

BSc Environmental Science
For students entering Part 1 in 2007

UCAS code: F851

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading Faculty of Science
Relevant QAA subject benchmarking group(s):	Earth Sciences, Environmental Sciences and Environmental Studies
Programme length:	3 years
Date of specification:	June 2008
Programme Director:	Dr HJ McGoff (SHES)
Programme Adviser:	Dr HJ McGoff (SHES)
Board of Studies:	Environmental Sciences
Accreditation:	Institute of Environmental Sciences

Summary of programme aims and learning outcomes

The programme aims to provide students with a sound scientific understanding of the processes operating in the Earth system, and to apply this science to the understanding of current and future environmental issues. It also aims to provide students with the scientific and transferable skills that are relevant to the application of environmental science in research, industry and other areas such as government policy.

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 spreadsheet and graphical applications programs, scientific programming, internet), scientific writing, oral presentation, experimental methods (laboratory and field), team-working, use of library resources, career planning and management. They will have developed skills in team-working and leadership, and be confident and self-reliant, particularly as a result of experience during field courses and independent fieldwork. They will also have a sound knowledge of fieldwork safety procedure.

Programme content

The profile 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 'optional' 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 module credits for each module is listed.

Part 1 (three terms 2007-08)

Compulsory modules (40 credits)

		<i>Credits</i>	<i>Level</i>	<i>Term</i>
ES1B1	<i>Introduction to Environmental Science</i>	10	C	1
ES1B2	<i>Introduction to Environmental Science Fieldwork</i>	10	C	Easter

Vac.				
ES1A2	<i>Chemistry and Physics for Environmental Science</i>	10	C	2
And either:				
CH1M1	<i>Mathematics M1</i>	10	C	1,3
Or:				
CH1M2	<i>Mathematics M2</i>	10	C	2,3

Optional modules (80 credits)

Students select a minimum of three contributory subjects to Environmental Science, including:

Earth Science, Soil Science, Meteorology, Geography, Chemistry, Biology, Rural Environmental Science, Mathematics. They may also chose a language as part of the Institute-wide Language Programme.

<u>Recommended:</u>		<i>Credits</i>	<i>Level</i>	<i>Term</i>
GO1D1	<i>Earth Structure</i>	10	C	1
GO1D2	<i>Earth History</i>	10	C	2
SS1A1	<i>Introduction to Soil Science</i>	10	C	1
SS1A2	<i>Soils, Land and the Environment</i>	10	C	2

Others Including:

Biology

BI1BA1	<i>The Living Cell</i>	10	C	1
BI1EB2	<i>Humans and the Changing World</i>	10	C	2
BI1ED2	<i>Mammals: Diversity, Behaviour and Conservation</i>	10	C	2
BI1EF2	<i>Ecology: Species and their Interactions</i>	10	C	2
BI1EF23	<i>Ecology: Species and their Interactions</i>	20	C	2,3
BI1EG2	<i>Plant Structure & Functions</i>	10	C	2

Archaeology

AR1TS2	<i>Bones, Bodies and Burials: the Archaeology of Death</i>	20	C	2,3
AR1TS3	<i>Practising Archaeology: methods & approaches</i>	20	C	1,3

Mathematics

AS1A	<i>Communicating with Statistics</i>	20	C	1,2
CH1M2	<i>Mathematics</i>	20	C	1,2,3

Chemistry

CH1FC1	<i>Fundamental Chemistry 1 (OK without A level Chemistry)</i>	10	C	1
CH1FC2	<i>Fundamental Chemistry 2</i>	10	C	2,3
CH1OR2	<i>Fundamentals of Organic Chemistry</i>	10	C	1
CH1PH2	<i>Physical Processes for Biologists</i>	10	C	2
CH1IN2	<i>Descriptive Inorganic Chemistry</i>	10	C	1

Geography

GG1C	<i>Climatology</i>	10	C	1
GG1D	<i>Hydrology</i>	10	C	1
GG1GS	<i>Geomorphology</i>	10	C	2

Meteorology			
MT11A	<i>Introduction to Atmospheric Science</i>	20	C 1,2
MT11B	<i>Weather System Analysis</i>	20	C 1,2

Languages			
IWLP	<i>Various languages</i>	20	C 1,2

Part 2 (three terms : 2008-2009)

Compulsory modules (60 credits)		<i>Credits</i>	<i>Level</i>	<i>Term</i>
ES2G4	<i>Skills for Environmental Scientists</i>	20	I	4&5
SS2D5	<i>Sustainable Land Management</i>	10	I	5
ES2M5	<i>Global Quaternary Climate Change</i>	10	I	5
ES2F4	<i>Soil Ecology & Function</i>	10	I	4

And one field class from:

AR2U2	<i>Silchester Field School</i>	10	I	6
ES2Z6	<i>Environmental Science Field Class</i>	10	I	Easter
Vac.				
SS2A6	<i>Soil Science Field Class (SS2D4 prerequisite)</i>	10	I	Easter
Vac				

Optional Modules (60 credits)

Students develop depth in a minimum of two contributory subjects to Environmental Science, including: Earth Science, Meteorology, Geography, Chemistry, Biology, Plant Sciences, Rural Environmental Science, Archaeology, Mathematics. They may also choose a language as part of the Institute-wide Language Programme

Recommended:

AP2A37	<i>Practical Nature Conservation</i>	10	I	5
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Earth Sciences

ES2E4	<i>Environmental Mineralogy</i>	10	I	4
ES2L4	<i>Earth Surface Processes</i>	10	I	4
SS2D4	<i>Soils and Soil Development</i>	10	I	4
SS2A4	<i>Transport Processes in Soils</i>	10	I	4

Others Including (subject to timetable constraints and students having appropriate pre-requisites):

Archaeology (20 to 40 credits)

AR2S1	<i>Archaeological Science</i>	20	I	4,5
AR2F5	<i>Techniques in Artefact Interpretation</i>	10	I	4
AR2F6	<i>Techniques of Skeletal Interpretation</i>	10	I	5

Rural Science and Agriculture (20 to 40 credits)

AP2A25	<i>Grassland Management</i>	10	I	4
AP2EE3	<i>Environmental Economics (prerequisite AP1EE1)</i>	10	I	4
AP2A39	<i>Environment and the Farm Business (prerequisite AP1A02)</i>	10	I	5
AP2A26	<i>Forestry and Woodlands</i>	10	I	4

AP2A38	<i>Organic Farming</i>	10	I	4
AP2A45	<i>Environment in Practice 2</i>	20	I	4,5,6
Bioscience(20 to 40 credits)				
BI2BM5	<i>Science Communication</i>	10	I	5
BI2EH4	<i>Introduction to the History & Philosophy of Science</i>	10	I	4
BI2BN5	<i>Vertebrate Zoology</i>	10	I	5
BI2ED4	<i>Evolution & Classification of Plant Diversity</i>	10	I	4
BI2EE4	<i>Evolutionary Biology</i>	10	I	4
BI2EF6	<i>Habitat Management</i>	10	I	6
BI2EI4	<i>Invertebrate Zoology</i>	10	I	4
BI2EN5	<i>Animal Behaviour</i>	10	I	5
BI2EO5	<i>Applied Ecology</i>	10	I	5
BI2EQ5	<i>Ecological Biochemistry</i>	10	I	5
BI2ER5	<i>Ecological Aspects of Environmental Impact Assessment</i>	10	I	5
BI2ET3P	<i>Flora of the British Isles</i>	10	I	4
Meteorology (20 or 40 credits)				
MT24A	<i>Atmosphere & Ocean Dynamics</i>	20	I	4,5
MT2BB	<i>Atmospheric Physics</i>	20	I	4,5
Mathematics (10 or 20 credits)				
AS2A1	<i>Statistics for Life Sciences</i>	10	I	4
MT24C	<i>Numerical Methods for Environmental Science</i>	10	I	4
Physical Geography (20 to 40 credits)				
GG2ER	<i>Energy Resources</i>	10	I	4
GG2M	<i>GIS and Mapping</i>	10	I	4
GG2P1	<i>Geomorphological Hazards</i>	10	I	4
GG2P3	<i>Human Activity and Environmental Change</i>	10	I	4
GG2P5	<i>Hydrological Processes</i>	10	I	4
GG2P8	<i>Biogeography and Ecosystems</i>	10	I	5
Environmental Chemistry (10 credits)				
CH2A2	<i>Analytical Chemistry for Environmental Earth and Archaeological Sciences</i>	10	I	4
<i>Others</i>				
LA1XX1	<i>Institute Wide Language Programme</i>	20	I	4,5
MM270	<i>Entrepreneurship</i>	20	I	4 or 5
Part 3 (three terms: 2009-2010)				
Compulsory modules (60 credits)				
ES3IP	<i>Independent Project</i>	40	H	7,8
ES3D7	<i>Land Evaluation</i>	20	H	7,8
Optional Modules (60 credits)				
<u>Recommended:</u>				
AP3A87	<i>Environmental Management</i>	10	H	7
ES3Z8	<i>Earth Systems Field Class</i>	10	H	8

ES3C7	<i>Earth Systems Science</i>	10	H	8
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Others Including (subject to timetable constraints and students having appropriate pre-requisites):

Environmental Science

ES3H7	Forensic Issues and Practice	20	H	7,8
ES3A8	<i>Environmental Issues</i>	10	H	8
ES3LP	<i>Library Project</i>	10	H	7,8
SS3A8	<i>Management of Soil Fertility</i>	10	H	8

Archaeology (20 credits)

AR3S13	<i>Vegetation History and Archaeobotany</i>	20	H	8
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Rural Science & Agriculture (20 to 40 credits)

AP3A89	Water, Agriculture and Irrigation	10	H	7
AP3EP3	<i>Rural Policy & Countryside Planning</i>	10	H	7
AP3A68	<i>Wildlife in the Farming Environment</i>	10	H	8
AP3A90	<i>Climate Change & Food Systems</i>	10	H	8

Biological Sciences (10 to 20 credits)

BI3EL7	<i>Plants & Climate</i>	10	H	7
BI3EJ8	<i>Conservation Biology</i>	10	H	8
BI3EO7	<i>Physiological Ecology</i>	10	H	7

Physical Geography (20 or 40 credits)

GG334	<i>Glacial and Periglacial Geomorphology</i>	20	H	8
GG361	<i>Aquatic Environments: Problems and Management</i>	20	H	7
GG362	Water Resources	20	H	7
GG3AP	Air Pollution	20	H	7
GG3CC	Climate Change	20	H	7

Others

LA1XX1	<i>Institute Wide Language Programme</i>	20	H	7,8
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Progression requirements

To gain a threshold performance at Part 1 a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 1, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 1 to Part 2, a student shall normally be required to achieve a threshold performance at Part 1. In addition, students shall normally obtain at least 40% in the compulsory modules ES1B1, ES1B2, ES1A2, and either CH1M1 or CH1M2, averaged together.

To gain a threshold performance at Part 2 a student should normally be required to achieve an overall average of 40% over 120 credits taken in Part 2, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 2 to Part 3, a student shall normally be required to achieve a threshold performance at Part 2. In addition students shall normally obtain at least 40% in the compulsory modules SS2D5, ES2M5, ES2E4, ES2G4, and a field class module, averaged together.

Summary of teaching and assessment

Teaching is organized in modules that typically involve lectures, problem solving classes, and practical classes. The assessment is carried out within the University's degree classification scheme, details of which are in the programme handbooks. The pass mark in each module is 40%. Parts 1 and 2 are assessed by a mixture of coursework and formal examination. In Part 3 there are some modules which are assessed wholly by coursework and others wholly by examination: the details are given in the module descriptions. The Part 3 project involves a substantial component of independent learning, under the supervision and guidance of Project Supervisors. The project is assessed on the basis of formal reports, oral presentations and development of independent learning skills.

Part 2 contributes one third (33%) of the overall assessment and Part 3 the remaining two thirds (67%).

To be eligible for Honours, students must normally pass Level H modules with a total credit of at least 100.

Admission requirements

Entrants to this programme are normally required to have obtained:

Grade C or better in English, Science and Mathematics in GCSE, and a minimum UCAS Tariff of 300 points including two full 'A' levels. One subject from Maths, Physics, Chemistry, Biology, Geography, Geology or Environmental Science preferred;

Or International Baccalaureat: minimum pass plus minimum 6,5,5 in Higher Level Subjects including at least one science or maths.

Or Irish Highers: four grade Bs and one grade C including two sciences.

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, analytical laboratories and dedicated computer laboratories. Substantial collections of earth materials and maps are available for hands-on access by students. Within the providing Departments additional support for students is given through practical and field classes and in the course of the independent project. There is a Course Adviser to offer advice on the choice of modules throughout the programme.

Career prospects

The requirement for environmental scientists with a sound scientific training continues to grow and opportunities for graduates from this course include employment by environmental

consultants, water companies and the many offices of national and local government concerned with environmental issues as well as post-graduate study. Private industry is increasingly concerned to employ scientists to help minimise the adverse environmental impact of its activities.

Opportunities for study abroad

Students following this degree programme may transfer to the parallel degree BSc Environmental Science with Professional Experience (F852) and complete an additional year of appropriate experience with a company overseas. Such transfers are only permitted if the student displays the appropriate ability to benefit from such a secondment, has taken appropriate options in Part 2, has the requisite degree of fluency in the foreign language required, and, if suitable industrial experience can be found for the student. Students may also participate in the ERASMUS exchange scheme where one or two terms are spent studying in a European university. Further details are available from the Course Director and the Study Abroad Office.

Educational aims of the programme

The programme aims to provide a thorough degree-level education in Environmental Science, with optional emphases being designed within Pathways, such as Environmental Change, Earth and Atmosphere, Environmental Management, Soil and Water.

Part 1 is designed to provide a sound foundation in Environmental Science, and supporting knowledge of relevant Chemistry, Physics and Mathematics to develop the knowledge and skills required for studying the environmental sciences.. A wide range of subject options contribute and shape the particular pathway chosen. Part 2 has a core of compulsory modules to develop further skills and technical experience in the core subject areas, with particular emphasis on environmental management. Options are designed to give depth to knowledge and methodology in key selected subject areas. Part 3 is integrative whilst providing scope for specialisation through the selection of options and 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 Science.

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 Systems including the lithosphere, hydrosphere, atmosphere and biosphere
2. Interactions between the processes operating in the different components of the Earth System.
3. The evolution of the Earth and the environment through different time scales, and the evidence for that change
4. Monitoring and management of natural and human-induced environmental change.
5. Scientific examination of the implications of sustainability and sustainable development.
6. A selected range of optional topics
7. Environmental issues and management with an interdisciplinary and integrative perspective.
8. Fieldwork safety issues and procedures

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 and Part 2, with additional optional field courses in 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. Dissertations 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 environmental observations and data and recognise and identify issues and problems with that data
3. organise tasks into a structured form
4. understand the current state of knowledge of the environment – a rapidly developing area
5. integrate and apply concepts and principles from one area of environmental science to another
6. recognise the need for professional codes of conduct

Teaching/learning methods and strategies

Logical and critical thinking is an essential part of interpreting environmental 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. Current developments in environmental science are highlighted by contact with visiting experts in the field in Part 3.

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 not directly assessed.

C. Practical skills – able to:

1. plan, conduct and report on investigations, including the use of secondary data
2. collect, record and analyse data using appropriate field and laboratory techniques
3. reference work in an appropriate manner
4. carry out a risk assessment for field and laboratory investigations
5. consider the impact of field investigations on the environment as well as other interested parties

Teaching/learning methods and strategies

Observing, recording and interpreting is taught in laboratory and field classes throughout the course. An investigative independent practical project is conducted by the student in Part III, 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 & 2 are tested both formatively in coursework and particularly during the final year projects. Summatively in examinations. 2 is assessed by means of coursework and project work, 4 & 5 during field classes and project work.

D. Transferable skills – able to:

1. use IT (word-processing, using standard software and the Internet)
2. understand issues of sample selection, accuracy, precision and uncertainty in field and laboratory work
3. prepare, process, interpret and present data in an appropriate manner, using both quantitative and qualitative techniques
4. communicate scientific ideas in verbal, written and graphic form to a variety of audiences.
5. work as part of a team, identifying individual and collective goals, respecting the views and opinions of others and evaluating both individual and team performances.
6. use library resources
7. manage their time
8. plan their career, developing skills for self-managed and lifelong learning.

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 and internet resources are required for the literature review in Part 3, and contribute to the best performances throughout.

Assessment

1, 2, 3 & 4 are assessed through coursework and particularly in the Part 3 project. 5 in field courses, 6 in the Library Project and 8 in the skills module in Part 2. 7 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 be expected 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 the module description and in the programme handbook. The University reserves the right to modify this specification in unforeseen circumstances, or where the process of academic development and feedback from students, quality assurance processes or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.