Earth Sciences –
Environmental Earth Sciences, Geology

Degree options in the Faculty of Science

MGeol (Integrated Masters Degree)
Earth Sciences

BSc (Single Honours Degrees)
Environmental Earth Sciences
Geology

BSc (Joint Honours Degrees)
Geology and Biology
Geology and Chemistry

Features

* Our programmes are ranked third in the UK by the Guardian University Guide and the Times and Sunday Times University Guides, respectively for 2016.
* We specifically focus on skills and vocational training, emphasising fieldwork experience in diverse geological settings within the UK and overseas.
* The MGeol degree can include a three-month industry placement.
* The Geology and Environmental Earth Sciences degrees are accredited by the Geological Society of London and the Institution of Environmental Sciences, respectively. Accreditation is a benchmark of quality and employability, a professional recognition that our teaching is of the highest standard. Both accredited degrees provide a faster track to chartered status.
* Industry professionals are involved in teaching within some of the Honours modules.
* There is an active student-led Geological Society which co-ordinates social events and academic events.
* A number of industry-sponsored bursaries and scholarships are available each year.

Facilities and resources

The University has recently invested in several new state-of-the-art laboratory facilities for Earth and environmental science research for the high precision geochemical and isotopic analysis of minerals, rocks, soils, and fluids. You will receive hands-on training on these analytical facilities and undergraduate experimental and analytical research is encouraged.

Field kit, such as compasses, are provided for all entering students through industry sponsorship and about 50% of all field training costs are paid for through alumni contributions to our training programme. Students will need to pay ~£1,500 over the four-year degree; this is ~50% of the total cost.

Entrance Requirements

Obtaining the following grades will not guarantee you a place as we consider all aspects of every application, including the Personal Statement.

First Year Entry
SQA Highers and GCE A-Levels should include at least two sciences from Biology, Chemistry, Geography, Geology, Mathematics and Physics

SQA Highers: AAB
GCE A-Levels: AAB
International Baccalaureate Points: 36 including at least 2 HL6 science subjects*

Preference may be given to candidates with strong science qualifications.

Second Year Entry
SQA Advanced Highers/Highers and GCE A-Levels should include Geology plus two sciences from Biology, Chemistry, Geography, Mathematics and Physics

SQA Advanced Highers: AA and AA in two other Highers
GCE A-Levels: AAA
International Baccalaureate Points: 38 including at least 3 at HL7, HL6, HL6 from the following subjects: Biology, Chemistry, Geography, Physics

* An approved science: Biology, Chemistry, Computing Science or equivalent, Geography, Geology, Mathematics, Physics, Psychology.

For full Faculty Entrance Requirements, see page 53.

For degrees combining more than one subject, the subject with the higher Entrance Requirements determines the grades you need. You will also need to meet any further subject-specific Entrance Requirements as outlined on their pages.

For further country-specific qualifications and pre-degree foundation programmes see:
www.st-andrews.ac.uk/study/international

Do I need previous knowledge of this subject?
– Preferable for direct entry into second year

Subject enquiries

Dr Rob Wilson
E: earthsci@st-andrews.ac.uk
“With supportive and engaging staff and the breadth of Scottish geology at its doorstep, St Andrews is perfectly situated to study all aspects of Earth Science. Dynamic fieldwork opportunities, both within the UK and abroad, supported by innovative lab-based research and teaching by the very best of staff ensures a degree here is a gateway to a world of opportunities.”

Callum (Perth, Scotland)

### What will I study?

The Geology degree provides the training to understand how the lithosphere, hydrosphere, biosphere and atmosphere co-evolved. It emphasises the origin and chemistry of rocks and minerals, geological mapping and the genesis of hallmark periods of change in the development of the Earth system. The Environmental Earth Sciences degree focuses on Earth surface processes, the biogeochemical cycling of elements at the surface of the Earth, and environmental change. The MGeol in Earth Sciences is an Integrated Masters degree that combines subject knowledge across the Earth and environmental sciences and includes the opportunity for an internship with industry, an extended research project, and a major fieldwork expedition.

**MGeol or BSc?**

The MGeol degree is designed to give you advanced experience prior to undertaking full-time employment or PhD research. MGeol students normally have a formal industrial placement and take part in a geological expedition. Some sectors do not require a Masters-level degree and therefore any student can choose to graduate with a BSc degree.

### Indicative programme information

The first two years of study for any degree are spent completing the core training in Earth Sciences and accompanying subjects.

**First Year (2 x 20 credit modules required)**

The Earth Sciences modules provide the underpinning concepts and fundamental aspects of Earth structure and Earth history, including the key ideas regarding the origin of the planet and its biosphere, as well as Earth materials and resources. There are several field excursions, including the five-day residential "Highland Fling" field course to classic Scottish geological localities, all of which are designed to reinforce and enhance the learning obtained in the lectures and laboratory practicals. The geological background to natural resources is a core theme of the excursion.

**Second Year (3 x 30 credit modules required)**

All students take a core Earth Sciences module in Semester 1 which provides basic knowledge and training in low temperature mineralogy, sedimentary systems, palaeontology, and geophysics. There is a dedicated module for each BSc degree in Semester 2 and they cover deep Earth geology (BSc Geology) and biogeochemical cycling and surface processes (BSc Environmental Earth Sciences). MGeol students take both Earth Sciences modules in Semester 2, and therefore develop the knowledge base and skills associated with the two core modules for Geology and Environmental Earth Sciences. There is a major emphasis on field training in second year through several day-long excursions in Scotland and two residential courses. BSc Geology students undertake an eight-day geological mapping excursion in central Spain, and the BSc Environmental Earth Sciences students complete a five-day excursion on the geochemistry and mineralogy of acid-mine drainage in the Rio Tinto region in southern Spain. The aims of the field courses are to develop the key skills required to observe, measure and interpret geological and geochemical data, as well as to build confidence, and encourage critical and independent thinking.

After completion of second year, you decide on your final degree choice (e.g. MGeol or BSc) and enter the Honours class.

**Honours – Third, Fourth and Fifth Years**

(7 - 8 x 15-credit core modules required in third year and at least 2 - 3 other 15-credit modules required over two years)

Study at Honours level is composed of core training and optional modules in which you have the opportunity to focus on a particular area of interest and undertake your own research. The modules involve key skills training and the opportunity to get first-hand experience of new research discoveries and advances in Earth and Environmental Sciences by our staff in an integrated lecture-lab-field forum. Some selected examples of core modules are provided in the table below. Other modules that are either core or optional courses, depending on the degree programme, include Geodynamics, Geochronology, Global Climate Change, Contemporary Environmental Problems, Metallogeny and Isotope Geochemistry.

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<th>Some of the Core Modules taken in Years 3, 4 &amp; 5</th>
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<td><strong>Geological Mapping</strong></td>
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<td><strong>Advanced Environmental Field Methods</strong></td>
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<td><strong>Geochemistry</strong></td>
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<td><strong>Igneous and Metamorphic Petrology</strong></td>
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<td><strong>Global Biogeochemical Cycles</strong></td>
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<td><strong>Processes and Products in Sedimentary Systems</strong></td>
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<td><strong>Structural Geology and Tectonics</strong></td>
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<td><strong>BSc Geology &amp; MGeol</strong></td>
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In-depth training occurs in the first Honours year and includes the statistical analysis and presentation of scientific data. Fourth and fifth years are dedicated to further developing critical thinking and problem-solving skills, and the opportunity to gain industry experience. The content of each year is dependent on degree choice (MGeol or BSc). Choosing the BSc degree pathways require an independent research dissertation, involving field and laboratory analyses and research presentations. MGeol students can apply for a three-month placement in industry and complete a field- or laboratory-based research project. The fifth year includes an extended independent research dissertation and a project-based geological overseas expedition to localities linked to staff.
research areas. Optional Honours modules are also on offer across a range of Earth science topics for the Honours years. The extensive field training combined with research and industry experience that our degrees offer produce graduates that successfully compete for industry jobs or the best PhD projects.

Fieldwork
Our graduates are valued as independent and confident scientists in the field. This level of competence is developed through 14-day field excursions during Years 3 and 4, weekend and day-long field excursions associated with individual modules, and up to four weeks of fieldwork associated with the independent research projects. Two weeks of geological mapping are conducted in the NW Highlands during Year 3, providing intensive training on classic Scottish geology. Environmental Earth Sciences students have a tailored field mapping and geochemistry course in the Cairngorms. A two-week field course across the western Alps (Geology) and the central Pyrenees (Environmental Earth Sciences) at the beginning of fourth year are designed to integrate all the learning of the previous three years for all degree students. In total, students participate in at least 70 supervised field days over the length of the degree, and in most cases the amount of fieldwork is over 100 days with the research project component.

Study abroad
You may apply to study abroad under the University’s St Andrews Abroad programme. See page 46.

Typical class sizes and teaching information
First Year: lectures 90 - 110, tutorials 3 - 6
Second Year: 40 - 50
Honours: 30 - 40

Teaching is based on semester-length modules and hands-on practical/laboratory training. Performance is measured through a mixture of continuous assessment and examinations. Our degrees balance skills training, incorporating a significant laboratory and/or field component, with subject-based modules that deepen and broaden theoretical knowledge. Many modules enhance problem-solving skills and involve professional Earth scientists from industry. Field courses are fully integrated with the degree programmes and have been conducted in Scotland, England, Spain and the Swiss-Italian Alps in recent years. The country and geological setting of the MGeol expeditions varies each year, and participating students are involved in choosing the location and planning the expedition.
“With some of the most iconic and diverse geology right on the doorstep, St Andrews is perfectly placed to study Earth Sciences. The Department is full of enthusiastic and supportive staff, and there are always opportunities for undergraduates to assist with cutting-edge research. The extensive fieldwork on offer, high-quality teaching and training in state-of-the-art laboratory facilities, ensure students graduate with the very best career prospects.”

*Tanya (Stanmore, Middlesex, England)*

Throughout each degree programme, you are encouraged and supported to develop literacy, numeracy, computing and presentation skills, as well as exercising critical, independent and creative thought and judgement.

**Typical methods of assessment**

All our 1000- and 2000-level modules are assessed by coursework that includes a practical examination (50%) and a final written examination (50%) based on short answer questions and essays. At Honours level, some modules are assessed through coursework (50%) and a final examination (50%), and other modules are based entirely on coursework. The BSc Honours dissertation and MGeol Advanced Research modules are year-long courses that are assessed through the written dissertation, a project proposal and a presentation. The MGeol research paper is expected to be of publishable quality.

**Scholarships and prizes**

Fieldwork expenses for Geology or Environmental Earth Sciences degree students are subsidised by the Irvine Bequest and contributions from our alumni. There are financial awards at every level of study for students who have earned the highest marks in fieldwork.

**Careers**

The Department is proactive about developing career opportunities, and career activities are provided for all students (from first year onwards). There are a wide variety of career options for Earth and Environmental Sciences graduates. Our graduates now work in the energy, natural resources and environmental sectors, as well as in wider science areas. Many students continue with research in PhD programmes before embarking on their professional careers. Our graduates are recognised internationally as being highly trained, independent thinkers with the appropriate skills required to problem solve in a variety of research or applied areas. For both BSc and MGeol graduates, recent employers include Chevron, Maersk Oil Ltd, BHP Billiton, BP, Shell, the British Geological Survey, Nexen Ltd., Norsk Hydro, Neftex, Red Rock Mining, African Mining Corporation, Fugro, Geotechnics Ltd., Axmin Inc., Scottish Natural Heritage, Scottish Environmental Protection Agency, Balfour Beatty, Mouchal and Jacobs.


See also page 36 for details of the University’s Careers Centre.