BSc Environmental Geochemistry UCAS code: F670

Awarding Institution: The University of Reading
Teaching Institution: The University of Reading
Relevant QAA subject benchmarking group(s): Earth Sciences, Environmental Sciences and Environmental Studies

Faculty of Science Programme length: 3 years
For students entering Part 1 in 2003 Date of specification: Mar 2003
Programme Director: Dr TJ Halsall (PRIS)
Programme Adviser: Dr MJ Almond (PRIS)
Board of Studies: Earth & Soil Sciences
Accreditation: Recognised for Associate Membership of Royal Society of Chemistry
The Geological Society of London (pending)

Summary of programme aims
To provide a broad and rigorous study of modern geochemistry and selected applications to the environment. (For a full statement of the programme aims and learning outcomes see below)

Transferable skills
The University's Strategy for Teaching and Learning has identified a number of generic transferable skills which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to enhance their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team working and use of information technology.

As part of this programme students are expected to have gained experience and show competence in the following transferable skills: IT (word-processing, using standard software packages), scientific writing, oral presentation, team-working, problem-solving, use of library resources, time-management and career planning and management. They will have developed skills in observing and recording data, analytical procedures, teamworking and leadership, and be confident and self-reliant, particularly as a result of experience during field courses. They will also have a sound knowledge of laboratory and fieldwork safety procedures.

Programme content
The programme which follows states which modules must be taken (the compulsory part), together with one or more lists of modules from which the student must make a selection (the "selected" modules). Students must choose such additional modules as they wish, in consultation with their programme adviser, to make 120 credits in each Part. The number of credits for each module is listed.

Part 1 (3 terms : 2002-2003)

***Compulsory modules* (100 credits)**		***Credits***	***Level***	***Term***
CH1I1	*Introduction to Inorganic Chemistry*	20	C	1,2,3
CH1O1	*Introduction to Organic Chemistry*	20	C	1,2,3
CH1P1	*Introduction to Physical Chemistry*	20	C	1,2,3
GO1A1	*Earth Structure & Processes*	10	C	1
GO1B1	*Earth Materials*	10	C	1
GO1C2	*Earth History & Evolution*	10	C	2
GO1X2	*Introduction to Geological Fieldwork*	10	C	E.Vac

***Optional modules* (20 credits)**

Recommended:		***Credits***	***Levels***	***Term***
CH1M	*Chemistry M*	20	C	1,2,3
SS1A1	*Introduction to Soil Science*	10	C	1
SS1A2	*Soils, Land and Environment*	10	C	2
Others including:				
AM1Z11	*Environmental Biology*	10	C	1
BI1M10	*Biodiversity*	10	C	1
MT11A	*Introduction to Atmospheric Science*	20	C	1,2
SS1B1	*Biological Processes in Soil*	10	C	1
SS1B2	*Soil Processes and Applications*	10	C	2

Part 2 (3 terms : 2003-2004)

***Compulsory modules* (100 credits)**		***Credits***	***Levels***	***Term***
CH2E1	*Environmental Chemistry*	20	I	4,5,6
CH2A2	*Introductory Analytical Chemistry*	10	I	4
CH2I2	*Inorganic Chemistry*	10	I	5
GO2A4	*Introductory Environmental Geochemistry*	10	I	4
GO2B4	*Crust & Mantle Processes*	10	I	4
GO2C4	*Sedimentology*	10	I	4
GO2I5	*Analytical Geochemistry*	10	I	5
GO2J5	*Skills for Earth & Environmental Scientists*	10	I	5
GO2X5	*Environmental Geology Field Class*	10	I	5

***Optional modules* (20 credits)**

Recommended:				
ES25A	*Environmental Systems*	10	I	5
GO2E5	*Geology Applied in SE England*	10	I	5
GO2F4	*Geophysics*	10	I	4
GO2H5	*Geological Processes and Hazards*	10	I	5
GO2Y3	*Geological Field Techniques Field Class*	10	I	3
SS2B4	*Chemistry of Soil Constituents*	10	I	4
SS2C5	*Soils and Environmental Pollution*	10	I	5
SS2D4	*Soils and Soil Development*	10	I	4
Others including:				
GO2D5	*Quaternary & Modern Geology*	10	I	5
GO2G4	*Structural and Engineering Geology*	10	I	4
MT24A	*Atmosphere and Ocean Dynamics 1*	10	I	4
MT24B	*Atmospheric Physics 1*	10	I	4
MT24C	*Numerical Methods for Environmental Science*	10	I	4
MT25A	*Atmospheric Ocean Dynamics 2*	10	I	5
MT25B	*Atmospheric Physics 2*	10	I	5
SS2A5	*Transport Processes in Soils*	10	I	5
SS2D5	*Sustainable Land Management*	10	I	5

Part 3 (three terms : 2004-2005)

***Compulsory modules* (110 credits)**		*Credits*	*Levels*	*Term*
CH3E2	*Environmental Chemistry 2*	10	H	7,8
CH3A1	*Analytical Chemistry*	20	H	7,8
GO3A8	*Hydrogeology & Water Resources*	10	H	8
GO3B7	*Environmental and Global Geochemistry*	10	H	7
GO3E8	*Environmental Geochemistry & Health*	10	H	8
GO3Y6	*Shallow Water Environments Field Class*	10	H	S.Vac
GO3PR7	*Independent Project*	30	H	7,8
GO3X8	*Sedimentary & Environmental Geology Field Class*	10	H	E.Vac

Optional modules **(10 credits)**		*Credits*	*Levels*	*Term*
Recommended:				
ES38A	*Environmental Issues*	10	H	8
GO3C7	*Earth's Resources*	10	H	7
GO3D8	*Global & Planetary Geology*	10	H	8
Others including:				
SS3A7	*Soil Contaminants*	10	H	7
SS3B8	*Soil & Mineral Equilibria Using MINEQL+*	10	H	8
SS3C8	*Soils and the Global Environment*	10	H	8

Progression requirements
Students must obtain at least 40% overall in Part 1, in addition to obtaining at least 40% in modules CH1I1, CH1O1 & CH1P1 averaged together, and in modules GO1A1, GO1B1, GO1C2 & GO1X2 averaged together, and gaining at least 30% in every module. Students must obtain at least 40% overall in Part 2, in addition to obtaining at least 40% in modules CH2E1, CH2A2, and CH2I2 averaged together, and in modules GO2A4, 2GOB4, GO2C4, GO2I5 and GO2X5 averaged together, and gaining at least 30% in every module. Marks of less than 30% in a total of 20 credits, in Part 1 and Part 2, will be condoned provided that the candidate has pursued the course for the module with reasonable diligence and has not been absent from the examination without reasonable cause.

Summary of teaching and assessment
Teaching is organised in modules that typically involve both lectures and practicals. Modules are assessed by a mixture of coursework and formal examinations. Part 3 project work, however, is monitored by means of tutorials with an individual advisor, and is assessed as coursework.

Degree Assessment: Part 2 will contribute 33% of the marks for the Final Degree classification.
Part 3 will contribute 67% of the marks for the Final Degree classification.

Admission requirements

Entrants to this programme are normally required to have obtained:
Grade C or better in English GCSE; and achieved
UCAS Tariff: 260 points from 3 A Levels or 300 points from 4 A Levels. Must include a minimum of C in A Level Chemistry, plus one other subject from Maths, Physics, Biology, Geography, Geology or Environmental Science.

Admissions Tutor: Dr Hazel McGoff

Support for students and their learning

University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses the Student Access to Independent Learning (S@IL) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, the Careers Advisory Service, the University's Special Needs Advisor, Study Advisors, Hall Wardens and the Students' Union.

The providing Departments have well-equipped teaching laboratories and dedicated computer laboratories. Substantial collections of earth materials and geological maps are

available for hands-on access by students. Within the providing Departments additional support for students is given through practical and field classes. There is a Course Adviser to offer advice on the choice of modules throughout the programme.

Career prospects
Environmental Geochemistry graduates have the advantage that many traditional chemistry jobs are also open to them. Previous graduates have found employment in analytical laboratories, the oil, water and electricity industries, environmental consultancies and the Environment Agency, computing and teaching and some have taken up postgraduate study before employment.

Opportunities for study abroad
Students following this degree programme may transfer to the parallel degree BSc Environmental Geochemistry with Professional Experience and complete an additional year of appropriate experience with an appropriate company overseas. Such transfers are only permitted if the student displays the appropriate ability to benefit from such a secondment, has the requisite degree of fluency in the foreign language required, and, if suitable industrial experience can be found for the student.

Educational aims of the programme
To provide a broad and rigorous study of modern geochemistry and selected applications to the environment.

Part 1 is designed to provide a sound foundation in geology and chemistry, an introduction to field work and the opportunity to select some additional introductory modules from a range of disciplines. Part 2 devotes special attention to the development of skills and technical experience, with further importance placed on fieldwork and emphasis on analytical skills and environmental systems. Part 3 is integrative and focuses on physical resources and pollution while providing scope for some specialisation through project work. The latter provides the student with the opportunity to demonstrate their ability to conduct and report on a detailed research investigation, drawing on their understanding of the fundamental concepts in environmental geochemistry.

Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

Knowledge and Understanding

A. Knowledge and understanding of:

1. Earth and planetary materials and how they are formed
2. The fundamentals of inorganic, physical and environmental chemistry
3. The evolution of the Earth and the environment through geological time, and how that understanding is arrived at
4. The internal structure and composition of the Earth and internal processes
5. Processes in the surface and near-surface environment, including interactions between the solid Earth, hydrosphere, atmosphere and biological agents, including man.
6. Environmental systems and issues
7. Earth's physical resources, their occurrence, location by man and the environmental issues associated with their exploitation
8. A selected range of optional topics
9. Fieldwork safety issues and procedures

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Teaching/learning methods and strategies

Underlying knowledge in the essential areas is set out in lectures, in most cases directly supported by illustrative practicals. The essential field experience required for proper understanding is provided by compulsory field courses in Part 1, Part 2 and Part 3. Students conduct an independent project in the form of practical investigation into an environmental topic in Part 3, with support and advice from academic and technical staff.

Assessment

Most knowledge is tested through a combination of coursework and unseen formal examinations. Written reports and oral presentations also contribute in Part 3.

Skills and other attributes

B. Intellectual skills – able to:

1. think logically and critically in a scientific manner
2. analyse and interpret chemical, geological and environmental observations and data and recognise and identify issues and problems
3. organise tasks into a structured form
4. appreciate the current state of knowledge of the environment
5. integrate and apply concepts and principles from one area of chemical, geological and environmental science to another
6. plan, conduct and write a report and give an oral presentation on an independent project.

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Teaching/learning methods and strategies

Logical and critical thinking is an essential part of interpreting earth science data and materials, it is embedded throughout the programme. The ability to integrate and apply concepts and principles from one area of the subject to another are intrinsic to high-level performance in the programme.

Assessment

1 and 2 are assessed indirectly in most parts of the programme, 3 in the course of laboratory and fieldwork. 4 is focused on by courses in Parts 2 and 3, while 5 contributes to more successful work. 6 is assessed by project work in Part 3.

C. Practical skills – able to: 1. accurately observe, record and interpret earth materials and data 2. conduct chemical and geochemical analyses using a variety of techniques 3. conduct a practical geochemical project 4. carry out a risk assessment for fieldwork in a given area.	**Teaching/learning methods and strategies** Observing, recording and interpreting, and analytical skills are taught in laboratory and field classes throughout the course. An investigative independent practical project is conducted by the student in Part 3, with advice from academic and technical staff. Risk assessment forms an essential part of each field course and any field based project work. *Assessment* 1 is tested both formatively in coursework and summatively in examinations. 2 is assessed by coursework and 3 means of the project report. 4 is assessed practically through coursework and project.
D. Transferable skills – able to: 1. use IT (word-processing, using standard software and the Internet) 2. communicate scientific ideas 3. give oral presentations 4. work as part of a team 5. use library resources 6. manage time 7. plan their career.	**Teaching/learning methods and strategies** The use of IT is embedded throughout the programme with special sessions in Part 1 and in the Skills Module in Part 2. Oral presentation and communication skills are developed in various modules, culminating in the Part 3 practical project. Career management is taught in the Part 2 Skills module. Teamworking is particularly emphasised in field courses. Time management is essential for the timely and effective completion of the programme. Library resources are required for the literature review in Part 3, and contribute to the best performances throughout. *Assessment* 1, 2 and 3 are assessed through coursework and particularly the Part 3 project. 4 in field courses, 5 in the project and 7 in the skills module in Part 2. 6 is not directly assessed but contributes to successful performance throughout the programme.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably expect to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in module and programme handbooks.