

Earth Sciences (ES) Modules

ES3003 GIS and Spatial Analysis for Earth Scientists				
SCOTCAT Credits:	15	SCQF Level 9	Semester	2
Academic year:	2019/0			
Planned timetable:	10.00 am - 1.00 pm Mon, Wed (lecture plus lab session) (Weeks 1 - 7)			
This module covers the principles behind, and practical application of digital spatial analysis in Earth Sciences. This includes the analysis of primary and secondary datasets, how to access and import a variety of data types, and the fundamentals of various spatial analytical methods including spatial statistics and modeling within a GIS environment. The module also prepares students for the correct presentation of maps and datasets in the dissertation proposal and thesis.				
Pre-requisite(s):	Before taking this module you must take ES3002			
Learning and teaching methods of delivery:	Weekly contact: 6 lectures and 14 practicals and support sessions (Weeks 1 - 7).			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr C R Bates			
Module teaching staff:	Dr C Bates			

ES3004 Processes and Products in Sedimentary Systems				
SCOTCAT Credits:	15	SCQF Level 9	Semester	2
Academic year:	2019/0			
Planned timetable:	9.00 am - 10.00 am Tue - Thu (lectures), 2.00 - 5.00 pm Mon (practicals). 3 field days (9.00 am - 5.00 pm)			
This core module provides fundamental knowledge and training in describing, studying and interpreting sediments, sedimentary rocks and stratigraphic frameworks. The concepts and methodologies of process sedimentology, stratigraphy and sedimentary petrography will be taught, and training undertaken using fieldwork and practicals. The module serves as preparation for subsequent modules on related topics and for field-based modules, including Advanced Geological Mapping, the Research dissertation, and the fourth-year field course.				
Pre-requisite(s):	Before taking this module you must pass ES2001 and (pass ES2002 or pass ES2003)			
Learning and teaching methods of delivery:	Weekly contact: Weekly lectures and practicals averaging 6 hours per week plus field training			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Prof A R Prave			
Module teaching staff:	Prof T Prave, Dr C Rose			

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ES3008 Geochemistry				
SCOTCAT Credits:	15	SCQF Level 9	Semester	1
Academic year:	2019/0			
Planned timetable:	10.00 am Tue and Thu (lectures), 2.00 - 5.00 Fri (practicals)			
<p>This module provides an introduction to geochemistry: the study of the abundance, distribution and circulation of the chemical elements in minerals, rocks, soils, water and the atmosphere. Geochemical tools are a powerful means to study geological, economic, and environmental problems. In the module we study the origin and distribution of the chemical elements in the Earth and solar system and review thermodynamics and kinetics as applied to the Earth system. We apply thermodynamics to make quantitative predictions regarding the outcome of chemical reactions associated with geological processes. We consider the behaviour of elements, in both low temperature environments and planetary interiors. Material covered includes introductory chemistry, chemical bonding, thermodynamics, kinetics, aqueous geochemistry, mineral precipitation and dissolution, CO₂ change, and planetary chemistry. We utilise geochemical tools to constrain changes in geological processes and Earth's environment.</p>				
Pre-requisite(s):	Before taking this module you must take at least 1 and no more than 2 modules from {ES2001, ES2003}			
Learning and teaching methods of delivery:	Weekly contact: 2 x 1 hour lectures (8 weeks), 1 x 3 hour practical (8 weeks), 1 field class			
Assessment pattern:	Written Examination (x2) = 100% (mid-term worth 35%, end of term worth 65%)			
Re-assessment pattern:	Written Examination = 100%			
Module coordinator:	Dr J W B Rae			
Module teaching staff:	Dr J Rae, Dr P Savage			

ES3009 Igneous and Metamorphic Petrology				
SCOTCAT Credits:	15	SCQF Level 9	Semester	1
Academic year:	2019/0			
Planned timetable:	9.00 am Tue and Thu (lectures); 2.00 pm - 5.00 pm Mon (practicals)			
<p>This is a core module within the BSc Geology and MGeol Earth Sciences degrees and delivered early in the Honours programme in order to provide a fundamental framework for interpreting major petrological processes acting within the silicate portion of planet Earth. The course focuses on solid-state equilibria, liquid-solid phase equilibria, crystallography, and spatial associations. The module serves as preparation for subsequent modules on related topics and for field-based modules, including Advanced Geological Mapping, the Research dissertation, the Alps field course, Advanced Petrogenesis.</p>				
Pre-requisite(s):	Before taking this module you must pass ES2002			
Learning and teaching methods of delivery:	Weekly contact: 2 x 1-hour lectures (x 10 weeks), 3-hour practicals most weeks.			
Assessment pattern:	2-hour Written Examination = 50%, 2 x 2-hour Practical Examination = 50%			
Re-assessment pattern:	2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Dr S Mikhail			
Module teaching staff:	Dr S Mikhail, Prof A Finch, Prof R White			

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ES3011 Global Biogeochemical Cycles				
SCOTCAT Credits:	15	SCQF Level 9	Semester	2
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>Environmental Earth Science is inherently multi-disciplinary, but many environmental science courses focus on specific reservoirs of the Earth system (e.g., the atmosphere, oceans, or continental crust), rather than examining the system as a whole. The study of global biogeochemical cycling crosses these disciplinary boundaries, following specific elements as they are cycled through the Earth surface by physical, chemical, and biological transformations. This module will focus on the cycling of the five elements critical to life on Earth - carbon, oxygen, sulfur, phosphorus, and nitrogen - using examples from both modern and ancient environments and their response to human influence. An emphasis will be placed on the understanding proxies utilised for unravelling these processes in the environment and in the rock record, along with modern quantitative methods used to constrain these cycles.</p>				
Pre-requisite(s):	Before taking this module you must (take ES2002 or take ES2003) and take ES3008			
Learning and teaching methods of delivery:	Weekly contact: 2-hour lectures (x 6 weeks and only 1 hour in week 7) and 3-hour practical sessions (x 7 weeks).			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Dr A L Zerkle			
Module teaching staff:	Dr A Zerkle, Dr M Claire, Dr S Mikhail			

ES4007 Petroleum Exploration and Geophysics				
SCOTCAT Credits:	15	SCQF Level 10	Semester	1
Academic year:	2019/0			
Planned timetable:	11.00 am - 1.00 pm Thu (lectures), 2.00 - 5.00 pm Thu (practicals)			
<p>The fundamental concepts, techniques and practices of the hydrocarbon exploration industry are presented. Students will gain a thorough understanding of the geoscience of petroleum exploration, particularly using geophysical methods, and a working knowledge of modern concepts in oil and gas geology.</p>				
Pre-requisite(s):	Before taking this module you must pass ES2001 and (pass ES2002 or pass ES2003)			
Learning and teaching methods of delivery:	Weekly contact: 19 lectures and 4 workshops, 2 practicals and support sessions (Weeks 1 - 10).			
Assessment pattern:	Coursework (Petrel Logging - 50%, Carbonate Workshop - 20%, Wireline Logging Workshop - 10%, North Sea Report - 20%) = 100%			
Re-assessment pattern:	Current Coursework (Petrel Logging) = 50%, Coursework = 50%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Dr C R Bates			
Module teaching staff:	Dr R Bates			

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ES4009 Geodynamics				
SCOTCAT Credits:	15	SCQF Level 10	Semester	2
Academic year:	2019/0			
Planned timetable:	Lectures: 9.00 am - 11.00 am Tue (Weeks 1, 8-11) 9.00 am - 10.00 am Tue Wed (weeks 2-7) Practical: 9.00 am - 5.00 pm Fri (Week 6)			
A study of the geodynamic evolution of Earth's crust since the Archaean, the evolution of convergent and divergent margins, and the relationships between deep Earth geodynamics, surficial tectonics, erosion, climate, and biosphere. The module investigates how fundamental geodynamic processes operate and impact the rock record and contrasts geodynamic evolution over time. The module develops skills of geodynamic interpretation, use of numerical models, palaeogeographic and metadata analysis. Students will undertake an independent research project culminating in a manuscript-style report for continuous assessment; and there will be a final exam focusing on continental tectonics.				
Pre-requisite(s):	Before taking this module you must pass ES2002 and pass ES2003			
Anti-requisite(s)	You cannot take this module if you take ES5009			
Learning and teaching methods of delivery:	Weekly contact: 2 hour lectures (11 weeks), 7 hour practical (1 week)			
Assessment pattern:	Coursework = 50%, 2-hour Written Examination = 50%			
Re-assessment pattern:	Coursework = 20%, 2-hour Written Examination = 80%			
Module teaching staff:	Dr T Raub, Prof. R White			

ES5005 Isotope Geochemistry: Theory, Techniques, and Applications				
SCOTCAT Credits:	15	SCQF Level 11	Semester	1
Academic year:	2019/0			
Planned timetable:	To be arranged.			
Isotope geochemistry has grown over the last 50 years to become one of the most important fields in the Earth sciences. The growth in the importance of isotope geochemistry reflects its remarkable success in solving fundamental problems in mantle formation, ore genesis, hydrology, hydrocarbon formation, crustal evolution, planetary formation, geochemical cycles, hydrothermal circulation, ocean circulation, and climate and environmental change. In this module, we will explore the theory of isotopes and their fractionation, including kinetic, equilibrium, and Rayleigh fractionation. We will also use case studies and applications of isotopes to interesting problems across Earth Sciences including the evolution of the atmosphere, the formation of the solar system and planets, and climate and carbon cycle reconstructions. These case studies will introduce concepts such as clumped isotopes, isotope mass balance, mass independent fractionation, and radionuclide disequilibria.				
Pre-requisite(s):	Current bsc students should pass ES3008 or pass (ch1401, CH1402 and ch2501)			
Learning and teaching methods of delivery:	Weekly contact: 2 x2-hour lectures (x 5 weeks), 3-hour practical sessions (x 3 weeks)			
Assessment pattern:	2-hour Practical (Open Book) Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Practical (Open Book) Examination = 80%, Coursework = 20%			
Module coordinator:	Dr A Burke			
Module teaching staff:	Dr A Burke, Dr P Savage, Dr A Zerkle			

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ES5010 Advanced Geochemistry				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Planned timetable:	To be arranged.			
The objective of this course is to provide students with skills in some of the more advanced topic in geochemistry that are not commonly discussed in introductory courses, including isotope geochronology, aqueous geochemical modeling, non-traditional stable isotopes and organic geochemistry. This selection of topics covers both theoretical and applied aspects in geochemical sciences with the aim of laying out potential avenues for future professional development.				
Pre-requisite(s):	Before taking this module you must take ES3008			
Learning and teaching methods of delivery:	Weekly contact: 33 hours in total over the semester, composed of a combination of lectures and 2-3 hour practicals.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	2-hour Written Examination = 80%, Coursework = 20%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Dr E E Stueeken			
Module teaching staff:	Dr Eva Stueeken, Prof D Mark and A Bradley			

ES5011 Water in the Environment				
SCOTCAT Credits:	15	SCQF Level 11	Semester	1
Academic year:	2019/0			
Planned timetable:	To be arranged.			
This module provides an introduction to hydrogeology (the distribution and movement of water through rocks and soils) and water quality and contamination. In the module we study the theory and concept of hydrology and groundwater flow, how to model fluid flows and how to predict solute and contaminant transport. We study key aqueous pollutants (e.g. metals, radionuclides, nutrients), their behaviour in different waters (speciation, mobility, bioavailability and toxicity) and methods of remediation.				
Pre-requisite(s):	Undergraduate students without the prerequisite but with a suitable chemistry background should be considered			
Learning and teaching methods of delivery:	Weekly contact: Total of 20 hours of lectures, 9 hours of practicals, one field trip and interviews.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework (including Technical Brief, Media Interview and Qualitative analysis exercise) = 60%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr N Allison			
Module teaching staff:	Dr N Allison, Mr A Black (Groundwater Science Ltd)			

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ES5012 Biogeochemistry				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>Earth's surface environment is tightly regulated by biogeochemical processes. The biosphere directly influences the composition of Earth's atmosphere, ocean chemistry, and global climate, through the cycling of nutrients and other elements. This module will examine the role of biogeochemical processes in controlling Earth surface chemistry, and their possible influence on deep Earth reservoirs. Emphasis will be placed on feedbacks between the geosphere, atmosphere, and biosphere over geologic time, and how these interactions have both contributed and responded to important transitions in Earth history (e.g., the Great Oxidation Event, global glaciations). We will also highlight current geochemical (e.g., stable isotope ratios) and numerical (e.g., modelling) techniques used to constrain these interactions in both modern and ancient (rock record) systems.</p>				
Learning and teaching methods of delivery:	Weekly contact: 2 x 1-hour lectures and 3-hour practical sessions.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework (including modelling exercises, literature review and project) = 60%			
Re-assessment pattern:	2-hour Written Examination = 80%, existing Coursework = 20%			
Module coordinator:	Dr A L Zerkle			
Module teaching staff:	Dr A Zerkle, Dr M Claire, Dr S Mikhail			

ES5013 Advanced Petrogenesis				
SCOTCAT Credits:	15	SCQF Level 11	Semester	1
Academic year:	2019/0			
Planned timetable:	10.00 am Mon and Tue (lectures). 10.00 - 1.00 pm Wed or Fri (practicals)			
<p>Rocky planets, like Earth, comprise of a metallic core with a rocky mantle and crust topped with a gaseous atmosphere. The focus of this course is the genesis of the rocky mantle and crust ? termed the silicate Earth ? and it?s relationship to small-scale to planetary-wide processes. The silicate Earth primarily comprises igneous and metamorphic rocks. This module explores the nature of the magmatic and metamorphic processes that characterise the Earth from the immediate subsurface to the base of the mantle. We focus on the petrology and geochemistry of the minerals and rocks created, and the evolution of composition as a function of time and depth. Students completing this module will understand how magmatic systems operate from melting source, through ascent to the plumbing systems in the immediate subsurface. The response of the crust to dynamic changes in pressure and temperature will also be explained along with the methods used to determine these. The course will develop key skills in identifying rocks, interpreting geochemical data, and using geochemical and thermodynamic methods to unravel rock histories. Students will also be shown how these data can be used to understand any and all rocky bodies in the cosmos, from Earth to exoplanets.</p>				
Pre-requisite(s):	Before taking this module you must take ES3009			
Learning and teaching methods of delivery:	Weekly contact: 19 lectures, 15 hours of laboratory work, 18 hours of field-related study over the semester			
Assessment pattern:	2-hour Written Examination = 50%, 3-hour Practical Examination = 50%			
Re-assessment pattern:	2-hour Written Examination = 100%, No Re-assessment if Coursework mark is less than 4			
Module coordinator:	Prof A A Finch			
Module teaching staff:	Prof A Finch, Prof R White and Dr S Mikhail			

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ES5031 Statistics and Analytical Sciences				
SCOTCAT Credits:	5	SCQF Level 10	Semester	2
Academic year:	2019/0			
Planned timetable:	To be confirmed			
<p>This module is designed to provide MSc Geochemistry students with a strong background in Statistics and methods of data analysis used in Earth Sciences. The module comprises a series of combined lecture-practical classes. These will cover both statistical concepts (distributions, accuracy and precision, error propagation, Monte Carlo simulations etc.) and applied data manipulation (using spreadsheets and the statistical programming language R). Weekly practical classes will put the lecture material into a practical context and comprise 40% of the module grade. Students also are asked to independently assess a large (n > 100) dataset, provided mid-way through the course, and present their findings as a poster imitating the poster sessions at major conferences. Posters are marked by discussion with staff and will comprise 60% of the module grade. The module will give students the necessary training to allow them to excel in their own data analysis during their Research Dissertations.</p>				
Learning and teaching methods of delivery:	Weekly contact: 1 hour lecture (8 weeks), 2 hour practicals (8 weeks)			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr R C J Steele			
Module teaching staff:	Dr Robert Steele			

ES5050 Earth's Greatest Hits				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Availability restrictions:	Available to General Degree students with the permission of the Honours Adviser			
Planned timetable:	Lecture - Thursday, Practical - Wednesday			
<p>This module is based around current hot topics in Earth science research. It will introduce cutting-edge science questions about how our planet has evolved from a ball of molten rock to the habitable blue planet it is today, and some of the major changes in its chemistry, biosphere, and climate that have happened along the way. Topics will vary from year to year, depending on staff participating in the module and the advances in Earth science research. This module is research-led, requiring that you read, digest, and discuss a number of topical papers each week. For some of these topics there is no given answer; instead you gain an in-depth understanding of the current state of research. Topics are introduced in lectures and then discussion seminars, organised around student presentations, are designed to encourage debate and critique of the arguments presented in the research papers.</p>				
Pre-requisite(s):	Undergraduate students should pass ES2001 and (pass ES2002 or pass es2003)			
Learning and teaching methods of delivery:	Weekly contact: 8 hours of lectures and 24 hours of seminars over the semester.			
Assessment pattern:	Practical Examination (Oral Presentations) = 60%, Written Examination = 40%			
Re-assessment pattern:	Written Examination = 100%			
Module coordinator:	Dr J W B Rae			
Module teaching staff:	Dr James Rae			

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ES5051 Geochemistry Field Excursion				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Planned timetable:	2 weeks of field work and post-trip analysis in April			
<p>Field sampling and laboratory analysis of natural samples are an important part of a geochemists' toolkit. This module will introduce the skills necessary for planning and executing a successful field campaign, developing best practice field skills in documenting the geological and environmental controls on a geochemical problem, and how to select and take samples. This forms the introduction to methodologies and training in applied environmental problems. Specific environmental problems will be identified, and researched in detail before a one-week field excursion to Rio Tinto in southern Spain, a world-famous environmental mining disaster.</p>				
Learning and teaching methods of delivery:	Weekly contact: Occasional seminar, 6 hours of lectures and labs in Week 10 and week long field trip in Week 11.			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr M Claire			
Module teaching staff:	Dr M Claire, Dr J Cloutier, Dr A Zerkle, Dr. E Stüken			

ES5099 Research Project				
SCOTCAT Credits:	60	SCQF Level 11	Semester	Both
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>This module provides an opportunity to conduct independent research with an academic supervisor, usually within a research group. The research topic is defined by the student and can be chosen from research foci within the School. The research project will involve project formulation, a background literature review, proposal writing, and analytical design, as well as data integration and interpretation. The results are presented as oral presentations, as a poster as part of a conference, and in a dissertation.</p>				
Learning and teaching methods of delivery:	Weekly contact: introductory lectures, presentations and supervisory meetings.			
Assessment pattern:	Coursework (10,000 word dissertation + other elements) = 100%			
Re-assessment pattern:	No Re-assessment available			
Module coordinator:	Dr P S Savage			
Module teaching staff:	TBC Module coordinator(s): Dr P Savage/Dr E Stueken			

ES5300 Magmatic-related Ore Deposits				
SCOTCAT Credits:	15	SCQF Level 11	Semester	1
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>The module focuses on the geodynamic setting, age, geometry, and mineralogy of the principal metallic mineral deposits related to magmatic processes. The different deposit types are studied using a holistic (geology, structural, geochemistry, and geophysics) mineral system approach. Current genetic models of ore deposits related to magmatic processes are reviewed with an emphasis on the geological processes required to create them. Finally, a roadmap to mineral exploration for each type of ore deposit is discussed. Deposit types discussed include magmatic Ni-Cu, magmatic PGE-Cr, porphyry, epithermal, skarn, Rare Earth Element (REE) and iron oxide copper gold (IOCG). Laboratory exercises involve geological problem solving using a mineral exploration industry focus involving the examination of geological maps and representative suites of samples (thin sections and hand samples) from different types of metallic mineral deposits.</p>				
Learning and teaching methods of delivery:	Weekly contact: 2 x 1-hour lectures (22 hours over 10 weeks), 3 x 1-hour seminars (x 2 weeks); 3-hour practical classes (x 4 weeks)			
Assessment pattern:	2-hour Written Examination = 50%, Practical Examination = 15%, Coursework = 35%			
Re-assessment pattern:	2-hour Written Examination = 80%, Existing Coursework = 20%			
Module teaching staff:	Prof A Finch and new EES staff member			

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ES5301 Mineral Exploration				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>The purpose of this module is to learn basic concepts of mineral exploration that are used by the mineral exploration industry. The module focusses on different aspects of mineral exploration including geochemical methods, hyperspectral methods, and geophysical methods. Each section discusses the theoretical background necessary to understand the different methods and introduces the different available analytical techniques, and highlights effective data acquisition. Finally, interpretation and application of datasets related to each method is conducted as practical exercises.</p>				
Pre-requisite(s):	Student must have gained entrance to the mgeol or msc mineral resources			
Learning and teaching methods of delivery:	Weekly contact: 2 lectures (x 11 weeks), 1 practical (x 2 weeks)			
Assessment pattern:	Coursework = 50%, 2-hour Written Examination = 50%			
Re-assessment pattern:	2-hour Written Examination = 80%, grade derived from Previous Coursework = 20%			
Module teaching staff:	Dr W McCarthy, Dr C Cousins, Dr R Bates			

ES5302 Hydrothermal Ore Deposits				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Planned timetable:	To be arranged.			
<p>The module focuses on the geodynamic setting, age, geometry, and mineralogy of the principal metallic mineral deposits related to hydrothermal processes. The different deposit types are studied using a holistic (geology, structural, geochemistry, and geophysics) mineral system approach. Current genetic models of ore deposits related to hydrothermal processes are reviewed with an emphasis on the geological processes required to create them. Finally, a roadmap to mineral exploration for each type of ore deposit taught is discussed. Deposit type discussed in the module includes orogenic gold, VMS, SEDEX, Mississippi Valley-type, and sedimentary-hosted stratiform copper deposits. Laboratory exercises involve geological problem solving using a mineral exploration industry focus involving the examination of geological maps and representative suites of samples (thin sections and hand samples) from different types of metallic mineral deposits.</p>				
Pre-requisite(s):	Student must have gained entrance to the mgeol or msc mineral resources programmes			
Learning and teaching methods of delivery:	Weekly contact: 2 lectures (x 11 weeks), 1 practical (x 3 weeks), 1 field trip			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 80%, Existing Coursework = 20%			
Module teaching staff:	Dr W McCarthy + external specialists			

ES5304 3D Geological Modelling				
SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2019/0			
Availability restrictions:	Available only to students on the MGeol or Mineral Resources degrees			
Planned timetable:	To be arranged.			
<p>This module aims to familiarise students with three-dimensional geological modelling using the industry-standard pieces of software. The module emphasises the creation, validation and interpretation of geological and structural models, as well as their use in mineral exploration and mineral resource estimation. Module assessment is based on the quality of three-dimensional models created and group participation.</p>				
Learning and teaching methods of delivery:	Weekly contact: 3 hours of lectures (x 5 weeks), 3 hours of practical classes (x 5 weeks)			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available			
Module teaching staff:	Dr W McCarthy, Dr R Bates			

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ES5305 Applied Geological Mapping				
SCOTCAT Credits:	30	SCQF Level 11	Semester	1
Academic year:	2019/0			
Availability restrictions:	Priority for the module will be given to the students enrolled in the MSc in Mineral Resources. Extra spaces will be allocated on a first-come-first-serve basis.			
Planned timetable:	To be confirmed			
<p>This module aims to train students to use a suite of modern software packages and field tablet computers to conduct geological fieldwork. The module focuses on creating and interpreting surface and underground maps and drill core logs using computers, a skill that is not core at undergraduate level but is sought by employers in the mineral resource sector. Module assessment is based upon the reproducibility and organisation of field data (notes, logs and maps), the interpretation of these data, group participation and upon a series of technical reports.</p>				
Learning and teaching methods of delivery:	Weekly contact: 1 lecture (x11 weeks), 1 lab (x11 weeks). Four field excursions, one of these is a single day trip, two are over night trips and one is a 5 day excursion. Some field excursions will be during the weekend			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No reassessment is offered			
Module coordinator:	Dr W McCarthy			
Module teaching staff:	Dr W McCarthy, Dr C Cousins			