BSc Environmental Science with Professional Experience UCAS code: F852
For students entering Part 1 in 2006

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:	4 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, independent fieldwork and the period of Professional Experience. They will also have a sound knowledge of fieldwork safety procedures.

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)		*Credits*	*Level*	*Term*
Compulsory modules (40 credits)				
ES1B1	Introduction to Environmental Science	10	C	1

ES1B2	Introduction to Environmental Science Fieldwork	10	C	Easter Vac.

And either:

CH1M1	Mathematics M1	10	C	1,3
ES1A2	Chemistry and Physics for Environmental Science	10	C	2

Or:

MA111	Mathematics for Scientists	20	C	1,2,3

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.

Recommended:		*Credits*	*Level*	*Term*
GO1D1	*Earth Structure & Materials*	10	C	1
GO1D2	*Earth History*	10	C	2

Soil Science (20 credits)

SS1A1	*Introduction to Soil Science*	10	C	1
SS1A2	*Soils, Land and the Environment*	10	C	2

Others Including:

Biology

AM1L10	*Animal Biology*	20	C	1,2
AM1S10	*Introduction to Biology* (OK without A level Biology)	10	C	2
BI1C10	*Cell Biology and Biochemistry*	10	C	1
BI1C11	*Genetics and Molecular Biology*	10	C	2
BI1M10	*Biodiversity*	10	C	1
BI1Z10	*Ecology*	20	C	2
BI1Z11	*Community Ecology*	10	C	3

Archaeology

AR1P2	*From Primates to Pyramids: Introduction to World Prehistory*	20	C	1,3
AR1TS3	*Practising Archaeology: methods & approaches*	20	C	1,3

Mathematics

AS1A	*Communicating with Statistics*	20	C	1,2
CH1M2	*Mathematics M2*	10	C	2,3

Chemistry

CH1C	*Chemistry C* (OK without A level Chemistry)	20	C	1,2,3
CH1I1	*Introduction to Inorganic Chemistry*	20	C	1,2,3
CH1I2	*Descriptive Inorganic Chemistry*	10	C	2
CH1O2	*Fundamental Organic Chemistry*	10	C	1
CH1P2	*Physical Biochemistry*	10	C	1

Geography

GG1P1	*Physical Geography 1: Climatology and Hydrology*	20	C	1
GG1P3	*Physical Geography 2: Earth Surface Processes*	20	C	2

Meteorology

MT11A	*Introduction to Atmospheric Science*	20	C	1,2
MT11B	*Weather System Analysis*	20	C	1,2

Plant Science

PS1AB2	*Physical Ecology*	10	C	2
PS1BA1	*Plant World*	10	C	1
PS1BA2	*Plant Development*	10	C	2
PS1BC2	*Introductory Botany*	10	C	2

Soil Science

SS1B2	*Soil Processes and Applications*	10	C	2

Languages

IWLP *Various Languages*

Part 2 (three terms : 2007-2008)

Compulsory modules (40 credits)		*Credits*	*Level*	*Term*
AP2A37	*Practical Nature Conservation*	10	I	5
ES2A5	*Environmental Systems*	10	I	5
ES2J4	*Skills for Environmental Scientists*	10	I	4

And one field class from:

AP2A21	*Rural Environmental Sciences Field Class 1*	10	I	Summer
AR2U2	*Silchester Field School (AR1TS1prerequisite)*	10	I	Summer
ES2X6	*Earth and Atmosphere Field Class*	10	I	Easter Vac.
SS2A6	*Soil Science Field Class (SS2D4 prerequisite)*	10	I	6

Optional Modules (80 credits)

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

<u>Recommended</u>:

Environmental Geochemistry (20 credits)

ES2E4	*Environmental Mineralogy*	10	I	4
CH2A2	*Analytical Chemistry for Environmental Earth and Archaeological Sciences*	10	I	4

Soil Science 1 (20 credits)				
SS2D4	*Soils and Soil Development*	10	I	4
SS2D5	*Sustainable Land Management*	10	I	5
Others Including:				
Geoscience (20 credits)				
GO2L4	*Sedimentology & Palaeoclimate Analysis*	10	I	4
GO2M5	*Global Change Through Geological Time*	10	I	5
Soil Science 2 (20 credits)				
SS2A4	*Transport Processes in Soils*	10	I	4
SS2E6	*Environmental Monitoring*	10	I	6
Archaeology (20 to 40 credits)				
AR2S1	*Archaeological Science*	20	I	4,5
AR2F5	*Techniques in Artefact Interpretation*	10	I	4
AR2F6	*Techniques of Skeletal Interpretation*	10	I	5
Rural Science and Agriculture (20 to 40 credits)				
AP2EE3	*Environmental Economics (prerequisite AP1EE1)*	10	I	4
AP2A39	*Environment and the Farm Business (prerequisite AP1A02)*	10	I	5
AP2A26	*Forestry and Woodlands*	10	I	4
AP2A25	*Grassland Management*	10	I	4
AP2A38	*Organic Farming*	10	I	4
Plant Sciences (20 to 40 credits)				
PS2BB4	*Evolution and Plant Biodiversity*	10	I	4
PS2BD4	*Plants and the Environment*	10	I	4
PS2BC5	*Ecological Aspects of Environmental Assessment*	10	I	5
PS2BG3	*Flora of the British Isles*	10	I	6
Biology	(20 to 40 credits)			
BI2B31	*Macro Evolution*	10	I	4
BI2Z31	*Micro Evolution*	10	I	5
AM2Z32	*Vertebrate Zoology (AM1Z10 prerequisite)*	10	I	4
AM2Z33	*Animal Behaviour*	10	I	5
AM2Z34	*Invertebrate Zoology*	10	I	4
History and Philosophy of Science (10 or 20 credits)				
PS2NA4	*Introduction to the History and Philosophy of Science* (excludes PS1N45)	10	I	4
PS2N45	*History and Philosophy of Science* (excludes PS2NA4)	20	I	4
Meteorology (20 or 40 credits)				
MT24A	*Atmosphere & Ocean Dynamics*	20	I	4,5
MT2BB	*Atmospheric Physics*	20	I	4,5
Mathematics				

AS2A1	*Statistics for Life Sciences*	10	I	4
MT24C	*Numerical Methods for Environmental Science*	10	I	4

Physical Geography (20 to 40 credits)

GG2ER	*Energy Resources*	10	I	4
GG2M	*GIS and Mapping*	10	I	4
GG2P1	*Geomorphological Hazards*	10	I	4
GG2P3	*Human Activity and Environmental Change*	10	I	4
GG2P7	*Fluvial Hydrology & Morphology*	10	I	4
GG2P8	*Biogeography and Ecosystems*	10	I	5
GG2RE	*Resources and the Environment*	10	I	5

Environmental Chemistry (20 credits)

CH2P2	*Intermediate Physical Chemistry (prerequisite CH1P1)*	10	I	4
CH2I2	*Inorganic Chemistry (prerequisite CH1I1)*	10	I	5

Part 3 (2008-2009)

Part 3 will consist of the 120 credits of industrial experience and its assessment (by in-service assessment, written report and presentation) will contribute 10% of the Part 2 mark. There is a separate Handbook for the Professional Year.

Part 4 (three terms: 2009-2010)

Compulsory modules (60 credits)		**Credits**	**Level**	**Term**
ES3IP	*Independent Project*	40	H	7,8
ES3D7	*Land Evaluation*	20	H	7,8

Optional Modules (60 credits)

Recommended:

AP3A87	*Environmental Management*	10	H	7
ES3Z8	*Earth Systems Field Class*	10	H	8
ES3C7	*Earth Systems Science*	10	H	8

Others Including:

Environmental Science

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

Archaeology (20 credits)

AR3S13	*Vegetation History and Archaeobotany*	20	H	8

Rural Science & Agriculture (20 to 40 credits)

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

Biological Sciences (10 to 20 credits)				
BI3EL7	*Plants & Climate*	10	H	7
BI3EJ8	*Conservation Biology*	10	H	8
BI3EO7	*Physiological Ecology*	10	H	7
Physical Geography (20 or 40 credits)				
GG334	*Glacial and Periglacial Geomorphology*	20	H	8
GG361	*Aquatic Environments: Problems and Management*	20	H	7
GG362	Water Resources	20	H	7
GG3AP	Air Pollution	20	H	7
GG3CC	Climate Change	20	H	7
Others				
LA1XX1	*Institute Wide Language Programme*	20	H	7,8

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, and either CH1M1 with ES1A1 or MA111, 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 AP2A37, ES2A5, ES2J4, 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. The period of Professional Experience is assessed by means of a report and presentation. It contributes 10% to the Part 2 mark. In the Final Year there are some modules which are assessed wholly by coursework and others wholly by examination: the details are given in the module descriptions. The Final Year 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 the Final Year 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 UCAS Tariff: *minimum* 280 points including at least 2 full 'A' levels or equivalent. These must include at least two subjects from Maths, Physics, Chemistry, Biology, Geography, Geology or Environmental Science;
Or International Baccalaureat: 31 points including Mathematics and Science;
Or Irish Highers: four grade Bs and one grade C including two sciences.

Admissions Tutor: Dr Samantha Baxter

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
It may be possible for students to complete the year of professional experience with a company overseas. This is 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. 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. Options in mathematics depend on the mathematical skills of the student prior to entry. 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 designed to provide professional, practical experience in a company or organisation, giving the student an opportunity to gain relevant skills and experience whilst working alongside practicing environmental scientists. Part 4 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 materials and how they are formed
2. The evolution of the Earth and the environment through geological time, and how that understanding is arrived at
3. Processes in the surface and near-surface environment, including interactions between the solid Earth, hydrosphere, atmosphere and biological agents, including man.
4. Environmental systems
5. Earth's physical resources, their occurrence, location by man and the environmental issues associated with their exploitation
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:	**Teaching/learning methods and strategies**
1. think logically and critically in a scientific manner 2. analyse and interpret environmental observations and data and recognise and identify issues and problems 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. plan, conduct and write a report and give an oral presentation on an independent project.	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 is assessed by project work in Part 3.

C. Practical skills – able to:	**Teaching/learning methods and strategies**
1. accurately observe, record and interpret earth materials and data 2. conduct a practical environmental science project 3. carry out a risk assessment for fieldwork in a given area.	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 is tested both formatively in coursework and summatively in examinations. 2 is assessed by means of the project report. 3 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 in the Part 3 project. 4 in field courses, 5 in the Library 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 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.