The University of Reading is ranked 2nd in the world for research in meteorology and atmospheric sciences\(^1\) and learning with and from our world-leading faculty will enable you to gain the skills needed to make your own contribution to addressing environmental challenges.

"The opportunity to get involved with research, our excellent staff-student ratio, and 96% overall satisfaction in Meteorology\(^2\) means that our students are well-supported to achieve their potential. We are committed to equality of opportunity for all as shown by our Athena SWAN silver award.

We need talented and enthusiastic people to address some of the scientific problems that are most critical to society, and I hope that you will choose to join us.\(^3\)

Professor Andrew Charlton-Perez
Head of the Department of Meteorology

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\(^1\) Latest Center for World University Rankings by Subject 2017
\(^2\) National Student Survey, amalgamated value from 2016-2020

The Department of Meteorology brings together a gifted community of scientists united by a passion to explore how mathematics and physics may be best applied to better predict weather and climate. We are helping to understand climate change, improving our ability to anticipate extreme weather and developing new tools to forecast space weather.
Awarded the Institute of Physics’ Appleton medal and prize in 2016, Professor Giles Harrison is renowned for his ground-breaking work in the field of atmospheric electricity.

Giles has always been fascinated by natural science, taking every opportunity to learn more about how clouds, wind, rain and storms work. This early enthusiasm for learning and testing out new ideas has remained with him ever since, enabling him to make breakthroughs in research throughout his career.

Giles is currently engaged in pioneering work investigating the response of clouds to natural and artificial quantities of electric charge. This could be used to create more rain in the Middle East – a region dominated by dry desert. Having been awarded a share of $5m USD by the United Arab Emirates’ Rain Enhancement Programme in January 2017, he is leading a team exploring the sensitivity of clouds to these effects, and how to use remotely piloted aircraft as measurement and charge delivery platforms.

His work shows that charge is always present in the atmosphere – not just in thunderstorms – and that this can influence the behaviour of drops and particles in clouds and dust storms. This has applications on this planet and even elsewhere in the solar system.

Giles integrates his research with his teaching wherever possible, from using case studies to illustrate scientific principles to encouraging students to experiment with developing and using meteorological instruments of his own design. He convenes the module “Atmospheric Electricity”, introducing undergraduate students to atmospheric electricity in a global context. His experience and knowledge also feeds in to his undergraduate module “Instrumentation for Environmental Measurements”, where students learn about the nature of sensors and advanced instrumentation used in environmental measurements, and he wrote a master’s level textbook on meteorological measurements and instrumentation.
The 2010 eruption of Iceland’s Eyjafjallajökull volcano closed European airspace and cost the global airline industry an estimated $200 million per day. It also disrupted the journeys of over 10 million passengers.

Dr Helen Dacre worked with the Met Office to analyse some of the data from the event. Helen was already engaged in researching pollution transport by weather systems, using the same model employed by the Met Office for its own operational volcanic ash forecast. The collaboration raised further questions. Can we make good predictions about where ash is going to go? Can we use those predictions to make decisions about where to fly?

Helen’s research initially focused on evaluating the models used to forecast volcanic ash movement. Helen determined just how good these models were at predicting volcanic ash in the right place, at the right time. Once she was convinced that the models could do this, Helen then focused on the more challenging task of reducing airspace closures following a volcanic eruption.

To do this, the models would need to predict the concentration of ash, as well the right place and time.

Helen and colleagues in the Department of Meteorology helped to successfully develop models that predict the dispersal of volcanic ash after eruptions, as well as instrumentation that monitors ash clouds during flight bans. In fact, these procedures are credited with being one of the main reasons why the 2011 Grímsvötn eruption caused much less disruption.

Helen’s research feeds directly into the “Atmospheric chemistry and transport” undergraduate module, where her research on volcanic ash serves as a great visual example of how large-scale pressure systems can affect the movement of pollutants. Helen convenes a master’s-level module “Hazardous weather analysis”, where students use hazardous weather case studies to analyse observational and model data and deepen their understanding of the physical processes leading to weather systems that produce damagingly hazardous conditions.
Despite its relative youth as an area of scientific research, the study of space weather is critically important. Events such as geomagnetic storms, radiation storms and solar flares are listed in the UK Government’s National Risk Register of Civil Emergencies due to the adverse effect they can have on our planet and the space environment surrounding it.

Professor Mathew Owens studies the Sun, specifically the effect it has on humans and technology such as power grids, aircraft and satellites. The Sun’s cycle lasts approximately 11 years, meaning that since detailed measurements have been made we’ve witnessed only four or five of the Sun’s seasons.

The Met Office Space Weather Operations Centre (MOSWOC) currently forecasts space weather in a similar way to how it approaches terrestrial weather: it makes observations and puts them into a computer simulation, which then forecasts forward a few days. However, it’s limited by the relatively small number of observations and our physical understanding of the Sun.

Mathew led a project to produce statistical techniques influenced by the terrestrial weather forecasting method known as “persistence forecasting”. This approach assumes that tomorrow’s weather will be the same as today’s weather. MOSWOC has since adopted these tools in addition to its cutting-edge simulation-based forecasts. This statistical approach is especially robust because it doesn’t rely on satellites and other technology, meaning there is no risk of space weather disrupting the observations.

Mathew convenes the “Physics of the Natural World” undergraduate module, introducing the physics essential to understanding the natural world including classical mechanics, thermodynamics and electromagnetism. He regularly supervises both undergraduate and master’s student dissertations and offers opportunities for students to engage with research.

One of the most successful projects involved MSc Meteorology alumna Rosemary Challen, who worked with Mathew on developing the 27-day persistence model of near-Earth solar wind conditions. The project went on to become a paper in the academic journal Space Weather, and the model is now used by the Met Office in its forecasting activities.
UNDERGRADUATE

BSc METEOROLOGY AND CLIMATE*

MMet METEOROLOGY AND CLIMATE WITH A YEAR IN OKLAHOMA*

BSc MATHEMATICS AND METEOROLOGY**+

* These courses are approved by the Royal Meteorological Society as appropriate academic training for meteorologists seeking the qualifications of Chartered Meteorologist (CMet) or Registered Meteorologist (RMet).

** This programme will meet the educational requirements of the Chartered Mathematician designation, awarded by the Institute of Mathematics and its Applications, when it is followed by subsequent training and experience in employment to obtain equivalent competences to those specified by the Quality Assurance Agency (QAA) for taught masters degrees.
BSc METEOROLOGY & CLIMATE

Explore all aspects of meteorology and climate, from atmospheric science to oceanography. Understanding the science of the atmosphere is a vital tool for dealing with some of the biggest challenges we face, such as climate change, ozone depletion and atmospheric pollution.

Year one modules include:
- Calculus
- Introduction to Meteorology
- Weather and Climate Fundamentals
- Skills for Environmental Science
- Linear Algebra

Year two modules include:
- Atmosphere and Ocean Dynamics
- Atmospheric Physics
- Forecasting: Practice and Presentation
- Quaternary Global Climate Change
- Sustainable Resource Management

Year three modules include:
- Boundary Layer Meteorology
- Research Project
- Atmospheric Science Field Course
- Dynamics of Weather Systems
- Numerical Weather Prediction

Year three modules include (at the University of Oklahoma):
- Fall semester
  - Synoptic Meteorology
  - Cloud Physics
  - Weather Forecasting
- Spring semester
  - Mesoscale Meteorology
  - Radar Meteorology
  - Climate Dynamics

Year four modules include:
- Research Project
- Boundary Layer Meteorology
- Atmospheric Science Field Course
- Numerical Modelling of the Atmosphere and Oceans
- Extratropical Weather Systems

MMet METEOROLOGY & CLIMATE WITH A YEAR IN OKLAHOMA

Explore all aspects of meteorology and climate, before taking the unique chance to study severe weather systems up close. Spend a year abroad to focus on the weather of the US High Plains regions and the methods used to observe and forecast it.
**BSc MATHEMATICS & METEOROLOGY**

Explore the physics of the Earth’s atmosphere and oceans in a mathematical context. Modern weather forecasting and climate prediction rely upon accurate numerical modelling. This degree is ideal if you are considering a career applying mathematical techniques to environmental problems.

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<th>Year one modules include:</th>
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<td>Foundations of Mathematics</td>
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<td>Calculus</td>
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<td>Linear Algebra</td>
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<td>Introduction to Meteorology</td>
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<td>Weather and Climate Fundamentals</td>
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<th>Year two modules include:</th>
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<td>Differential Equations</td>
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<td>Vector Calculus</td>
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<td>Real Analysis</td>
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<td>Atmosphere and Ocean Dynamics</td>
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<td>Atmospheric Physics</td>
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<td>Numerical Methods for Environmental Science</td>
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<th>Year three modules include:</th>
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<td>Climate Change</td>
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<td>Dynamical Systems</td>
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<td>Statistical Mechanics and Applications</td>
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<td>Oceanography</td>
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<td>Atmospheric Electricity</td>
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**IN THE FIELD**

Gain valuable field-work experience and apply what you learn in the classroom and labs to real-world scenarios. The skills you develop during field-work exercises will help you in your own project work, and are highly sought-after by employers.

During your final year, you’ll have the option to attend a field trip; in recent years students have gone to the Isle of Arran, but the location of the field class is subject to change.

Whilst out in the field you will take meteorological measurements – measuring energy fluxes, launching and tracking weather balloons, and preparing and delivering local weather forecasts to staff and fellow students. You’ll also learn a wide range of analytical skills, such as how to read tephigrams and process eddy-covariance data.
PLACEMENTS

UNDERGRADUATE

Enhance your career prospects, apply what you learn during your studies and develop a network of contacts through a work placement*.

You may choose to apply to undertake paid or unpaid placements at companies and organisations within the meteorological, climate and related sectors. You can opt to do a placement during a vacation period, such as over summer, or in between your second and final year by choosing one of our courses with a built-in placement year.

Our dedicated placements team will support you to identify and contact a company or government laboratory working in your chosen scientific area.

In recent years, students within the Department have undertaken placements with organisations such as the Met Office, Pixalytics, Rezatec, Nationwide, and RPS Group.

* Terms and conditions apply; please see inside back cover for details.

CAREERS

UNDERGRADUATE

A degree from the Department of Meteorology will help you to become highly sought-after by employers in a diverse range of industries.

You will have the opportunity to develop vital scientific skills throughout your course, including forecasting, computer modelling and programming, and scientific communication. We also support you to develop transferable skills, including numeracy, problem-solving, teamwork and presentation skills.

Our graduates go on to work in a wide range of areas within the meteorological, climate and related sectors, applying their skills and knowledge in areas such as broadcast meteorology, water resource management, environmental consultancy, energy supply, flood modelling, pollution prediction, and terrestrial and space weather forecasting.

Recent graduates have gone on to work for organisations including the Natural Environment Research Council, the Met Office, the National Centre for Atmospheric Research, and the Environment Agency.

You’ll also be well placed for career opportunities outside the meteorological and climate world, including insurance, finance, power, transport, education, agriculture and health. Recent graduates have gone on to work for organisations including British Energy, Aviva Investors, Kimberly-Clark, Hiscox Ltd, the Health Protection Agency, Deloitte, and Unilever.
MSc ATMOSPHERE, OCEANS AND CLIMATE *

MSc APPLIED METEOROLOGY*

MSc APPLIED METEOROLOGY AND CLIMATE WITH MANAGEMENT

* This course is fully accredited by the Royal Meteorological Society (RMetS) and is your first step towards becoming professionally accredited as either a Registered Meteorologist (RMet) or Chartered Meteorologist (CMet).
MSc ATMOSPHERE, OCEANS & CLIMATE

Gain a deep quantitative understanding of the climate system and build experience in meteorological observation, forecasting, and data interpretation. Develop your understanding of the physical and dynamical building blocks of our climate, and the methods used to construct state-of-the-art models of the climate system.

Compulsory modules include:
- Introduction to Weather Systems
- Atmospheric Physics
- Weather and Climate Discussion
- Professional Skills
- Experiencing the Weather (Dorset field course)
- Dissertation Project
- Fluid Dynamics of the Atmosphere and Oceans
- Introduction to Numerical Modelling
- Numerical Modelling of Atmospheres and Oceans

Optional modules include:
- Climate Change
- Tropical Weather Systems
- Oceanography
- Remote Sensing
- Extra-tropical Weather Systems
- Global Circulation of the Atmosphere and Oceans

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MSc APPLIED METEOROLOGY

Develop expertise in atmospheric physics, forecasting, and meteorological and climate data analysis. You will build a strong foundation in the understanding and interpretation of meteorological and climate data, forecasts and observations.

Compulsory modules include:
- Measurements and Instrumentation
- Introduction to Computing
- Forecasting Systems and Applications
- Introduction to Weather Systems
- Atmospheric Physics
- Weather and Climate Discussion
- Professional Skills
- Experiencing the Weather (Dorset field course)
- Boundary Layer Meteorology
- and Micrometeorology
- Dissertation Project

Optional modules include:
- Statistics for Weather and Climate Science
- Climate Change
- Tropical Weather Systems
- Oceanography
- Hazardous Weather Analysis
- Remote Sensing
- Hydrology and Global Environmental Change
Combine the study of meteorology and climate science with management training with this interdisciplinary course, delivered in collaboration with the triple-accredited Henley Business School. Deepen your understanding of meteorology and climate, and prepare for current – or future – managerial responsibilities.

Compulsory modules include:
- Managing People and Organisations
- Introduction to Computing
- Forecasting Systems and Applications
- Atmospheric Physics
- Weather and Climate Discussion
- Professional Skills
- Experiencing the Weather (Dorset field course)
- Dissertation Project

Optional modules include:
- Preparing for Floods
- Leadership Theory and Practice
- Statistics for Weather and Climate Science
- Climate Change
- Tropical Weather Systems
- Hazardous Weather Analysis
- Remote Sensing
- Hydrology and Global Environmental Change

CAREERS

As a graduate of one of our master’s courses you should be well placed to pursue a scientific career in weather forecasting and meteorological research. According to the Graduate Outcomes Survey 2017/18, 98% of leavers were in work and/or study 15 months after the end of their course; and of those who reported their main activity to be full-time employment, 97% were in graduate level roles.¹

Employers value our postgraduates for their strongly developed skills in numeracy, spatial awareness, quantitative and analytical reasoning skills, practical use of measurements and numerical modelling, and application of first-class scientific and mathematical principles to real-world problems.

Many of our students choose to continue their studies to PhD level at the University of Reading or elsewhere, or pursue research in industry. In recent years, our students have been recruited by organisations including the Met Office, the Environment Agency, Fugro GEOS, Arup, ECMWF, the Ministry of Defence, AIL and RMS. Others pursue careers associated with diverse aspects of environmental measurement, risk management and policy development. Opportunities outside of the meteorological world include careers in insurance, finance, power, utilities, transport, space, education, agriculture and health sectors.

¹First Degree, Postgraduate (Taught) and Postgraduate (Research) responders from Meteorology
“Our subject is an amazing branch of physics and mathematics. It is both fascinating and incredibly important - it is central to our future on this planet.”

Sir Brian Hoskins
Commander of the British Empire,
Fellow of the Royal Society
Disclaimer
This brochure was issued in 2020 and is aimed at prospective undergraduate and master’s students wishing to apply for a place at the University of Reading (the University) and start a course in autumn 2021. The brochure describes in outline the courses and services offered by the Department of Meteorology at the University. The University makes every effort to ensure that the information provided in the brochure is accurate and up-to-date at the time of going to press (September 2020). However, it may be necessary for the University to make some changes to the information presented in the brochure following publication – for example, where it is necessary to reflect changes in practice or theory in an academic subject as a result of emerging research; or if an accrediting body requires certain course content to be added or removed.

To make an informed and up-to-date decision, we recommend that you check www.reading.ac.uk/ready-to-study for up-to-date information. The University undertakes to take all reasonable steps to provide the services (including the courses) described in this brochure. It does not, however, guarantee the provision of such services. Should industrial action or circumstances beyond the control of the University interfere with its ability to provide the services, the University undertakes to use all reasonable steps to minimise any disruption to the services.

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Modules disclaimer
Sample modules are provided as a taster of some of the modules that may be available on this course. The sample modules listed may be compulsory (core) or optional modules. Information is correct at the time of going to press (September 2020) but the University cannot guarantee that a module appearing in this list will definitely run.

For optional modules, the University cannot guarantee that all optional modules will be available to all students who may wish to take them, although the University will try to ensure that students are able to take optional modules in which they have expressed interest at the appropriate time during their course.

Optional modules vary from year to year and entry to them will be at the discretion of the Programme Director.

Some modules are available on more than one course; if you see a sample module under one course and want to know if it is available on another course, contact the relevant department.

Joint courses disclaimer
Our joint courses may have extra requirements, including English language requirements. Please check the individual course pages on our website for further details.

Year abroad and placement fees
Some courses include an optional or compulsory year abroad or placement year. During this year you will only pay a partial fee which is currently set at 15% of the normal tuition fee. Check the website for the latest information:

www.reading.ac.uk/fees-and-funding

Placements disclaimer
Programmes with a Professional Placement Year (also known as ‘Year in Industry’ or ‘Placement Year’) are fully dependent on students securing their own placement opportunity, normally through a competitive recruitment process. The University provides dedicated career and application support for placement year students. Students who do not secure a placement or who are unable to complete the placement year due to extenuating circumstances, have the option to transfer to a three year variant of their programme with agreement from their school/department.