



MONASH  
University

MONASH  
EARTH,  
ATMOSPHERE  
AND ENVIRONMENT

[monash.edu/earth-atmosphere-environment](https://monash.edu/earth-atmosphere-environment)





# EARTH, ATMOSPHERE AND ENVIRONMENT

**Studies in Earth, Atmosphere and Environment encompass the whole Earth system, from the core of the Earth to our planet's atmosphere. If you love science you are invited to apply your passion and study in the School of Earth, Atmosphere and Environment (EAE) at Monash.**

## WHERE WILL YOUR STUDIES TAKE YOU?

Studies in the School of EAE will qualify you for many exciting careers as future leaders in applied or fundamental science, in industry or academia.

Earth and Environmental Scientists earn some of the highest graduate salaries, even higher than Medicine, Law and Economics (source: [www.graduatecareers.com.au](http://www.graduatecareers.com.au)).

## YOUR CAREER NETWORK

We have our eye on your future and we work collaboratively with industry so our students develop an early link with real-world problems.

EAE has links with employers including the Bureau of Meteorology, Melbourne Water, Snowy Hydro, Hydro Tasmania, ESSO, Rio Tinto, Mount Isa Mines, MMG, AusIMM, Navarre Minerals, Agnew Gold, ANSTO, MTEC, Shell International, Geoscience Australia, Victorian Department of Land, Water and Planning, Victorian Department of Jobs, Precincts and Regions, and a number of environmental consultancies, not-for-profits and Co-operative Research Centres.

### Some career options include

- Environmental Scientist
- Weather Forecaster
- Meteorologist
- Policy Analyst
- Science Communicator
- Planetary Scientist
- Volcanologist
- Seismologist
- Exploration Geologist
- Survey Geologist
- Geotechnical Engineer
- Secondary Education
- Policy Advisor
- Palaeontologist
- Soil Scientist
- Groundwater Scientist
- Climate Change Scientist

# WHAT YOU'LL STUDY

The majors offered are Earth Science (consisting of 3 streams), Atmospheric Science and Geographical Science. Earth Science and Geographical Science are also offered as extended majors. There are also many electives to choose from. Environmental and climate units offered by EAE also form part of the Environmental Science extended major managed by the School of Biological Sciences. For further details about the units you will study, as well as the electives available, visit the handbook: [monash.edu/pubs/handbooks](https://monash.edu/pubs/handbooks).

# TO SHAPE OUR WORLD FOR A SUSTAINABLE FUTURE, YOU NEED TO KNOW HOW IT WORKS.

Majors	First year units	Brief description
<b>Earth Science</b>  Geoscience  The Earth's Physical Environment  The Earth's Climate	EAE1011: Earth Atmosphere and Environment 1 EAE1022: Earth Atmosphere and Environment 2 Elective SCI1300	Earth Sciences is a broad discipline that addresses the major processes that have shaped our planet over time and continue to pose natural hazards to society, but also provide resources that we need to sustain a modern society.  In the Geosciences stream, you will learn about geological processes: plate tectonics, basin formation, volcanology, earthquakes, and formation of the critical mineral resources need for our transition to a renewable energy futures. In the Earth's physical environment stream you will learn about the interaction of physical systems with the biosphere (rivers, groundwater, soils, landscapes). In the Earth's climate you will learn how to understand and predict natural and anthropogenic climate change.
<b>Atmospheric Science</b>	EAE1011: Earth Atmosphere and Environment 1 EAE1022: Earth Atmosphere and Environment 2 Elective SCI1300	Atmospheric Science is an interdisciplinary science that draws on the strengths of Environmental Science, Applied Mathematics and Physical Geography. It also applies concepts derived from Physics and Chemistry. Atmospheric Science explains how the weather and climate system works, from a gust of wind to global-scale climate change. Weather and climate are both critical to understanding the natural environment and how it is changing with human influence.
<b>Geographical Science</b>	ATS1310: Extreme Earth! Elective ATS1309: The Global Challenge EAE1022: Earth Atmosphere and Environment 2 Elective SCI1300	Geographical Science is the interdisciplinary study of understanding how natural and human processes affect our planet including soils, vegetation, water, landforms and climate throughout time.  You will learn to analyse and synthesise complex environmental, economic, social and political information to enable a geographical understanding of humans, environments and the planet.

## What you'll study in first year

### EAE1011: Earth Atmosphere and Environment 1

This unit provides an introduction to the science involved in studying the Earth, including explanations of how and why our planet has changed since its formation 4.56 billion years ago. You will study the formation, history and anatomy of the Earth and the processes that drive change within our planet and its environmental systems, from the formation of the core to its crust, to the systems driving and sustaining the planet's living surface to the forces and processes involved in the formation of mountains and oceans, and our changing atmosphere and climate.

### EAE1022: Earth Atmosphere and Environment 2

This unit will expand your knowledge of the environmental, geological and atmospheric processes that create the unique physical environment in which we live, and will demonstrate how these processes influence our lives and affect the society in which we live. You will examine how and why the Earth's surface, atmosphere and vegetation have changed in the past, and are predicted to change in the future, as a result of human influences such as deforestation, agricultural practices and human-induced climate change.

### ATS1310: Extreme Earth!

This unit will focus on the catastrophes of our world today, such as droughts, earthquakes, epidemics, fires, floods, hurricanes, landslides, tsunamis and weather extremes. It seeks to understand the mechanics and dynamics of these environmental phenomena and how they interact with the social contexts in which these disasters occur. We will also investigate the role of international aid and risk management using local and international case studies.

### ATS1309: The Global Challenge (Elective Unit)

What can you do in a world that is challenged by questions of poverty, environmental degradation, social inequality and economic exclusion? Insight is gained into the new and emerging forces of social, economic and environmental change. The unit examines how changing population and migration dynamics, urban development, patterns of consumption and growth, and labour markets intersect at local, national and global scales.

### SCI1300: Climate Change: From Science to Society (Elective Unit)

This unit provides the scientific background to climate change, and assesses the environmental and societal impacts, and community and political responses to climate change. Starting from the basic principles and processes that define and govern the Earth's climate, the unit explores how the different spheres on Earth interact to produce the rich past and current variability of climate in space and time and how human influences are shaping the future of the Earth's climate. The unit investigates what options humankind has to respond to the economic, ethical and political challenges of climate change, including global and national governance models required to mitigate and adapt to its effects. The unit will provide students with the foundation and knowledge to respond to climate change challenges throughout their career, independent of their specific discipline.



# UNIQUE LEARNING SPACES



## **You will be taught in the award-winning Monash Earth Sciences Garden and will utilise the Augmented Reality Monash Rocks App.**

The app will transport you back in time to oceans brimming with now-extinct fauna that existed 410 million years ago. Download now from iTunes. The Monash Earth Sciences Garden is an outdoor teaching space composed of more than 500 rock specimens laid out to form a 'living' geological map of Victoria.

Our state-of-the-art teaching laboratories and practical classes are also complemented by innovative field experiences. Some of the places you can visit include the volcanic plains of western Victoria, the You Yangs, Cape Liptrap, the Otway and Gippsland coasts, Wilsons Promontory and

Lake Eildon in Victoria; and Broken Hill and Bermagui in New South Wales. We also have a field unit based in Italy in the Cinque Terre, Liguria.

As a student, you have the opportunity to accompany senior researchers on fieldwork expeditions, to places including Antarctica and Africa. In addition, you can also take part in student exchange programs with other Universities across North America, UK and Europe.





# APPLY YOUR PASSION FOR ALL SCIENCES

## CHEMISTRY OF THE EARTH

The first chemists were geochemists. Studying geochemistry will give you an understanding of the building blocks of our planet, from minerals to mountains and from our ever-changing environment to the formation of the solar system.

Geochemistry has many applications in industry and scientific research. At EAE we study the chemistry of rocks, sediments, soils and waters so we can expand our understanding of our environment, how and when rocks or ores form, and processes to make use of geo-materials.

## BIOLOGY OF THE EARTH

Combine your love of Biology with Earth Science to understand how life and planets develop together. The biology of the Earth embraces the investigation of all life (animals, plants, microorganisms) and its dynamic ecosystems, from the first record of fossils ~3.7 billion years ago to the present.

By studying the Biology of the Earth, you'll examine how and why ecosystems move and change. You will search for signs of early life in the far reaches of the planet through fossil records, painting a vivid picture of ancient and unfamiliar worlds. You'll also learn how plants and microorganisms can restore damaged and contaminated environments and how life in extreme environments on Earth informs our ongoing search for biology elsewhere in our Solar System.

## PHYSICS OF THE EARTH

Did you know that the Earth behaves as one big magnet?

Have you ever considered that the Earth's resources are a consequence of the interaction between the deep mantle interior of the Earth and the movement of thin plates that form the skin of the Earth? These same plate movements are responsible for many of the natural disasters that affect modern society.

By studying the Physics of the Earth in EAE, you will be able to understand the world you live on and what lies below our feet. You can use your curiosity to become part of one of the great scientific challenges – how we manage our magnificent planet and its natural resources for future generations.

## GEOGRAPHY AND ENVIRONMENT

Physical, chemical and biological processes have worked together to make the surface of our planet what it is today. But how do these landscapes form and how and why do they change? You can find out by studying Geographical Science.

You'll learn about the processes that form characteristic climates, move water and influence water quality, impact soil fertility which affects how we grow food, restore forests after a fire and use advanced spatial mapping tools to identify these changes.

You'll also discover how we can use this knowledge to understand human interactions with the land, water and atmosphere and how we can best manage Earth's precious resources.

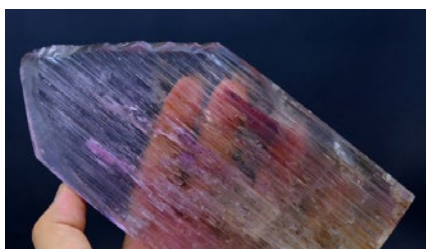
## PHYSICS OF THE ATMOSPHERE

Ever wondered why we can make accurate weather forecasts? Do you want to know how a tornado works? What does the science really say about human-induced climate change?

The answers lie in physics, and every day you are witnessing it in action in our atmosphere! By studying with EAE, you will be able to understand how the atmosphere works to make our weather and climate. You will learn the skills to do anything from weather forecasting, to untangling the intricacies of climate science for decision making in an era of human-induced climate change.



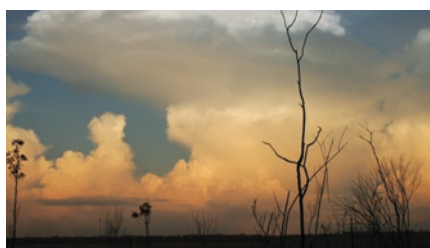
NATURAL HAZARDS



SUSTAINABLE RESOURCES



PRESERVING ECOLOGY



WEATHER PREDICTION



WATER AND FOOD SUPPLIES



CLIMATE CHANGE



# RESEARCH SNAPSHOT

**The School of Earth, Atmosphere and Environment has an extensive and highly successful research program with research strengths in Atmosphere and Climate, Geography and Environment and Geoscience. You can become part of our vibrant research community and undertake an Honours, Masters or PhD, being mentored by some of Australia's best scientists.**

## MASTERS

**The School of Earth, Atmosphere and Environment provides opportunities for you to pursue a Master's degree.**

### MASTER OF SCIENCE IN EARTH SCIENCE

The Master of Science in Earth Science is an innovative, interdisciplinary two-year course that will equip students for a career in resource exploration or environmental earth science. Students can specialise in applied geoscience, remote sensing and spatial data science, or environmental earth science. Graduates gain skills in data analytics, advanced 3D geological modelling, remote sensing, spatial data science, GIS, drones and sensors. Training in these areas will be enhanced by the cutting-edge facilities and equipment available at Monash including the Cave II immersive visualisation facility, state-of-the-art geochemical and materials analytical laboratories, drones and sensors.

For more information visit:

**[www.monash.edu/science/future-students/graduate-options/master-of-science-in-earth-science](http://www.monash.edu/science/future-students/graduate-options/master-of-science-in-earth-science)**

### MASTER OF SCIENCE IN ATMOSPHERIC SCIENCE

The Master of Science in Atmospheric Science is a two-year course designed to give students the knowledge and skills necessary for a professional career in weather and climate science. Students can select units in statistics for climate dynamics, dynamical meteorology, the general circulation, atmospheric modelling, atmospheric boundary layers and ocean circulation and dynamics as well as undertaking research projects in theoretical, computational or observation-based atmospheric science.

For more information visit:

**[www.monash.edu/science/future-students/graduate-options/master-of-science-in-atmospheric-science](http://www.monash.edu/science/future-students/graduate-options/master-of-science-in-atmospheric-science)**

**You can also use these Masters as a springboard to a PhD.**

## GEOSCIENCE

Geoscientists study how the Earth formed and evolved over its 4.6 billion year history to shape the continents and oceans with volcanoes and plate tectonics.

## GEOGRAPHY AND ENVIRONMENT

Geography and Environment research includes water resources, and human impacts on the environment, climate, soils, protecting living landscapes, environmental change, GIS and remote sensing.

## ATMOSPHERE AND CLIMATE

Atmosphere and Climate focuses on weather climate and oceans. You can research clouds, climate change, bushfires, oceans, tornadoes, cyclones and the physics and maths driving weather and climate.



“My PhD project can help to determine how climate change will affect Melbourne and its residents and how dangerous future heatwaves will be.”

STEPHANIE JACOBS



## **PROJECT: REDUCING URBAN HEAT DURING HEATWAVES TO CREATE A MORE COMFORTABLE CITY**

**PHD CANDIDATE: STEPHANIE JACOBS**

I study urban climate, climate change and their impacts on human health. More specifically, I research how to cool cities during heatwaves by painting roofs white to reflect away sunlight and planting gardens to create a more comfortable urban environment.

I do this by using a supercomputer to model the current and future climate of Melbourne. This gives me an idea of how climate change will affect Melbourne and its residents and how dangerous future heatwaves will be. My dream job would be to work at the Bureau of Meteorology as a climate scientist or as a climate change consultant.



“My research has allowed me to conduct meaningful research across different aspects of the environment, providing me with the opportunity to explore Victoria’s coastline whilst also completing my studies.”

MATTHEW PECK

I study how climate change and natural disturbance affects Victoria’s coastline. My research investigates how changes to these ecosystems may affect the benefits they provide, including the storage of greenhouse gases, water availability and movement, and protection to human infrastructure. I look at how change is likely to occur within these environments, what affects this change, and at what rate this change is occurring.

I investigate these disturbance features through both field and laboratory work. For example, one aspect of my work allows me to utilise our world-class drone platform; where I am able to investigate coastal subsidence down to the millimetre scale across large wetland areas.

My research has enabled me to develop wide range of employability skills, preparing me for life after University.


Through this work I aim to improve our understanding as a society of the importance and fragile nature of coastal wetland ecosystems in Victoria. This will allow us to develop our knowledge base of how these systems shift with a changing climate, improving our understanding of what Victoria’s coastline may look like in the future.



## Further information

[monash.edu/earth-atmosphere-environment](https://monash.edu/earth-atmosphere-environment)

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The information in this brochure was correct at the time of publication (July 2020).  
Monash University reserves the right to alter this information should the need arise.  
You should always check with the relevant faculty office when considering a course.

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