indicated at the start of the year, with details posted on student notice boards to enable you to make an informed decision on the choices available. In order to help you manage their field course costs, the payments are also spread over the course of the academic year, normally January, March and May. The first instalment is non-refundable due to the need to pre-book accommodation, flights, etc. in advance.

All Geoscience students undertake an independent field project with five-weeks fieldwork carried out during the summer vacation between Levels 5 and 6 (years 2 and 3). Students are responsible for organising their own transport and accommodation as well as paying any costs incurred. These costs are extremely variable as they are dependent on where the student carries out their project. Costs are minimal if the project work is undertaken in the student's local area.

At Level 7, receipted costs incurred of up to £300 on your Masters project will be reimbursed.

IMPORTANT: Costs are only for indicative purposes and correct at the time of printing. Costs are dependent on the options chosen by students and susceptible to changes in the number of students taking field courses and changes in external factors such as flight and accommodation costs outside the University's control. In addition, we reserve the right to change the venues of field courses due to both cost and academic considerations.

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.

Activity	Estimated cost
Field course - compulsory	
Either: One-week residential field course to Almeria, Spain	£0
Or: Twelve-day residential field course to Western USA	£850
Total estimated additional costs: Depends on field course chosen	Either £0 or £850

19. Quality management and enhancement

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

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

Student evaluation of, and feedback on, the quality of learning on every M.Geoscience 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 M.Geoscience 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 in all three years of the M.Geoscience Programme is considered and acted on at regular meetings of the Programmes Staff/Student Liaison 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/ga/externalexaminers/currentexternalexaminers/>

20. The principles of programme design

The Geoscience Programmes described in this document have 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: : Earth Sciences, Environmental Sciences and Environmental Studies (2014)
<http://www.qaa.ac.uk/en/Publications/Documents/SBS-earth-sciences-14.pdf>
- c. The Geological Society Accreditation Scheme for First Degree Courses in Geoscience
www.geolsoc.org.uk/Education-and-Careers/Universities/Degree-Accreditation
- d. Keele University Regulations and Guidance for Students and Staff: <http://www.keele.ac.uk/regulations>

21. Document Version History

Version history	Date	Notes
Date first created	October 2016	
Revision history	V2.0: 04/2018	Addition of International Year option (annex A) [Major change: reissued]
Date approved		

Annex A

M.Geoscience with International Year

International Year Programme

Students registered for M.Geoscience - Geoscience Route may either be admitted for or apply to transfer during their period of study at Level 5 to the Single Honours 'M.Geoscience 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 M.Geoscience programme without the International Year and progress to Level 6 on that basis. The failure will be recorded on the student's final transcript.

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

- i) Design, plan and critically evaluate a practical investigation within the geosciences, record relevant information accurately and systematically and be able to reflect upon the data in a critical manner.
- ii) Integrate, apply and develop fundamental geoscience principles to describe and explain phenomena and solve problems in the context of selected topics within geoscience.

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 'M.Geoscience 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 Geoscience 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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