MSc in Geochemistry
2016 Entry
MSc Geochemistry
(One Year – Full time)

Written Examinations, Coursework & 15,000-word Dissertation. For all Masters degrees there are exit awards available that allow suitably-qualified candidates to receive a Postgraduate Certificate or Postgraduate Diploma.

Features

The Department of Earth & Environmental Sciences has 20 full-time academics, 8 research fellows and 4 technical staff members, with a student population of about 170. We have a wide range of expertise in the field of geochemistry, underpinned by new state-of-the-art laboratory facilities developed as a result of the recent appointment of early-career academics over the past five years. Geochemistry research spans investigations into the origins of life, evolution of the Earth and other terrestrial planets, composition of oceans, rivers and atmospheres, and the pulse of past and current climate change.
Postgraduate community

A dynamic and research-intensive atmosphere is encouraged and supportive of all students. The size of our Department engenders cohesive and friendly collaborations between staff, postdoctoral research fellows and postgraduate students, and co-authored papers are routinely published in the top journals for geochemistry, such as *Nature, Nature Geoscience, Geochimica et Cosmochimica Acta* and *Science*. We are part of the ‘IAPETUS’ NERC Doctoral Training programme, along with the universities of Durham, Glasgow, Newcastle and Stirling, and the British Geological Survey. Our PhD and Masters students are studying a wide range of topics across the Earth and environmental sciences based within our five major research themes: *Global Change, Solid Earth, Geobiology and Earth System Evolution, Earth Surface Processes*, and *Economic Geology and Energy*. Skills development within these areas of current research are part of the core training for all postgraduate students.

Careers

The range of research areas and applications of geochemistry is so broad that career opportunities span the whole of Earth and environmental sciences. Geochemists are employed in the energy sector (hydrocarbon industries, petrochemicals, nuclear and renewables), in mining and mineral exploration, extraction and processing, and in environmental industries and agencies focused on pollution monitoring and environmental remediation. Masters-level training in geochemistry would provide a suitable platform for a career in materials science outside of Earth and environmental sciences specifically. MSc Geochemistry graduates are also in demand as specialised research technicians in academic institutes worldwide and as PhD students in geochemistry-focused research.
Lecturer Andrea Burke (in a check shirt) sampling the deep waters of the Southern Ocean with research colleagues during their ocean field work on ocean circulation and the regulation of CO₂ in the atmosphere.

Facilities

The Department houses state-of-the-art stable and radiogenic isotope geochemistry and geobiology laboratories, including culturing facilities for corals and microbes. Our research equipment includes five high-precision isotope mass spectrometers (two MAT 253s, two Nu Plasma, and one Neptune Plus installed in 2015), two Class 100 clean labs, an XSeries quadropole ICP-MS, ICP-OES, and a Finnegan Delta Plus XP gas source mass spectrometer. All materials, and particularly gases, liquids, minerals, rocks, organisms and soils, can be analysed for isotopes and major and trace elements within research projects that cover the breadth of Earth and environmental science. We host an experimental petrology facility capable of simulating conditions from the mid-crust to upper mantle (pressures of between 0.5-4.5 GPa and 300-2000°C). A range of spectroscopic, SEM, electron microprobe and X-ray diffraction and fluorescence equipment are also part of our analytical facilities.
MSc in Geochemistry

Geochemistry is at the heart of Earth sciences, and provides the techniques and knowledge that allow scientists to answer such fundamental questions as: how has the mantle evolved through time, was there ever life on Mars, what was the chemistry of Earth’s and Mars’ ancient atmospheres, and what are the rates and drivers of past and current climate change on Earth? Geochemistry has widespread applications to understanding and solving contemporary problems in Earth surface chemistry, such as pollution of soils and water or rates of ocean acidification, and for the exploration of natural resources, such as metals and rare Earth elements. It is a forensic part of Earth science and is used to address questions that are both diverse and profound.

The St Andrews MSc in Geochemistry delivers postgraduate-level knowledge and skills training in geochemistry and modern geochemical methods, involving extensive hands-on laboratory training and experience with state-of-the-art equipment. This comprehensive and rigorous course is relevant preparation for pursuing a PhD in geochemistry by incorporating a lab-based research dissertation, as well as employment in industry through incorporation of applied economic and environmental geochemistry modules. Staff in the Department of Earth & Environmental Sciences and the School of Chemistry contribute to the core laboratory training and teaching within subject modules.

**Compulsory modules**
- Introduction to Geochemistry
- Environmental Geochemistry
- Physical Chemistry Laboratory
- Isotope Geochemistry

**Whole year – Integrated Earth Sciences**

**Summer – Research Project for MSc**

**Optional modules**
- Global Biogeochemical Cycles
- Geodynamics
- Metallogeny (subject to approval)
- Homogeneous Catalysis
- Processing of Materials
- Energy Conversion and Storage
- Blockbuster Solids
- Molecular Inorganic Solids

Magma mingling at the centimetre- to metre-scale in Paatusoq, SE Greenland.
Department of Earth & Environmental Sciences
University of St Andrews
Irvine Building
University of St Andrews
St Andrews, Fife, KY16 9AL
Scotland (UK)

T: +44 (0)1334 463940
F: +44 (0)1334 463949
E: earthsci@st-andrews.ac.uk

www.st-andrews.ac.uk

Photographs by: Graham Hambley, Josh Hughes and Rhona Rutherford
Produced by Print & Design, University of St Andrews, October 2015
Printed by Winter & Simpson on Revive 100 White Offset 100% recycled paper.

Curriculum Development
As a research intensive institution, the University ensures that its teaching references the research interests of its staff, which may change from time to time. As a result, programmes are regularly reviewed with the aim of enhancing students’ learning experience. Our approach to course revision is described at: www.st-andrews.ac.uk/media/teaching-and-learning/policies/course-revision-protocol.pdf

The University of St Andrews is a charity registered in Scotland. No: SC013532