BSc Environmental Science of the Earth and Atmosphere with a year of Professional Experience **UCAS code: F901**
For students entering Part 1 in 2003

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Relevant QAA subject benchmarking group:	Earth Science, Environmental Science and Environmental Studies
Faculty of Science	Programme length: 4 years

Date of specification: May 2006
Programme Director: Revd. Dr TR Astin (SHES)
Programme Adviser: Revd. Dr TR Astin (SHES)
Board of Studies: Environmental Sciences
Accreditation: None.

Summary of programme aims and learning outcomes
The programme aims to provide the student with a sound scientific understanding of the principles governing earth and atmospheric processes, and to apply this science to the understanding of current and future environmental issues. It also aims to provide students with the scientific and transferrable skills that are relevant to the application of environmental science in general.

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 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 '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 shown after its title.

Part 1 (three terms)
Compulsory Modules

Module	Title	Credits	Level	Term	
GO1B1	Earth Materials	10	C	1	
SS1A1	Introduction to Soil Science	10	C	1	
ES1A1	Essential Maths for the Env. & Atmosphere	10	C	1	
GO1C2	Earth History and Evolution	10	C	2	
GO1X2	Introduction to Geological Fieldwork	10	C	2	Easter Vac

SS1A2	Soils, Land and Environment	10	C	2	
SS1B2	Soil Processes and Applications	10	C	2	
ES1A2	Essential Chemistry & Physics for Environmental. Scientists	10	C	2	
MT11A	Introduction to Atmospheric Science	20	C	1	& 2
MT11B	Weather systems analysis	20	C	1	& 2

Part 2

Compulsory Modules

Module	**Title**	**Credits**	**Level**	**Term**	
GO2A4	Introductory Environmental Geochemistry	10	I	4	
GO2C4	Sedimentology	10	I	4	
SS2B4	Chemistry of Soil Constituents	10	I	4	
ES2A5	Environmental Systems	10	I	5	
ES2X5	ESEA Field Course	10	I	5	Easter Vac
SS2A5	Transport Processes in Soils	10	I	5	
MT25D	Skills for Graduates (Meteorology Stream)	10	I	5	
Or	or	or			
GO2J4	Skills for Earth & Environmental Scientists (Earth Stream)	10	I	4	

Select 50 Credits from Optional Modules (dependent on mathematical and other pre-requisites):

MT23E	Surface Energy Exchange	10	I	3	Wks 8-10
MT24A	Atmosphere and Ocean Dynamics	20	I	4 & 5	
MT24B	Atmospheric Physics	20	I	4 & 5	
MT24C	Numerical Methods for Env. Scientists (pre-req A-Level Maths)	10	I	4	
SS2C4	Soil Microbiology and Biotechnology	10	I	4	
SS2D4	Soils and Soil Development	10	I	4	
GO1A1	Earth Structure and Processes	10	C	4	
GO2B4	Crust and Mantle Processes	10	I	4	
SS2D5	Sustainable Land Management	10	I	5	
GO2D5	Global Change Through Geological Time	10	I	5	
GO2F5	Geophysics	10	I	5	
GO2I5	Analytical Geochemistry	10	I	5	
SS2A6	Soil Survey and Experimentation	10	I	6	Wks 1 - 3
SS2E6	Environmental Monitoring	10	I	6	
MT26F	Atmospheric Analogues (pre-req MT11A, MT11B,MT24A)	10	I	6	Wks 1 - 3

Part 3

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 marks for the Final Degree Assessment.

ES2PE	Professional Experience	120	I/H	7,8,9

Part 4

Compulsory Modules

ES3PR	Lab/Field Project	30	H	End 6 & 7 & 8
ES3LP	Library Project	10	H	End term 6 & 7
ES3A8	Environmental Issues	10	H	8
MT38D	Advanced Weather System Analysis	10	H	8

Select 60 credits from Optional Modules: (dependent on mathematical and other pre-requisites):

GG327	Water Pollution Issues	20	H	7
GG332	Estuarine and Coastal Processes	20	H	7
GG333	Geographic Information Systems	20	H	7
GG335	Ice Sheets & Climate Change	20	H	8
GG336	Managing Environmental Change	20	H	8
GG338	Mountain Environments	20	H	8
GO3B8	Environmental and Global Geochemistry	10	H	8
GO3G7	Applied Geology	10	H	7
GO3Q7	Quaternary Studies	10	H	7
GO3U8	Forensic Geology	10	H	8
GO3X8	Earth Systems Field Class	10	H	Easter Vac
MT37C	Data Analysis for Weather & Climate Research	10	H	7
MT37D	Remote Sensing	10	H	7
MT37E	Dynamics of Weather Systems	10	H	7
MT37F	Oceanography	10	H	7
MT38A	Global Circulation	10	H	8
MT38B	Climate Change	10	H	8
MT38C	Numerical Weather Prediction	10	H	8
MT38D	Advanced Weather System Analysis	10	H	8
SS3A8	Management of Soil Fertility	10	H	8
SS3B7	Soils, Vegetation and Atmosphere	10	H	7
SS3C7	Soil and Land Evaluation	10	H	7
SS3C8	Soils and the Global Environment	10	H	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 modules MT11A and MT11B averaged together, modules SS1A1, SS1A2, and SS1B2 averaged together, and modules GO1B1 and GO1X2 averaged together.

To gain a threshold performance at Part 2 a student shall 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 and achieve an overall average of 50% over 120 credits taken in Part 2 (of which not less than 100 credits should normally be at I level or above). In addition, students shall normally obtain at least 40% in modules GO2A4, GO2C4, SS2B4, ES2A5, ES2X5, SS2A5, GO2J4 (Earth Stream) Or MT25D (Meteorology Stream). Students unable to progress after their first attempt at Part 2, or for whom it is not possible to find an appropriate placement, may qualify for progression to the 3-year BSc in Environmental Science of the Earth and Atmosphere.

Summary of teaching and assessment.

Teaching is organised 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%. Part 1 and 2 are assessed by a mixture of coursework and formal examination.

In Part 3 (year in industry) the student is assessed by in-service assessment, written report and presentation. The written report is produced under the guidance of the Industry Mentor and Student's Tutor. It is assessed by the student's tutor and BSc ESEA Internal Examiner. The 30 minute presentation takes place at The University of Reading and assessed by the BSc ESEA Internal Examiner, Student's Tutor and Industrial Mentor.

In Part 4 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 4 project involves a substantial component of independent learning, under the supervision and guidance of Project Supervisors. The projects are assessed on the basis of formal reports, oral presentations and development of independent learning skills.

Part 2 contributes 33% of the overall assessment. Part 3 contributes 10% of the Part 2 mark. Part 4 contributes the remaining 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
- *Either* A2/AS Level: 280 points from 3 subjects or 320 points from 4 subjects. Must include at least 2 from Physics, Chemistry, Biology, Geography, Environmental Science or Geology. Mathematics is recommended but not compulsory.
- *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 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.

Within the providing Departments additional support is given through practical classes and problem solving classes. The Department of Meteorology Library holds all textbooks used in connection with the programme, and also contains a Learning Resource Centre containing additional material such as course notes, reprints of important papers, and past examination papers. There is a Course Adviser to offer advice on the choice of modules within 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. Graduates who have work experience, gained in the Industrial placement are particularly sought after and many of them should expect an offer employment at the establishment once they have graduated. Graduates gaining a good honours degree are also suitably qualified for entry into the Meteorological Office.

Opportunities for study abroad
Students following this degree programme may complete the additional year of appropriate 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 for the student.

Educational aims of the programme
The programme aims to provide a thorough degree-level education in environmental science, with an emphasis on the physical sciences of the Earth and atmosphere.

Part 1 is designed to provide a sound foundation in geology, atmospheric science, and soil science, with particular reference to developing the knowledge and skills required for studying the physical environmental sciences. The various options depend on the mathematical skills of the student. Part 2 devotes further attention to the development of skills and technical experience in the core subject areas. Part 3 allows the student to obtain practical experience. Part 4 is integrative whilst providing scope for some 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:	Teaching/learning methods and strategies
1. The application of physical methods to the description, modelling and prediction of physical phenomena in the Earth and atmosphere. 2. More specialist topics relating to the Earth's environmental system of current research interest 3. Impacts of climate and environmental change on society and ecology. 4. Processes in the surface and near-surface environment, including interactions between the solid Earth, hydrosphere, atmosphere and biological agents. 5. Environmental systems, issues and management with an interdisciplinary and integrative perspective. 6. Fieldwork safety issues and procedures	The knowledge required for the basic topics is delineated in formal lectures supported by problem sets for students to tackle on their own. The knowledge required for more specialist topics is enhanced through self-learning based on guided reading, problem solving and project work. The knowledge required for 3 is gained from weekly discussion classes during part 3. Feedback on most of 1 and 2 is provided through formative assessed work. **Assessment** Most knowledge is tested through a combination of coursework and unseen formal examinations. Dissertation and oral presentations also contribute. .

Skills and other attributes

B. Intellectual skills – the ability to:

1. Recognise and use subject-specific theories, paradigms, concepts and principles
2. Analyse, synthesise and summarise information critically

Analyse and interpret earth science and environmental observations and data and recognise and identify issues and problems

3. Understand the current state of knowledge of the environment - a rapidly developing area
4. Integrate and apply concepts and principles from one area of environmental science to another

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Teaching/learning methods and strategies

Most modules are designed to develop 1 to 4. 1, 2 and 3 are enhanced through the use of coursework assignments, fieldwork and project work. 4 and 5 are enhanced mainly by project work produced during Part 3 and Part 4

Assessment

1-3 are assessed indirectly in most parts of the programme. 4 is assessed by courses in part 2 and 3.
5 is mainly assessed by the projects in Part 3 and Part 4.

C. Practical skills

1. Planning, conducting, and reporting on investigations, including the use of secondary data
2. Collecting, recording and analysing data using appropriate techniques in the field and laboratory
3. Undertake field and laboratory investigations in a responsible and safe manner
4. Referencing work in an appropriate manner

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Teaching/learning methods and strategies

Laboratory, IT, field work and field classes are designed to enhance skills 1 and 2. 3 is emphasised through guidelines and advice given to students in connection with practical work.
4. is emphasised through guidelines issued to students in connection with project work.

Assessment

1 and 2 are tested formatively in coursework connected with laboratory and field classes. 3 is not assessed although will be an integral part of the work placement and good practice is endorsed throughout the course. 4 is assessed as part of Part 3 and Part 4 project report.

D. Transferable skills

1. Numeracy and C & IT: appreciating issues relating to the selection and reliability of field and laboratory data; preparing, processing, interpreting and presenting data; solving numerical problems using computer and non-computer based techniques; using the Internet critically as a source of information.
2. Interpersonal skills: ability to work with others and share knowledge effectively; recognise and respect the views and opinions of other team members.
3. Self management and professional development: study skills, independent learning, time management, identifying and working towards targets for personal, academic and career development

Teaching/learning methods and strategies

Skills listed under 1 are developed throughout most of the programme, but especially through practical work, field classes and project work. 2 is encouraged through team-working within laboratory and field classes. 3 is enhanced partly through the provision of a Career Development Skills module during part 2, and partly through a PAR tutorial system.

Assessment

Skills in 1 and 2 are assessed indirectly, mainly in connection with laboratory and field classes. Skills in 3 are not directly assessed but their effective use during Parts 1,2 and 4 together with the year in industry will enhance performance in H level modules.

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.