

Master of Science Mineral Resources

Programme Requirements

Mineral Resources - MSc	
ES5303 (15 credits) and ES5304 (15 credits) and ES5300 (15 credits) and ES5301 (15 credits) and ES5013 (30 credits) and ES5302 (15 credits) and ES5009 (15 credits) and ES3003 (15 credits) and ES5099 (60 credits)	
If students have prior experience of the above modules, the following are suitable substitutes:	
ES3004 – Sedimentology and Stratigraphy	
ES3007 – Structure and Tectonics	
ES4007 – Petroleum Exploration and Geophysics	
ES5005 – Isotope Geochemistry	
ES5010 – Advanced Geochemistry	

Compulsory modules: ES5099 Research Project				
SCOTCAT Credits:	60	SCQF Level 11	Semester:	Summer
Planned timetable:	To be arranged.			
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.				
Programme module type:	Compulsory for MSc in Geochemistry and MSc in Mineral Resources			
Learning and teaching methods and delivery:	Weekly contact: introductory lectures, presentations and supervisory meetings.			
Assessment pattern:	Coursework (10,000 word dissertation + other elements) = 100%			
Module coordinator:	Dr P Savage and Dr J Cloutier			

ES3003 GIS and Spatial Analysis for Earth Scientists				
SCOTCAT Credits:	15	SCQF Level 9	Semester:	2
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, 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.				
Programme module type:	Compulsory for MSc in Mineral Resources			
Learning and teaching methods and delivery:	Weekly contact: 6 lectures and 14 practicals and support sessions (Weeks 1 - 7).			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr C Bates			
Module teaching staff:	Dr C Bates			

Earth & Environmental Sciences - Mineral Resources - 2017/8 - August 2017

ES5009 Geodynamics				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	9.00 am - 10.00 am Tue and Wed; 9.00 am - 5.00 pm Fri (Weeks 2,5,9)			
A study of the geodynamic evolution of Earth's crust since the Archaean, the evolution of convergent and divergent margins, and the relationships between tectonics, erosion and climate. The module contrasts geodynamic evolution in the Archaean, Proterozoic, Palaeozoic, Mesozoic and Cenozoic using a number of case studies, including examples visited in the field. The module develops skills of geodynamic interpretation, field observation, use of numerical models, report writing and oral presentation.				
Programme module type:	Compulsory for MSc in Mineral Resources Optional for MSc in Geochemistry Optional for MSc in Oil and Gas Innovation			
Learning and teaching methods and delivery:	Weekly contact: 2 x 1-hour lectures(x 11 weeks) , plus 2 extended laboratory classes, and 2 days in the field during the semester.			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr R White			
Module teaching staff:	Dr T Raub, Dr R White			

ES5013 Advanced Petrogenesis				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	10.00 am Mon and Tue (lectures). 10.00 - 1.00 pm Wed or Fri (practicals)			
The Earth's crust is largely created by acid and basic magmatism and many of the planet's critical resources are formed from igneous processes. The module explores the nature of that magmatism, the petrography and geochemistry of the minerals and rocks created, and the petrogenesis and evolution of the magma. The petrological characteristics of the continental crust and of the upper mantle, the principal sources of acid and basic magmas, are examined in detail for the influence which these have on the magmas created by partial melting. The economic significance of alkaline rocks as the hosts for many of the world's critical metals is considered.				
Programme module type:	Compulsory for MSc in Mineral Resources Optional for MSc in Geochemistry			
Learning and teaching methods and delivery:	Weekly contact: 18 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%			
Module coordinator:	Prof A Finch			
Module teaching staff:	Prof A Finch and Dr S Mikhail			

ES5300 Magmatic-related Ore Deposits				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
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.				
Programme module type:	Compulsory for MSc in Mineral Resources Optional for MSc in Geochemistry			
Anti-requisite(s):	ES5006			
Learning and teaching methods and 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 = 25%, Coursework = 25%			
Module coordinator:	Dr J Cloutier			
Module teaching staff:	Dr J Cloutier and Prof A Finch			

ES5301 Mineral Exploration				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
The purpose of this module is to learn basic concepts of mineral exploration that are used by the mineral exploration industry. The module is divided into three sections each focusing on different aspect of mineral exploration. Section 1 focuses on geochemical methods, section 2 on hyperspectral methods, and section 3 on 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.				
Programme module type:	Compulsory for MSc in Mineral Resources			
Learning and teaching methods and delivery:	Weekly contact: 2 lectures (x 10 weeks), 1 practical (x 2 weeks), 1 fieldtrip (x 1 week)			
Assessment pattern:	2-hour Practical Examination = 50%, Coursework = 50%			
Module coordinator:	Dr J Cloutier			
Module teaching staff:	Dr J Cloutier, Dr R Bates			

ES5302 Hydrothermal Ore Deposits				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
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, unconformity-related uranium deposits, 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>				
Programme module type:	Compulsory for MSc in Mineral Resources Optional for Geochemistry			
Learning and teaching methods and 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%			
Module coordinator:	Dr J Cloutier			
Module teaching staff:	Dr J Cloutier			

ES5303 Applied Geological Mapping				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged			
<p>This module aims to train students in applied geological field skills. The module focuses on creating and interpreting surface and underground maps, and drill core logs. Module assessment is based on the quality of field notebooks, maps, logs, and group participation. All travel and accommodation costs associated with the field work are provided by the School of Earth and Environmental Sciences.</p>				
Programme module type:	Compulsory for MSc in Mineral Resources			
Learning and teaching methods and delivery:	Weekly contact: 2 hours of lectures (x 3 weeks), 12 hours of practicals (x 2 weeks) and 17.5 hours of fieldwork (x 4 weeks)			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr W McCarthy			
Module teaching staff:	Dr J Cloutier, Dr W McCarthy, Dr T Prave			

ES5304 3D Geological Modelling				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
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>				
Programme module type:	Compulsory for MSc in Mineral Resources			
Learning and teaching methods and delivery:	Weekly contact: 3 hours of lectures (x 5 weeks), 3 hours of practical classes (x 5 weeks)			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr J Cloutier			
Module teaching staff:	Dr J Cloutier, Dr R Bates			