

School of Geography & Geosciences

Earth Science (ES) modules

| ES3001 Geological Mapping | | | | |
|---|--|--------------|--|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | To be arranged. | | | |
| This module provides training in independently constructing and interpreting geological maps and cross sections. It develops the student's abilities to recognise structures in both two and three dimensions and, by inferring how these structures have changed with time, to develop four-dimensional intellectual skills. The module provides training in defining geological sampling strategies and field report writing. | | | | |
| Programme module type: | Compulsory for BSc Geology, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and ES2002 | | | |
| Required for: | ES3006, ES3010 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 4 map and cross-section practicals (3 hours each) and lectures over 11 weeks and occasional 2-hour fieldwork tutorials. | | | |
| | Scheduled learning: 19 hours | | Guided independent study: 131 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | | |
| Module Co-ordinator: | Dr T Prave | | | |
| Lecturer(s)/Tutor(s): | Dr T Prave | | | |

| ES3002 Analytical and Statistical Methods in Earth Sciences | | | | |
|---|---|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 11.00 am - 1.00 pm Mon (analytical methods), 2.00 pm - 4.00 pm Thu (stats) | | | |
| This module covers the principles behind, and practical application of, analytical science and data handling in Earth Sciences. Four key analytical methods are presented and students operate instruments under technical supervision. Statistical training includes (i) understanding data types, (ii) data presentation and basic descriptive statistics, (iii) probability, (iv) hypothesis testing using parametric statistics, (v) correlation and regression, (vi) introduction to numerical methods. Each student will have an opportunity to research an unusual analytical method, relevant to their own interests. Skills taught here reinforce Earth Sciences honours teaching, particularly the independent research project module. | | | | |
| Programme module type: | Compulsory for BSc Geology, Environmental Earth Science, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and (ES2002 or ES2003) | | | |
| Required for: | ES3003, ES3008 | | | |
| Learning and teaching methods and delivery: | Weekly contact: Lectures, practicals, tutorials and lab time averaging 5 hours per week. | | | |
| | Scheduled learning: 55 hours | | Guided independent study: 95 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | Oral Examination = 100% | | | |
| Module Co-ordinator: | Dr A Finch | | | |
| Lecturer(s)/Tutor(s): | Dr A Finch, Dr R Wilson | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3003 GIS and Spatial Analysis for Earth Scientists | | | | |
|---|--|--------------|--|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 10.00 am - 1.00 pm Mon, Wed (lecture plus lab session) (Weeks 1 - 6) | | | |
| 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 BSc Geology and Environmental Earth Science, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES3002 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 5 lectures and 12 practicals and support sessions (Weeks 1 - 6). | | | |
| | Scheduled learning: 48 hours | | Guided independent study: 102 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | | |
| Module Co-ordinator: | Dr R Robinson | | | |
| Lecturer(s)/Tutor(s): | Dr R Robinson | | | |

| ES3004 Processes and Products in Sedimentary Systems | | | | |
|---|---|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| 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. | | | | |
| Programme module type: | Compulsory for BSc Geology, Environmental Earth Science, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and (ES2002 or ES2003) | | | |
| Learning and teaching methods and delivery: | Weekly contact: Weekly lectures and practicals averaging 6 hours per week plus field training | | | |
| | Scheduled learning: 54 hours | | Guided independent study: 96 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | | |
| Module Co-ordinator: | Dr T Prave | | | |
| Lecturer(s)/Tutor(s): | Dr T Prave, Dr M Singer, Dr R Robinson, Mr S Allison | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3006 Advanced Geological Mapping | | | | |
|---|--|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Availability restrictions: | Not available to General Degree students. | | | |
| Planned timetable: | 9.00 am - 5.00 pm Fri (map practicals) | | | |
| <p>Geological maps are not just summaries of rocks - they are ways of conveying three-dimensional structure and geological history. This module starts with sessions on geophysics techniques and field-based skills training sessions and lab-based analysis of classic geology maps, followed by two one-week field courses. Field assessment comprises a geophysical report, field notes and geological maps within holistic, problem-based exercises, determining the geology of the field areas from first principles. At the end of the module, students will not only have learned how to record, interpret and present field data, but also to visualise geology in four dimensions. This module is one of the most important for developing confidence in field techniques prior to independent research projects.</p> | | | | |
| Programme module type: | Compulsory for BSc Geology, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | ES3001 | | | |
| Required for: | ES4001 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 8 practical sessions through semester plus residential field class. | | | |
| | Scheduled learning: 88 hours | | Guided independent study: 62 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | | |
| Module Co-ordinator: | Dr A Finch | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3007 Structural Geology and Tectonics | | | | |
|---|---|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 10.00 am - 12.00 noon Thu (lectures), 2.00 - 5.00 pm (practicals) | | | |
| This module covers the principles of rock deformation and associated metamorphism, and the tectonic processes that drive this deformation. The goals of this module are: a) the development of skills in the structural analysis of rock bodies to gain an understanding of the geometries, sequencing, and kinematics of deformational features; b) understanding of tectonic principles and controls on rock deformation and mountain building. | | | | |
| Programme module type: | Compulsory for BSc Geology and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and ES2002 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 1 x 2-hour lecture (x 11 weeks), 7 x 3-hour practicals during the semester and fieldwork | | | |
| | Scheduled learning: 55 hours | | Guided independent study: 95 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | | |
| Module Co-ordinator: | Prof P Cawood | | | |
| Lecturer(s)/Tutor(s): | Prof P Cawood | | | |

| ES3008 Geochemistry | | | | |
|---|--|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 10.00 am Tue and Thu (lectures), 2.00 - 5.00 Fri (practicals) | | | |
| This module focuses on the application of chemical principles to the Earth sciences, and the development of these principles as valuable tools available to the modern Earth scientist. The course aims to develop a comprehensive understanding of: (1) the origin and distribution of chemical elements in the Earth and solar system, (2) the major chemical reactions that take place on the surface of the Earth and its interior, and (3) how matter is cycled between the Earth's major chemical reservoirs. These concepts are developed through the application of thermodynamics to natural systems and the use of radiogenic and stable isotopes, based on theoretical and practical discussions. These tools are used in the module to allow quantitative predictions regarding the outcome of chemical reactions associated with geological processes. | | | | |
| Programme module type: | Compulsory for BSc Environmental Earth Science, MGeol Earth Sciences, BSc Geology and joint degrees with Biology and Chemistry | | | |
| Pre-requisite(s): | Normally ES3002, ES3005 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 17 lectures, 15 hours of laboratory classes, 2 or more field classes over the semester. | | | |
| | Scheduled learning: 54 hours | | Guided independent study: 96 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | | |
| Module Co-ordinator: | Dr N Allison | | | |
| Lecturer(s)/Tutor(s): | Dr A Finch, Dr M Claire, Dr N Allison, Dr J Rae, Dr A Burke | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3009 Igneous and Metamorphic Petrology | | | | |
|---|--|--------------|--|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 9.00 am Tue and Thu (lectures); 2.00 pm - 5.00 pm Mon (practicals) | | | |
| This is a core module in Geology delivered early in the honours programme providing a framework for interpreting major petrological processes acting within the Earth's crust and mantle. 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 Alps field course. | | | | |
| Programme module type: | Compulsory for BSc Geology, joint degrees with Biology and Chemistry, and MGeol Earth Sciences; optional for BSc Environmental Earth Science | | | |
| Pre-requisite(s): | Normally ES2001 and (ES2002 or ES2003) | | | |
| Required for: | ES4006 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 2 x 1-hour lectures (x 11 weeks), 3-hour practicals most weeks. | | | |
| | Scheduled learning: 50 hours | | Guided independent study: 100 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 50%, Coursework = 0% | | | |
| | As used by St Andrews: 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 <4 | | | |
| Module Co-ordinator: | Dr C Donaldson | | | |
| Lecturer(s)/Tutor(s): | Dr C Donaldson, Dr A Finch, Dr W McCarthy | | | |

| ES3010 Advanced Environmental Field Methods | | | | |
|---|---|--------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 9.00 am - 5.00 pm Fri (Weeks 1 - 4) | | | |
| This forms the introduction to methodologies and training in applied environmental problems. This module starts with sessions on geophysics techniques and field-based skills training sessions. Specific environmental problems will be identified, and researched in detail before a one-week field excursion where an environmental impact problem will be addressed in the field using geological and geophysical mapping, and analysis of surface and sub-surface hydrology. | | | | |
| Programme module type: | Compulsory for BSc Environmental Earth Science | | | |
| Pre-requisite(s): | ES3001 | | | |
| Required for: | ES4008 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 8 field-based skills training sessions, fortnightly seminar, one 1-week field excursion, and 1-week of lab-based data analysis . | | | |
| | Scheduled learning: 53 hours | | Guided independent study: 97 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | Oral Examination = 100% | | | |
| Module Co-ordinator: | Dr R Wilson | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3011 Global Biogeochemical Cycles | | | |
|---|--|-------------------------------------|-------------|
| SCOTCAT Credits: | 15 | SCQF Level 9 | Semester: 2 |
| Academic year: | 2015/6 & 2016/7 | | |
| 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 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 understanding proxies utilized for unravelling these processes in the environment and in the rock record, along with modern quantitative methods used to constrain these cycles.</p> | | | |
| Programme module type: | Compulsory for Environmental Earth Sciences and MGeol Earth Sciences, Optional for Geology, Biology and Geology, Chemistry and Geology | | |
| Pre-requisite(s): | Normally ES2002 or ES2003, and ES3008 | | |
| Learning and teaching methods and delivery: | Weekly contact: 2-hour lectures and 2-hour practical sessions (x 8 weeks). | | |
| | Scheduled learning: 32 hours | Guided independent study: 118 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | |
| Module Co-ordinator: | Dr A Zerkle | | |
| Lecturer(s)/Tutor(s): | Dr A Zerkle, Dr M Claire | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES3099 Field Methods in Geosciences | | | | |
|---|---|--------------|---|---|
| SCOTCAT Credits: | 30 | SCQF Level 9 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Availability restrictions: | Available only to visiting students. | | | |
| Planned timetable: | none - field-based module. | | | |
| <p>This module is designed exclusively for non-graduating overseas undergraduate students seeking advanced training in geological field methods. It consists of hands-on experience honing observational and mapping skills by participating in highly focused residential and one-day excursions and associated laboratory classes. The module takes full advantage of the University's location close to some classic geological locations, normally including the central Spain Sierra Norte region, the Moine thrust system, the Buchan and Barrovian metamorphic zones, the Girvan-Ballantrae ophiolite and the Hebridean plutonic and volcanic centres.</p> | | | | |
| Programme module type: | Available to visiting students only. | | | |
| Pre-requisite(s): | Must be studying Earth Science at an overseas university | | | |
| Learning and teaching methods and delivery: | Weekly contact: Occasional lectures, tutorials and practicals in addition to fieldwork - this is predominantly a residential field-based module. | | | |
| | Scheduled learning: 268 hours | | Guided independent study: 32 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr R Robinson | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES4001 Field Excursion and Map Interpretation | | | | |
|--|--|---------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 10 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 12 days fieldwork in August - September. 9.00 am - 5.00 pm Fri (practicals) | | | |
| <p>Building on the field training of JH, this module develops the field observation and interpretation skills of collecting, recording, interpreting and synthesising data in the field and from geological maps and cross-sections. The field course will be thematic and examine all aspects of a region using an integrated approach. Theme and location may vary but the excursion will generally be based within a well-exposed orogenic belt with the aim of traversing from the foreland to the interior. Fieldwork will be combined with the interpretation of a region as represented on a geological map. Students will also be trained in the advanced techniques of interpreting remotely sensed images of the Earth's surface and geological maps, and in the construction of cross-sections.</p> | | | | |
| Programme module type: | Compulsory for BSc Geology and MGeol Earth Sciences | | | |
| Pre-requisite(s): | normally ES3006 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 2-week field course and 4 lab sessions. | | | |
| | Scheduled learning: 84 hours | | Guided independent study: 66 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | | |
| Module Co-ordinator: | Dr T Prave | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES4002 Research Review, Essay and Seminar | | | | |
|---|--|---------------|--|----------------------|
| SCOTCAT Credits: | 15 | SCQF Level 10 | Semester: | 1 & 2 (taught twice) |
| Academic year: | 2015/6 & 2016/7 | | | |
| Availability restrictions: | BSc students may only take this module in semester 1, MGeol students can take this module in either semester | | | |
| Planned timetable: | Not applicable. | | | |
| <p>The student proposes an Earth Science topic, one that has not been directly covered in a module. They discuss the suitability of the topic with a lecturer who agrees to become adviser to the student. Student and adviser are required to meet 2 further times during the module. Literature and web-based research is conducted and the student writes a critical review of ca. 3,500 words. The same material is also presented in a 15 minute seminar to staff and classmates. Advice on critical writing and presenting talks is given a year before the start of the module, on entry to Junior Honours, for use throughout the Honours programme. The seminar is assessed by both lecturers and peers. The module is normally carried out in Semester 1 but a Semester 2 Research Review may be considered for MGeol students on a case by case basis.</p> | | | | |
| Programme module type: | Compulsory for BSc Geology and Environmental Earth Science, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Admission to an Honours Earth Sciences programme or Environmental Earth Science | | | |
| Learning and teaching methods and delivery: | Weekly contact: Occasional lecture and 3 meetings with adviser spread across the semester. | | | |
| | Scheduled learning: 10 hours | | Guided independent study: 140 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 15%, Coursework = 85% | | | |
| | As used by St Andrews: Practical Examination = 15%, Coursework = 85% | | | |
| Re-Assessment pattern: | Oral Examination = 100% | | | |
| Module Co-ordinator: | Dr C Donaldson | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES4003 Research Dissertation | | | | |
|--|--|---------------|--|------------|
| SCOTCAT Credits: | 45 | SCQF Level 10 | Semester: | Whole Year |
| Academic year: | 2015/6 & 2016/7 | | | |
| Availability restrictions: | Available only to Single Honours BSc Earth Science students | | | |
| Planned timetable: | Not applicable. | | | |
| <p>An individual research project which allows the student to pursue in depth a topic of personal interest. The student works largely independently of supervision and has the opportunity to demonstrate individuality, initiative and enterprise. Skills of planning and executing research are learnt, as well as the ability to work independently, and present the results orally and in dissertation form (up to 10,000 words). (Guidelines for printing and binding dissertations can be found at: http://www.st-andrews.ac.uk/printanddesign/dissertation/)</p> | | | | |
| Programme module type: | Compulsory for BSc Geology and Environmental Earth Science | | | |
| Pre-requisite(s): | Admission to an Honours Earth Sciences programme or Environmental Earth Science | | | |
| Learning and teaching methods and delivery: | Weekly contact: Regular meetings with supervisor arranged as required. | | | |
| | Scheduled learning: 20 hours | | Guided independent study: 430 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 10%, Coursework = 90% | | | |
| | As used by St Andrews: Proposal = 5%, Oral presentation = 10%, Dissertation = 85% | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr T D Raub and Dr S Mikhail | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES4006 Advanced Igneous Petrogenesis | | | | |
|--|---|---------------|--|---|
| SCOTCAT Credits: | 15 | SCQF Level 10 | Semester: | 1 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 10.00 am Mon and Tue (lectures). 10.00 - 1.00 pm Wed or Fri (practicals) | | | |
| <p>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.</p> | | | | |
| Programme module type: | Optional for BSc Geology, Environmental Earth Science, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES3009 | | | |
| Learning and teaching methods and delivery: | Weekly contact: 18 lectures, 15 hours of laboratory work, 18 hours of field-related study over the semester. | | | |
| | Scheduled learning: 50 hours | | Guided independent study: 100 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 50%, Coursework = 0% | | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, 3-hour Practical Examination = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | | |
| Module Co-ordinator: | Dr C Donaldson | | | |
| Lecturer(s)/Tutor(s): | Dr C Donaldson, Dr A Finch, Dr S Mikhail | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES4007 Petroleum Exploration and Geophysics | | | |
|--|---|--|--------------------|
| SCOTCAT Credits: | 15 | SCQF Level 10 | Semester: 1 |
| Academic year: | 2015/6 & 2016/7 | | |
| Planned timetable: | 11.00 am - 1.00 pm Thu (lectures), 2.00 - 5.00 pm Thu (practicals) | | |
| 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. | | | |
| Programme module type: | Optional for BSc Geology, Environmental Earth Science, joint degrees with Biology and Chemistry, and MGeol Earth Sciences | | |
| Pre-requisite(s): | Normally ES2001 and (ES2002 or ES2003) | | |
| Learning and teaching methods and delivery: | Weekly contact: 17 lectures, 15 hours laboratory classes, field classes over the semester. | | |
| | Scheduled learning: 38 hours | Guided independent study: 112 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | |
| Module Co-ordinator: | Dr R Bates | | |
| Lecturer(s)/Tutor(s): | Dr R Bates | | |

| ES4008 Environmental Excursion and Maps | | | |
|---|--|---|--------------------|
| SCOTCAT Credits: | 15 | SCQF Level 10 | Semester: 1 |
| Academic year: | 2015/6 & 2016/7 | | |
| Planned timetable: | 12 days fieldwork in August - September. 9.00 am - 5.00 pm Fri (practicals) | | |
| This module is designed to provide training in a variety of mapping and geochemical analytical techniques of utility to solving geo-environmental problems. The field course will be thematic and examine environmental aspects of a region using an integrated approach. Theme and location may vary. Additional mapping exercises will include use of aerial photographs, thematic mapping and GIS, and application of applied geophysical surveying and key analytical techniques. | | | |
| Programme module type: | Compulsory for BSc Environmental Earth Science | | |
| Pre-requisite(s): | ES3010 | | |
| Learning and teaching methods and delivery: | Weekly contact: 2-week field course and 4 lab sessions. | | |
| | Scheduled learning: 84 hours | Guided independent study: 66 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | |
| | As used by St Andrews: Coursework = 100% | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | |
| Module Co-ordinator: | Dr M Singer | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES4010 Joint Honours Research Project | | | | |
|---|--|---------------|--|------------|
| SCOTCAT Credits: | 30 | SCQF Level 10 | Semester: | Whole Year |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | Not applicable. | | | |
| <p>An individual research project allows the student to pursue in depth a topic of personal interest. The student works largely independently and has the opportunity to demonstrate individuality, initiative and enterprise. Projects will normally include an aspect of field and analytical science. Skills of planning and executing research are learned, as well as the ability to work independently, and present the results orally and in dissertation form (up to 7,000 words). (Guidelines for printing and binding dissertations can be found at: http://www.st-andrews.ac.uk/printanddesign/dissertation/)</p> | | | | |
| Programme module type: | EITHER (ES4010 and CH4448) OR ID4441 are compulsory for joint degrees with Chemistry | | | |
| Pre-requisite(s): | Admission to Joint Honours Geology and Chemistry | | | |
| Learning and teaching methods and delivery: | Weekly contact: Regular meetings with supervisor arranged as required. | | | |
| | Scheduled learning: 20 hours | | Guided independent study: 280 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 10%, Coursework = 90% | | | |
| | As used by St Andrews: Proposal = 5%, Oral Presentation = 10%, Dissertation = 85% | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr T Hill and Dr T Raub | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES4011 Work Placement in Earth Sciences | | | | |
|--|--|---------------|------------------|--------|
| SCOTCAT Credits: | 30 | SCQF Level 10 | Semester: | 1 or 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | To be arranged. | | | |
| <p>Practical experience of Earth Sciences is important to graduate job prospects and for students to understand the practical relevance of taught material course. This module is a platform for the students to obtain experience of the workplace through an 8-week industrial placement. The student finds their own work placement, some with the assistance of staff connections in industry and alumni. Work placements can be of a variety of forms, varying from office or lab-based work to engineering geology at sites in the UK to exploration geology across the world. The performance of the student in the workplace is assessed using similar criteria to those used when applying for Chartered (CGeol) status. The student reports on their activities during placement at the end of the placement period.</p> | | | | |
| Programme module type: | ES4011 or ES4012 is compulsory for MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and ES2002 and Entry to MGeol Earth Sciences | | | |
| Learning and teaching methods and delivery: | This is a Study Abroad or External Placement module. | | | |
| | Weekly contact: Meetings. | | | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 30%, Coursework = 70% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr R Robinson | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES4012 Research Placement in Earth Sciences | | | | |
|---|--|---------------|------------------|--------|
| SCOTCAT Credits: | 30 | SCQF Level 10 | Semester: | 1 or 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | To be arranged. | | | |
| <p>Practical experience of Earth Sciences is important to graduate job prospects and for students to understand the practical relevance of taught material in the course. The present module is a platform for the students to obtain experience of the working in an academic research team through a research placement. The student finds their own placement by negotiating with staff. The performance of the student in the workplace is assessed using similar criteria to those used when applying for Chartered (CGeol) status. The student reports on their activities during placement at the end of the placement period.</p> | | | | |
| Programme module type: | ES4011 or ES4012 is compulsory for MGeol Earth Sciences | | | |
| Pre-requisite(s): | Normally ES2001 and ES2002 and Entry to MGeol Earth Sciences | | | |
| Learning and teaching methods and delivery: | This is a Study Abroad or External Placement module. | | | |
| | Weekly contact: Meetings. | | | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr R Bates | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES5001 Expedition Field Course | | | | |
|--|--|---------------|--|--------|
| SCOTCAT Credits: | 15 | SCQF Level 11 | Semester: | Summer |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | To be arranged. | | | |
| <p>Fieldwork in Earth Sciences is key to graduate job prospects and is a platform for students to bring together the many aspects of Earth Sciences. The present module will involve the students not just in carrying out fieldwork, but also in the logistical and interpersonal sides of success fieldwork design. Students will identify a field area for study in consultation with a member of the teaching staff, which includes several aspects of Earth sciences, such as igneous, sedimentary, economic and environmental geology. The students will form a team and divide the responsibilities for fieldwork and logistics. The assessment will include a memoir that will summarise the geological history of the area, similar to that published by a Geological Survey or the exploration industry. Some student groups may choose to use this module to carry out ambitious fieldwork in a remote setting.</p> | | | | |
| Programme module type: | Optional for MGeol in Earth Sciences. | | | |
| Pre-requisite(s): | Entry to Year 5 of MGeol Earth Sciences | | | |
| Learning and teaching methods and delivery: | Weekly contact: 5 hours of orientation/tutorials over 2 weeks | | | |
| | Scheduled learning: 10 hours | | Guided independent study: 140 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% | | | |
| Re-Assessment pattern: | Oral Examination = 100% | | | |
| Module Co-ordinator: | Dr A Finch | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES5003 Research Dissertation | | | | |
|---|---|---------------|--|------------|
| SCOTCAT Credits: | 60 | SCQF Level 11 | Semester: | Whole Year |
| Academic year: | 2015/6 & 2016/7 | | | |
| An individual research project on a topic in geological sciences which allows the student to pursue in depth a topic of personal interest. The student works largely independently of supervision and has the opportunity to demonstrate individuality, initiative and enterprise. Skills of planning and executing research are learnt, as well as the ability to work independently, and present the results orally and in dissertation form (up to 7,000 words). The project report will be as a publication-ready article in the manner of the journal "Geology". | | | | |
| Programme module type: | Compulsory for MGeol Earth Sciences. | | | |
| Pre-requisite(s): | Entry to Year 5 of MGeol Earth Sciences | | | |
| Learning and teaching methods and delivery: | Weekly contact: Regular meetings with supervisor arranged as required. | | | |
| | Scheduled learning: 30 hours | | Guided independent study: 570 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100% | | | |
| | As used by St Andrews: Coursework = 100% (Project proposal = 5%, Oral Presentation = 10%, Dissertation = 85%) | | | |
| Re-Assessment pattern: | No Re-Assessment available | | | |
| Module Co-ordinator: | Dr T Raub, Dr T Hill | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES5004 Integrated Earth Sciences | | | | |
|---|--|---------------------------|--|------------|
| SCOTCAT Credits: | 30 | SCQF Level 11 | Semester: | Whole Year |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | To be arranged. | | | |
| This module requires students to think of themselves as practitioners of a single integrated subject and thereby to bring together the various themes they have explored in the modules taken through their degree programme. It also promotes independent, critical thinking across the subject. It is assessed by reports on talks/key topics, attendance at a major international conference (EGU) and a single 4-hour exam, in which students are given many different forms of geological data (numerical, thin section, hand specimen, maps etc.) and asked to solve a complex geological problem. The module also acts as a platform through which we deliver employment skills and involves a mock job interview. | | | | |
| Programme module type: | Compulsory for MGeol Earth Sciences. | | | |
| Pre-requisite(s): | Entry to Year 5 of MGeol Earth Sciences | Anti-requisite(s): | ES4004 | |
| Learning and teaching methods and delivery: | Weekly contact: Tutorials, mock job interview, assistance in preparation of EGU spread throughout the year. | | | |
| | Scheduled learning: 30 hours | | Guided independent study: 270 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | As used by St Andrews: 4-hour Written Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 100% | | | |
| Module Co-ordinator: | Dr R Robinson | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES5005 Isotope Geochemistry: Theory, Techniques, and Applications | | | |
|---|--|--|--------------------|
| SCOTCAT Credits: | 15 | SCQF Level 11 | Semester: 1 |
| Academic year: | 2016/7 | | |
| Planned timetable: | To be arranged. | | |
| <p>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 learn how isotope measurements are made, with an introduction to mass spectrometry methods, techniques, and analysis. The latter half of the course will be devoted to 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.</p> | | | |
| Programme module type: | Optional for BSc Geology and MGeol Earth Sciences. | | |
| Pre-requisite(s): | For current BSc students, normally ES3008 or CH1401, CH1402, and CH2501. | | |
| Learning and teaching methods and delivery: | Weekly contact: 2-hour lectures (x 10.5 weeks), 3-hour practical sessions (x 3 weeks) | | |
| | Scheduled learning: 30 hours | Guided independent study: 120 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50% | | |
| | As used by St Andrews: 2-hour Practical (Open Book) Examination = 50%, Coursework = 50% | | |
| Re-Assessment pattern: | 2-hour Practical (Open Book) Examination = 80%, Coursework = 20% | | |
| Module Co-ordinator: | Dr A Burke | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES5006 Metallogeny (SUBJECT TO APPROVAL) | | | | |
|--|---|---------------|---|---|
| SCOTCAT Credits: | 15 | SCQF Level 11 | Semester: | 2 |
| Academic year: | 2015/6 and 2016/7 | | | |
| Planned timetable: | 9:00 am - 11:00 am Thu (lectures); 9.00 am - 1.00 pm (practicals)_ | | | |
| | <p>The module focuses on the geodynamic setting, age, geometry and mineralogy of the principal metallic mineral deposits using a holistic approach (structural geology, geochemistry, isotope geochemistry, sedimentology, igneous geology, metamorphic geology, and geophysics). Current genetic models of ore deposits 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.</p> <p>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, hand samples, and outcrops) from different types of metallic mineral deposits.</p> <p>A single day field excursion will be to the gold mine at Cononish or the lead mine at Wanlockhead to cover the geological context of the ore bodies and aspects of their exploration and production.</p> | | | |
| Programme module type: | Optional for BSc Geology and MGeol Earth Sciences. | | | |
| Pre-requisite(s): | For current BSc & MGeol students, normally ES3009 or CH1401, CH1402, and CH2501. | | | |
| Learning and teaching methods and delivery: | Weekly contact: 2-hour lectures (x 11 weeks), 3-hour practical sessions (x 11 weeks); 9 hours of field work | | | |
| | Scheduled learning: 64 hours | | Guided independent study: 86 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50% | | | |
| | As used by St Andrews: 2-hour Practical (Open Book) Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Practical (Open Book) Examination = 80%, Coursework = 20% | | | |
| Module Co-ordinator: | Dr J Clouthier | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

| ES5009 Geodynamics | | | | |
|--|--|---------------------------|--|---|
| SCOTCAT Credits: | 15 | SCQF Level 11 | Semester: | 2 |
| Academic year: | 2015/6 & 2016/7 | | | |
| Planned timetable: | 9.00 am - 10.00 am Tue and Wed; 9.00 am - 5.00 pm Fri (Weeks 2,5,9) | | | |
| | <p>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.</p> | | | |
| Programme module type: | Optional for MGeol Earth Sciences, BSc Geology, Environmental Earth Science, and joint degrees in Biology and Chemistry. | | | |
| Pre-requisite(s): | Normally ES2001 and (ES2002 or ES2003) | Anti-requisite(s): | ES4009 | |
| 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. | | | |
| | Scheduled learning: 50 hours | | Guided independent study: 100 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50% | | | |
| | As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50% | | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | | |
| Module Co-ordinator: | Prof P Cawood | | | |
| Lecturer(s)/Tutor(s): | Earth and Environmental Sciences staff | | | |

Geography & Geosciences - Honours Level - 2015/6 - August 2015

| ES5010 Environmental Geochemistry | | | |
|---|---|--|--------------------|
| SCOTCAT Credits: | 15 | SCQF Level 11 | Semester: 2 |
| Academic year: | 2015/6 & 2016/7 | | |
| Planned timetable: | To be arranged. | | |
| <p>Many of the environmental challenges facing society revolve around the cycling of natural materials between fluid and solid phases. Some of the most fundamental aspects of Earth System development are investigated through geochemical methodologies that characterise and interrogate processes operating at the interface between the solid Earth and the fluid Earth. Further, the processes that concentrate many natural resources are a result of fluid-solid interactions that can be studied using organic and aqueous geochemistry. This module focuses on training in the state-of-the art techniques and methodologies that are tools that can be applied widely to address questions about environmental changes and chemistry in sediments and natural waters and, as well as utilisation and exploitation of hydrocarbon resources and Earth System evolution through time.</p> | | | |
| Programme module type: | Optional for MGeol Earth Sciences, BSc Geology, Environmental Earth Science, and joint degrees in Biology and Chemistry. | | |
| Pre-requisite(s): | ES3008 | | |
| Learning and teaching methods and delivery: | Weekly contact: 1-hour lecture (x 10 weeks) 5 x 3-hour practical sessions and 1 x 8-hour session of project presentations over the semester. | | |
| | Scheduled learning: 33 hours | Guided independent study: 117 hours | |
| Assessment pattern: | As defined by QAA: Written Examinations = 0%, Practical Examinations = 30%, Coursework = 70% | | |
| | As used by St Andrews: Coursework = 100% | | |
| Re-Assessment pattern: | 2-hour Written Examination = 80%, Coursework = 20%, No Re-Assessment if Coursework mark is <4 | | |
| Module Co-ordinator: | TBC | | |
| Lecturer(s)/Tutor(s): | Dr A Burke, Dr M Claire, Dr H Burdett | | |