BSc Meteorology with a year in Oklahoma   UCAS code: F862

Awarding Institution   The University of Reading
Teaching Institution   The Universities of Reading
                                                        and Oklahoma

Relevant QAA subject benchmarking group: ES3
Faculty of Science   Programme length: 4 years
For students entering Part 1 in 2002   Date of specification: 18/03/2003

Programme Director: Mr R Reynolds (Meteorology)
Programme Adviser: Dr E J Highwood (Meteorology)

Board of Studies: Single and Combined Subject Degrees in Meteorology
Accreditation: Approved by the Royal Meteorological Society as an appropriate academic training for meteorologists seeking the qualification *Chartered Meteorologist*.

Summary of programme aims and learning outcomes

The programme aims to provide the student with a broad knowledge of modern meteorology, and scientific and other transferable skills that are relevant to the application of environmental science in general. The year at the University of Oklahoma will extend the students' knowledge and understanding of weather science, partly with direct experience of a distinctly different geographical context.(For a full statement of the programme aims and outcomes see below.)

Transferable skills

The University's Strategy for Teaching and Learning has identified a number of generic transferable skills that 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, and business awareness.

Programme content

The profile that 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 module credits for each module is shown after its title.

Part 1 (three terms)

Compulsory Modules		*Credits*	*Level*
MT11A	*Introduction to Atmospheric Physics*	20	C
MT11B	*Weather Systems Analysis*	20	C
MT12C	*Skills for Environmental Science*	20	C

Optional Modules (must include at least 20 credits selected from modules marked #)

MA111	*# Mathematics for Scientists*	20	C
PH1003	*# Mathematical Physics & Problem Solving*	20	C
MA112	*# Applied Mathematics*	20	C
MA11A	*# Introduction to Analysis*	20	C
MA11B	*# Calculus and Applications*	20	C
MA11C	*# Matrices, Vectors and Applications*	20	C
PH1001	*Concepts in Physics*	20	C
PH1002	*Classical Physics*	20	C
GO1A1	*Earth Structure and Processes*	10	C
GO1B1	*Earth Materials*	10	C
GO1C2	*Earth History and Evolution*	10	C
SS1A1	*Introduction to Soil Science*	10	C
SS1A2	*Soils, Land and Environment*	10	C
SS1B2	*Soil Processes and Applications*	10	C

Part 2 (three terms)

Compulsory Modules

MT23E	*Surface Energy Exchange*	10	I
MT24A	*Atmosphere and Ocean Dynamics*	20	I
MT24B	*Atmospheric Physics*	20	I
MT24C	*Numerical Methods for Environmental Sci.*	10	I
MT25D	*Skills for Graduates*	10	I
MT26F	*Atmospheric Analogues*	10	I
MA240	*Mathematical Methods and Models*	20	I

Optional Modules subject to pre-requisites stated in the Module descriptions

Students must select one or more Level I modules to the value of 20 credits in subject areas other than meteorology. Alternatively, the student may select a Level C module (for 20 credits) in a foreign language offered by the Institute Wide Language Programme (IWLP)

GO2F4	Geophysics	10	I
GO2D5	Quaternary & modern Geology	10	I
MA24A	Analysis	20	I
PH2001	Thermal Physics	20	I
PH2003	Electromagnetism	20	I
SS2D4	Soils and soil development	10	I
SS2C5	Soils and environmental pollution	10	I
IWLP	Practical French/German/Italian/Spanish	20	C (terms 4 & 5)

Part 3 (three terms)

Compulsory Modules		Credits	Level
MT36E	*Boundary Layer Meteorology*	20	H
MT37C	*Climate and Climate Change*	10	H
MT37A	*Part 3 Project*	30	H
MT37B	*General Studies*	10	I
MT38J	*Clouds Radiation and Climate*	10	H
MT38H	*The Global Circulation*	10	H

Optional Modules			
MT37D	*Remote Sensing Methods and Applications*	10	H
MT37F	*Extra-tropical Weather Systems*	10	H
MT37G	*Oceanography*	10	H
MT38K	*Atmospheric Chemistry*	10	H
MT38M	*Tropical Weather Systems*	10	H
MT38L	*Numerical Weather Prediction*	10	H

Part 4 (two semesters)

Students must select four modules in each of the two semesters.

Fall Semester (August to December)

G4424	*Synoptic Meteorology Laboratory*	15	H
G5113	*Advanced Atmospheric Dynamics I*	15	H
G5223	*Cloud and precipitation Physics*	15	H
* G5243	*Atmospheric Electrodynamics*	15	H
* G5323	*Time Series Analysis I*	15	H
* G5344	*Computational Fluid Dynamics I*	15	H
G5990	*Independent Study*	15	H
G6950	*Weather Briefings*	15	H
G6970	*Seminar*	15	H

* *offered every second year*

Spring Semester (January to May)

G4433	*Mesoscale Meteorology*	15	H
G5223	*Atmospheric Radiation*	15	H
G5413	*Advanced Synoptic Meteorology*	15	H
G5503	*Climate Dynamics*	15	H
* G5303	*Objective Analysis*	15	H
* G5613	*Radar Meteorology*	15	H
* G5803	*Dynamic Data Assimilation*	15	H
G5990	*Independent Study*	15	H
G6950	*Weather Briefings*	15	H

* *offered every second year*

Progression requirements

To proceed to Part 2 it is sufficient to obtain an average of at least 40% overall and at least 40% in the Meteorology modules averaged together, with no module mark below 30%. Marks of less than 30% in modules to a total of 20 credits, except for MT11A, MT11B and MT12C, may 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.

To proceed to Part 3 it is sufficient to obtain an average of at least 40% overall, with no module mark below 30%. Marks of less than 30% in modules to a total of 20 credits may 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. The same conditions apply for progression from Part 3 to Part 4 in Oklahoma.

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 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 a Project Supervisor. The project is assessed on the basis of formal reports, oral presentations and development of independent learning skills. Part 4 consists of modules that are assessed by a combination of coursework and examination and ones that are coursework only. The grade equivalents for Oklahoma/Reading assessments are:

A	70% & above
A-	68-69%
B+	63-67%
B	58-62%
B-	53-57%
C+	50-52%
C	45-59%
C-	40-44%

Part 2 contributes 20% of the overall assessment. Parts 3 and 4 each contribute 40% of the overall assessment.

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 or equivalent
- *Either* A/AS Level: 300 points overall including an AB combination in physics and mathematics (both A levels) and 80 points from another A level or other AS levels;
- *Or* International Baccalaureat: 32 points including 6 in Physics and 6 in Mathematics;
- *Or* Advanced GNVQ of 18 units: 300 points (consult Admissions Tutor for advice regarding relevant units);
- *Or* Scottish Advanced Highers: 300 points with a BC combination in physics and mathematics plus 80 points from other exams;
- *Or* Irish Highers: one grade A and four grade Bs including physics and mathematics at grade A/B

Admissions Tutor: Mr Ross Reynolds (Meteorology)

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.

The University of Oklahoma at Norman matches the facilities outlined above, both through central provision and within the School of Meteorology. There is a Course Adviser to offer advice on the choice of modules within the Oklahoma programme

Career prospects

Graduates gaining a good honours degree are suitably qualified for graduate entry into the Meteorological Office, where they may pursue a career in either operational meteorology or research. The British Antarctic Survey, the Centre for Ecology & Hydrology and the Environment Agency are examples of agencies providing employment to graduates wishing to specialise in the applications of meteorology. Opportunities also exist in the general area of environmental consultancy, both with local authorities (in the UK) and private companies. However, a graduate is also qualified to follow a career involving more general applications of physical science and mathematics, as in teaching (primary or secondary level), the scientific civil service, and industry. The one year residence in the United States will offer the opportunity for undergraduates to move onto research degrees within the USA more easily, and possibly to establish links with the wider meteorological/environmental employment possibilities there.

Educational aims of the programme

The programme aims to provide a thorough degree-level education in environmental physical science, with emphasis on the physics of the Earth's atmosphere and oceans. It also aims to provide students with a sufficient degree level knowledge of applied physics and mathematics to enable them to pursue a career outside the specialist areas of meteorology and oceanography. The inclusion of the fourth year at one of the USA's top Schools of Meteorology will enhance students' knowledge and understanding by extending some Reading courses, by offering different courses than Reading's, and by offering the choice of studying weather systems (including severe weather) that characterise the High Plains region.

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 and mathematical methods to the description, modelling and prediction of physical phenomena in the atmosphere and oceans 2. More specialist topics relating to the Earth's climate system of current research interest 3. Impacts of weather, climate and climate change on society and ecology.	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 presentation also contribute.

Skills and other attributes

B. Intellectual skills – the ability to:	**Teaching/learning methods and strategies**
1. Recognise and use subject-specific theories, paradigms, concepts and principles 2. Analyse, synthesise and summarise information critically 3. Apply knowledge and understanding to address familiar and unfamiliar problems 4. Collect and integrate evidence to formulate and test hypotheses 5. Appreciate moral and ethical issues relating to the subject area	Most modules are designed to develop 1 and 2. 1, 2 and 3 are enhanced through the use of coursework assignments, fieldwork and project work. 4 is enhanced mainly by project work. 5 is addressed in discussion classes. *Assessment* 1-3 are assessed indirectly in most parts of the programme. 4 is assessed in the part 3 project. 5 is assessed by a General Paper.

C. Practical skills	**Teaching/learning methods and strategies**
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	Laboratory, IT, 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. 4 is assessed as part of the part 3 project report.

D. Transferable skills	**Teaching/learning methods and strategies**
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	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 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 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.