BSc & MMet
METEOROLOGY
The science of the atmosphere
Meteorology is the science of the atmosphere. Knowledge of meteorology allows us to forecast weather events and variations in the climate across a range of time scales. It is a vital tool for dealing with some of our biggest environmental challenges such as climate change, ozone depletion and atmospheric pollution.

Meteorology is a science subject which appeals to those who enjoy maths and physics and have an interest in our weather and climate and how they affect us. It is an ideal subject for students who are looking for somewhere they can apply their knowledge of these disciplines to problems which affect many aspects of everyday life and the wider environment.

The Department of Meteorology at Reading is one of the foremost Meteorology departments in the world, with research spanning the spectrum, from the smallest scale of atmospheric turbulence to the largest scale of climate patterns such as El Niño and the tropical monsoon circulations. In all research assessments, Meteorology at Reading has received the highest possible rating with 86% of our research being graded as world-leading1.

Our aim in teaching meteorology at Reading is to give you the knowledge and skills to become a professional scientist. Whilst our degree focuses on the science of the atmosphere and oceans, many of our graduates go on to develop careers in other areas where scientific, mathematical and computing skills are required.

1 Research Excellence Framework, 2014 – Earth Systems and Environmental Sciences

WHY READING?

The Department of Meteorology was established in 1965, and is the only UK university department to offer a full range of undergraduate and postgraduate courses in meteorology. We are internationally renowned for our excellent research and teaching in atmospheric, oceanic and climate science.

- Our teaching staff of about 45 academics includes many scientists recognised as world experts in their subjects, including three Fellows of the Royal Society
- The breadth of our research covers virtually every aspect of atmospheric and climate science, from small scale weather patterns associated with urban areas right up to the global circulation, climate change and even the weather in space. This means that whatever topics you cover on your course, you will be taught by experts in the field
- High staff numbers give our department a staff:student ratio of about 1:2. Most of your teaching will be in small groups and our staff members are able to get to know all our students well
- Our unrivalled atmospheric observatory, fluid dynamics laboratory and instruments workshop give us excellent facilities for the practical elements of the course
- We have a strong focus on employability and work closely with a number of meteorological employers to ensure that our students are fitted for careers in weather, climate and environmental science once they graduate

1 Research Fortnight’s Analysis Power Rankings, 2014, based on its analysis of REF 2014.

“Without doubt, the Meteorology Department in Reading is one of the best and most recognised in the world. My degree was a great experience and kick-started my career. I would happily recommend a meteorology degree at Reading to anyone interested in weather or climate.”

Caroline Bain
BSc Meteorology 2000-2003. Now a research scientist at the Met Office after a PhD at Leeds University and a postdoctoral position at the University of California studying tropical cyclones in the East Pacific.
METEOROLOGY AND CLIMATE
A FIRM FOUNDATION IN SCIENCE

Study of the atmosphere and oceans at Reading is firmly based on fundamental scientific principles. Both atmosphere and oceans are fluids in motion, obeying the laws of fluid dynamics and thermodynamics, and so our degree courses involve a considerable element of maths and physics: in doing so, our degree programmes prepare you for a wide range of scientific, mathematical and environmental careers, and offer an exciting chance for students with a strong interest in maths and physics to apply their knowledge to fascinating and complex physical systems.

A strong basis in research

The Meteorology Department at Reading has built its world-leading reputation on the quality and breadth of its research work, and we work closely with other organisations such as the UK Met Office, the European Centre for Medium Range Weather Forecasts (ECMWF) and a range of commercial and private sector organisations. The UK Met Office has a large research group based within the Meteorology Department building and we are also home to the Climate Division of the National Centre for Atmospheric Science and the National Centre for Earth Observation. All of this expertise feeds through into our undergraduate teaching.

A dedicated and friendly environment

The Meteorology Department has a strong sense of community, and with our high staff: student ratio you will soon get to know your fellow students and staff members. The departmental coffee room sits at the heart of the department, and staff mingle in a friendly and relaxed atmosphere. Real-time weather displays sit next to notices of talks, seminars and visiting speakers, and there are regular social and sporting events, including the famous Christmas pantomime put on by our PhD students, and cricket and croquet tournaments in the summer term.

An opportunity to study abroad

We have a well-established study exchange programme with Oklahoma University (OU) in the USA. As well as being home to a large and highly regarded School of Meteorology, OU also plays host to the US National Severe Storms Laboratory and the US National Weather Center. Each year, up to 10 undergraduate students spend the third year of their 4-year MMet degree studying at OU. Being in the heart of North America’s ‘Tornado Alley’, our students get a unique chance to study the development of the severe thunderstorms and tornadoes that characterise the weather in this region.

Student resources

The Meteorology Department is housed in a purpose-built building. We have our own departmental library, including study areas and an electronic whiteboard facility (useful for practising presentations and team projects); fluid dynamics and instrument laboratories: two computing laboratories: and of course a well-equipped atmospheric observatory. One of our optional modules - Weather Forecasting: Practice and Presentation - makes use of the University’s professional TV studio facilities, to provide the environment to make, present and critique your own forecasts.

Employability and skills development

It is our aim that you should graduate from Reading not only with a life-long interest in your subject, but also with a range of transferable skills that will help you develop your career. These include IT skills such as programming and data analysis, presentation skills both written and oral, team work and research methods and techniques. We offer a ‘skills for graduates’ non-assessed module to enhance existing skills and develop new ones, such as oral and written presentations, team-working, CV writing and applying for jobs. In your final year you will produce a poster summarising your project findings and then present your work to fellow students, staff members and invited visitors representing partner organisations and potential employers.

Pressed for time? Watch videos of students and graduates of the programme here.

“I’ve particularly enjoyed the practical side of the course – like the measurements we’ve taken out on the field of solar radiation and temperature. [In Oklahoma] When storm chasing season came round in the spring, students would head out on the road in the hope of experiencing more extreme weather events. As a meteorology student it was great to get close up to storms including witnessing three tornadoes!”

Zadie Stock
MMet Meteorology with a Year in Oklahoma. Now an air quality scientist at a major environmental consultancy company.

“I decided on Reading to do a meteorology degree because I really liked the campus, and had the opportunity to study in Oklahoma. This was an amazing experience that I will never forget. The department at Reading is a really friendly place and a nice community to have been a part of. There was always something going on in the coffee room, and the social events were a great way to get to know other students and lecturers too.

Lots of the research being carried out within the department is groundbreaking, and many of the undergraduate classes were taught by leading figures in weather and climate research. This was definitely something I took for granted at the time. Looking back I feel very fortunate to have studied at Reading.’

James Penrose
MMet Meteorology and Climate with a Year in Oklahoma, 2008-2012. Now working as a meteorologist for a commodity trading company in European power and gas markets.

“If you’re after a career in meteorology, then this course is a must. I couldn’t recommend it, and the Department, highly enough. I’d been interested in the weather from an early age and actually wrote to the Met Office when I was about 14 asking how to go about getting a job there. They said a degree in maths, physics or meteorology would be a good idea. I decided I’d prefer the meteorology degree, and Reading was the best place for it. The BSc Meteorology course was excellent, and is highly respected in the Met Office.”

Paul Gundersen
BSc Meteorology and now a Chief Forecaster at the Met Office.
BSc Meteorology and Climate

This degree gives you the opportunity to study this important subject, starting from the fundamental physical principles and building towards a wide range of theoretical and applied topics related to weather and the climate system. Year 1 starts off by introducing you to the basic building blocks of atmospheric science and weather systems, together with some essential applied mathematics. Optional modules include additional physics and earth sciences. In the second year we take a strong focus on the underpinning science of the atmosphere and oceans, using laboratory classes and numerical modelling to enhance your understanding and develop skills which will be useful in a wide range of careers. Options at this stage include the chance to make and present your own weather forecasts in a professional TV studio, together with the possibility of studying a foreign language or more Earth sciences. The third and final year is taken up by meteorology and Earth sciences. In the second year we take a strong focus on the underpinning science of the atmosphere and oceans, using laboratory classes and numerical modelling to enhance your understanding and develop skills which will be useful in a wide range of careers. Options at this stage include the chance to make and present your own weather forecasts in a professional TV studio, together with the possibility of studying a foreign language or more Earth sciences. The third and final year is taken up by meteorology and Earth sciences.

MMet Meteorology and Climate

Students on the MMet programme then spend their 3rd year at Oklahoma University in the USA. The modules there are strongly geared towards the unique weather systems of that part of the world and the observational and forecasting methods that are used to understand these systems and predict their occurrence. Students return to Reading for their final year, completing a research project and choosing from an extended range of optional modules at Masters Level.

BSc Mathematics and Meteorology

This joint honours programme aims to provide you with a good general mathematical education and a broad knowledge of modern meteorology and environmental physical science, with the emphasis on the physics of the Earth’s atmosphere and oceans. The meteorology component develops both physical and dynamical meteorology. The mathematical part focuses in particular on the theory and application of numerical methods and differential equations, together with the calculus and analysis upon which these methods are based. Because all modern weather forecasting and climate prediction is based upon building numerical models of the atmosphere and oceans using advanced mathematical techniques, this degree is ideal for students who may be considering the possibility of a career in numerical modelling.

MMath Mathematics and Meteorology

This 4 year version of the Mathematics and Meteorology combined degree is designed to develop both subjects, and students undertake a mathematical research project in their 3rd year and a meteorological research project in their final year. This degree is particularly appropriate for those intending to pursue a research career in mathematical modelling of the atmosphere or other environmental or fluid dynamical systems. Students get to choose from a wide range of mathematical and meteorological optional modules in the final two years and the degree results in the award of a Masters level qualification. The strong emphasis on developing independent research skills also makes this an ideal programme for students considering the possibility of going onto a PhD or other higher research degree programme.

OUR UNDERGRADUATE METEOROLOGY PROGRAMMES

BSc Meteorology and Climate

This degree gives you the opportunity to study this important subject, starting from the fundamental physical principles and building towards a wide range of theoretical and applied topics related to weather and the climate system. Year 1 starts off by introducing you to the basic building blocks of atmospheric science and weather systems, together with some essential applied mathematics. Optional modules include additional physics and earth sciences. In the second year we take a strong focus on the underpinning science of the atmosphere and oceans, using laboratory classes and numerical modelling to enhance your understanding and develop skills which will be useful in a wide range of careers. Options at this stage include the chance to make and present your own weather forecasts in a professional TV studio, together with the possibility of studying a foreign language or more Earth sciences. The third and final year is taken up by meteorology and Earth sciences. In the second year we take a strong focus on the underpinning science of the atmosphere and oceans, using laboratory classes and numerical modelling to enhance your understanding and develop skills which will be useful in a wide range of careers. Options at this stage include the chance to make and present your own weather forecasts in a professional TV studio, together with the possibility of studying a foreign language or more Earth sciences. The third and final year is taken up by meteorology and Earth sciences.

MMet Meteorology and Climate with a Year in Oklahoma

The first 2 years of this degree course are the same as the BSc in Meteorology and Climate. Students on the MMet programme then spend their 3rd year at Oklahoma University in the USA. The modules there are strongly geared towards the unique weather systems of that part of the world and the observational and forecasting methods that are used to understand these systems and predict their occurrence. Students return to Reading for their final year, completing a research project and choosing from an extended range of optional modules at Masters Level.

BSc Mathematics and Meteorology

This joint honours programme aims to provide you with a good general mathematical education and a broad knowledge of modern meteorology and environmental physical science, with the emphasis on the physics of the Earth’s atmosphere and oceans. The meteorology component develops both physical and dynamical meteorology. The mathematical part focuses in particular on the theory and application of numerical methods and differential equations, together with the calculus and analysis upon which these methods are based. Because all modern weather forecasting and climate prediction is based upon building numerical models of the atmosphere and oceans using advanced mathematical techniques, this degree is ideal for students who may be considering the possibility of a career in numerical modelling.

MMath Mathematics and Meteorology

This 4 year version of the Mathematics and Meteorology combined degree is designed to develop both subjects, and students undertake a mathematical research project in their 3rd year and a meteorological research project in their final year. This degree is particularly appropriate for those intending to pursue a research career in mathematical modelling of the atmosphere or other environmental or fluid dynamical systems. Students get to choose from a wide range of mathematical and meteorological optional modules in the final two years and the degree results in the award of a Masters level qualification. The strong emphasis on developing independent research skills also makes this an ideal programme for students considering the possibility of going onto a PhD or other higher research degree programme.

OUR UNDERGRADUATE METEOROLOGY PROGRAMMES

PRACTICAL WORK AND FIELD STUDIES

Theoretical studies of the atmosphere and oceans is augmented by a wide range of practical and field work, helping to reinforce theoretical concepts as well as developing practical skills such as weather systems analysis, instrument calibration and deployment, computer programming and experimental design and execution, all of which are valuable career-enhancing skills.

• Our fluid dynamics laboratory allows you to study the effects of heating, rotation and density contrasts on the behaviour of fluid flows, with direct analogues to real weather systems.

• Our instruments lab provides facilities to build and test a wide range of meteorological instruments.

• Our extensive atmospheric observatory, situated in the centre of campus, is equipped with a huge range of meteorological instruments, used at various points in the degree programmes to study the Earth’s energy balance and the small-scale turbulent fluctuations in winds, temperature and humidity that transport heat, moisture and momentum between the surface and the atmosphere.

• We are one of only a handful of sites in the UK permitted to launch instrumented weather balloons, allowing us to study the atmosphere in three dimensions.

• We provide ‘synoptic laboratory’ classes to teach and study the evolution of real weather systems by analysing weather charts and studying radar and satellite imagery.

• All students on Meteorology degree programmes have the chance to attend a one-week field trip to the Isle of Arran in the Inner Hebrides, experiencing the weather first-hand in this beautiful location, and taking meteorological measurements throughout – measuring energy fluxes, launching and tracking weather balloons to determine wind structures in the atmospheres, and preparing and delivering local weather forecasts to staff and fellow-students.

PRACTICAL WORK AND FIELD STUDIES

Theoretical studies of the atmosphere and oceans is augmented by a wide range of practical and field work, helping to reinforce theoretical concepts as well as developing practical skills such as weather systems analysis, instrument calibration and deployment, computer programming and experimental design and execution, all of which are valuable career-enhancing skills.

• Our fluid dynamics laboratory allows you to study the effects of heating, rotation and density contrasts on the behaviour of fluid flows, with direct analogues to real weather systems.

• Our instruments lab provides facilities to build and test a wide range of meteorological instruments.

• Our extensive atmospheric observatory, situated in the centre of campus, is equipped with a huge range of meteorological instruments, used at various points in the degree programmes to study the Earth’s energy balance and the small-scale turbulent fluctuations in winds, temperature and humidity that transport heat, moisture and momentum between the surface and the atmosphere.

• We are one of only a handful of sites in the UK permitted to launch instrumented weather balloons, allowing us to study the atmosphere in three dimensions.

• We provide ‘synoptic laboratory’ classes to teach and study the evolution of real weather systems by analysing weather charts and studying radar and satellite imagery.

• All students on Meteorology degree programmes have the chance to attend a one-week field trip to the Isle of Arran in the Inner Hebrides, experiencing the weather first-hand in this beautiful location, and taking meteorological measurements throughout – measuring energy fluxes, launching and tracking weather balloons to determine wind structures in the atmospheres, and preparing and delivering local weather forecasts to staff and fellow-students.
## BSc Meteorology and Climate

### Compulsory modules

#### Year One
- Introduction to Meteorology
- Weather and Climate fundamentals
- Skills for environmental science
- Calculus
- Linear Algebra

#### Year Two
- Atmosphere and Ocean Dynamics
- Atmospheric physics
- Numerical methods for environmental science
- Surface energy exchange
- Atmospheric analogues
- Differential Equations
- Statistics for Environmental Science

#### Year Three
- Part 3 project
- Boundary layer meteorology
- General Studies

### Optional Modules

#### Year One
- Physics of the natural world
- Atomic and nuclear physics
- Global environmental chemistry

#### Year Two
- Global quaternary climate change
- Weather forecasting: practice and presentation
- Institution wide language programme
- Atmospheric Chemistry and Transport

#### Year Three
- Remote sensing methods and applications
- Climate change
- Dynamics of weather systems
- Oceanography
- Atmospheric field course (Arran)
- Numerical weather prediction
- Global circulation
- Atmospheric electricity
- Space Weather

## MMet Meteorology and Climate with a year in Oklahoma

### Compulsory modules

#### Year One
- Introduction to Meteorology
- Weather and Climate fundamentals
- Skills for environmental science
- Calculus
- Linear Algebra

#### Year Two
- Global quaternary climate change
- Weather forecasting: practice and presentation
- Institution wide language programme
- Atmospheric Chemistry and Transport

#### Year Three sample modules

**Autumn semester:**
- Atmospheric dynamics
- Synoptic meteorology
- Senior seminar
- Advanced dynamics
- Cloud physics
- Atmospheric electrodynamics
- Weather forecasting I

**Spring semester:**
- Mesoscale meteorology
- Radar meteorology
- Weather forecasting II
- Advanced synoptic meteorology
- Climate Dynamics
- Weather briefing
- Mesoscale modelling

### Optional Modules

#### Year One
- Physics of the natural world
- Atomic and nuclear physics
- Global environmental chemistry

#### Year Two
- Global quaternary climate change
- Weather forecasting: practice and presentation
- Institution wide language programme
- Atmospheric Chemistry and Transport

#### Year Three
- Remote sensing methods and applications
- Climate change
- Dynamics of weather systems
- Oceanography
- Atmospheric field course (Arran)
- Numerical weather prediction
- Global circulation
- Atmospheric electricity
- Tropical weather systems
- Numerical modelling of the atmosphere and oceans

#### Year Four
- Remote sensing methods and applications
- Climate change
- Extratropical weather systems
- Oceanography
- Atmospheric field course (Arran)
- Numerical weather prediction
- Global circulation
- Atmospheric electricity
- Tropical weather systems
- Numerical modelling of the atmosphere and oceans
CAREER PROSPECTS

The major employer of meteorologists and climate scientists in the UK is the Met Office, but there is a wide range of employment options following on from a Meteorology degree. Whilst many of our graduates do indeed go onto work for the Met Office, either as weather forecasters or working in research, there are many other potential career paths. The Meteorology Department at Reading is itself the second largest employer of meteorologists in the UK. We have about 80 PhD students spending 3 years working on a research project, and about 180 research staff, so there are many opportunities to develop a research career by staying on at Reading after graduation.

We regard our undergraduate degrees as ideal training for a higher degree followed by a research career and in most years some of our graduates go on to PhD degrees at Reading or elsewhere. Many then obtain research jobs in the Reading Meteorology Department.

The private sector is a growing area of employment for our graduates. Many small companies specialise in providing forecast information to specialised sectors such as the off-shore oil and gas industry, commercial shipping, TV, digital and print media, highways agencies and even the financial markets. Typical of this type of company is Metraweather, the commercial arm of the New Zealand Met Service which has its UK forecasting office on the Reading University campus. EDF Trading, the utility trading arm of EDF Energy is typical of the utilities trading sector and employs several meteorologists. Gas and electricity prices on the open market are very sensitive to the weather forecast and so their forecasters work on the trading floor, advising traders on potential fluctuations in prices that will have a major impact on then profitability of their trades.

A degree in Meteorology and Climate also gives access to a wide range of career choices in environmental and physical sciences and mathematics. Flood modelling, forecasting and control, environmental pollution prediction and monitoring and numerical modelling of fluid systems are all potential career options. Several of our graduates are now working in financial management and accountancy and a number have gone on to careers in the teaching profession.

We actively engage with potential employers of our graduates in a number of ways. Every year we hold a series of seminars given by professional scientists working for a range of employers, many of whom are our former students. We take our final year students to visit the Met Office’s impressive HQ in Exeter where they get to look around the building and hear about the different career opportunities at the Met Office and how best to succeed in applying for forecasting and research jobs there.

STUDYING AT READING

Our magnificent setting is one of the University’s greatest attractions. Our main Whiteknights site is set in 130 hectares of beautiful parkland. This is the heart of University life and provides a special sense of community. With its green open spaces, lakes, rare trees and wildlife it is an exceptional environment in which to study, live and relax.

Visit us

We are home to a diverse and thriving community, which provides a unique and rewarding environment in which to live and study. To appreciate the University of Reading’s distinctive atmosphere and world-class facilities you need to come and look around. You can take advantage of one of the University Open Days or pay us an informal visit.

We invite all prospective students holding offers to visit our department. The day offers a chance to meet lecturers and current students, talk about our programmes and take a close look at our campus and departmental facilities.

We hold Open Days every June, September and October for prospective undergraduate students, their family and friends. For forthcoming dates and details of events visit www.reading.ac.uk/opendays.
“I really enjoyed my time at Reading for many reasons; the campus was all on one site which made everything accessible, the town centre had lots of bars and shops and the degree covered core subjects and contained lots of practicals, making it very varied. The Meteorology building was always a hive of activity and everyone was always willing to help. The course and the campus were second to none.”

Laura Tobin
BSc Meteorology 2000–2003. Former Met Office forecaster and presenter at the BBC Weather Centre, now ITV “Good Morning Britain” weather presenter.