



## Newly launched for 2021 entry

The new MSc in Strategic Earth Resources is a one-year postgraduate degree designed to prepare students for the challenges in resource exploration in the twenty-first century, combining core knowledge, fieldwork, short courses, seminars, and a research dissertation.

It tackles not only the fundamental geological knowledge and skills required for modern mineral exploration targeting and estimation, but also the economic, environmental, and social (ESG) aspects of mining: from exploration, extraction, to remediation. It will additionally cover topics such as critical metals and sustainable mining, the global climate challenge, and energy alternatives such as geothermal.

The MSc provides a fundamental grounding in high to low temperature ore-forming processes, and hands-on training in both the classroom and field in the latest digital and remote sensing mapping techniques, 3D modelling software, and geochemical modelling. Students also take additional optional topics either in geodynamics, climate science, or advanced geochemistry.

Students gain knowledge and experience through interactions with invited guest lecturers from industry and by visiting mine sites. Knowledge is consolidated through both an independent industry-focused or fundamental research dissertation, and through a field course, which for 2021 entry is planned to be in South Africa.

The MSc is targeted at both new quantitative geoscience graduates seeking a career in the resources industry and/or preparation for an applied PhD, but also at professional exploration geologists with several years industry experience seeking to move into an exploration strategy role.

# MSc Strategic Earth Resources

## 2021 Curriculum

- **Core to Crust Ore Genesis – High T and Low-T:** focuses on the geological processes, geodynamic drivers, and mineralogy of the principal metallic and non-metallic mineral deposits related to magmatic, hydrothermal and surficial processes.
- **Applied Digital Field Methods:** field-based module that focuses on creating and interpreting surface and underground maps, remote sensing exploration technology and 3D modelling.
- **Exploration to Estimation:** fundamental geochemical and geophysical concepts in mineral exploration, and key aspects leading to mineral resource estimation.
- **Global Resource Challenges:** the economic, environmental, and societal issues regarding mining, and future challenges shaping twenty-first century mineral exploration.
- **Over three weeks of field excursions:** covering digital mapping and remote sensing, different deposit types and mining operations, and mining-related environmental issues and remediations.
- **Statistics and Analytical Sciences:** provides students with a strong background in methods of data analysis.

Students also take one of the following three options:

- **Geodynamics:** studies the geodynamic evolution of Earth's crust through geological time.
- **Special Topics in Climate Science:** tackles a variety of topical research subjects in climate science, such as climate sensitivity, past warm climates, external forcing, and geo-engineering.
- **Advanced Geochemistry:** theoretical and applied advanced topics such as aqueous geochemical modelling and organic geochemistry.

## Field excursion to South Africa

The keystone of the course is a one-week field trip to visit world-class mineral deposit types and associated geology, which for 2021 entry is planned to be in South Africa. This trip allows students to consolidate knowledge gained and gives an opportunity to see mining operations first hand.

## Studying at St Andrews

A dynamic and research-intensive School, MSc students will interact with staff, postdoctoral research fellows and other postgraduate students in Earth & Environmental Sciences who study a wide range of topics across the Earth sciences.

[www.st-andrews.ac.uk/earth-sciences](http://www.st-andrews.ac.uk/earth-sciences)

## Facilities

To support the dissertation project, the School houses state-of-the-art stable and radiogenic isotope geochemistry laboratories (STAiG) for both *in situ* laser and solution measurement of a range of trace elements and radiogenic and stable isotopes. Other laboratories include geobiology, rock magnetism (M<sup>3</sup>ORE), luminescence spectroscopy, SEM and electron microprobe, X-ray diffraction and X-ray fluorescence.

## School of Earth & Environmental Sciences

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