



Study Guide to the Specialisation

Global Climate Change and Ecosystems

(MSc Global Change Ecology)

April 2026

Scientific and societal challenge

The increase in global temperature has manifold consequences within the climate system and other systems. One challenge is understanding the different spatio-temporal temperature changes and how they affect other climate parameters, especially rainfall patterns and evapotranspiration. These changes extend from local to global scales. Climate change and interlinked changes in land use impact ecosystems, soils, agroecosystems, hydrological systems, and urban spaces. Societies must adapt to these changes and mitigate them as much as possible. Therefore, an interdisciplinary approach is required.

Learning objectives

The module aims to improve your understanding of climate change, its impact on natural and human systems, and the interlinkages between these systems and societies. A key focus is the spatio-temporal scales of processes and patterns, from global to local.

Required knowledge

- Basic understanding of the climate system and its processes
- Basic understanding of ecosystem structures and functions

Competences

- Understanding climate change, the causes and processes
- Analysing and interpreting how climate changes are impacting systems from field data and modelling approaches
- Understanding of the interdisciplinary nexus of the different systems

Content of specialisation (theories & concepts)

The modules enable you to understand the connections between climate change and other systems at a theoretical level, as well as recognise the importance of extreme events and natural hazards. Although all modules are interconnected, you can focus more on either atmospheric systems, including microclimates, or ecosystems. Here, modules on agroecosystems, hydrological systems, and soil systems can be chosen.

Area Module	ECTS Final Grade	Teaching by...
T&C Theories & Concepts		
A Global Climate Change and Ecosystems (Environmental Change)		
Climate Change	5 yes	Physical Geography, University of Augsburg
Ecological Climatology	5 yes	Climatology, UBT
Extreme Events and Natural Hazards	5 yes	Disturbance Ecology, UBT; Physical Geography, University of Augsburg
Changes in Agroecosystems	5 yes	Soil Physics UBT, Agroecology UBT
Land Use Change and Microclimate	5 yes	Micrometeorology, UBT; Atmospheric Chemistry, UBT
Soils and Climate Change	5 yes	Soil Ecology, UBT
Changes in Hydrological Systems	5 yes	Hydrology, UBT

Related method courses

In most modules methods are a part of the teaching content. Additionally, method courses on statistical analyses, modelling, lab courses, GIS and remote sensing are recommended (see study guide on methods). Method modules primarily focusing on climate change are listed below:

M Methods		
Statistics, Data Sciences and Artificial Intelligence		
Advanced Multivariate Statistical Methods in Climate Research	3	Physical Geography, University of Augsburg
Environmental Models and Simulation		
Climate Data Modelling	3	Climatology, UBT
Mathematical Modeling for Climate and Environment	8	Scientific Computing, UBT

Related science schools and field camps / excursions

All offered Field Survey/Experiment and Science Schools/Field Camps are suitable for gaining in-depth knowledge and understanding of practical field work. The different modules should be selected according to your own interests and should lead to a master thesis in the respected field. Specifically related to the specialisation is the summer school in micrometeorology.

I & S Internships & International Science Schools		
S International Science Schools / Field Camps		
Experimental Micrometeorology	5	Micrometeorology, UBT

Participating chairs at UBT

A wide range of chairs at Geosciences, UBT are teaching in this specialisation.

Participating external lecturers

Climatology, University of Augsburg

Link to other specialisations

This specialisation links to the *Biodiversity and Ecosystem Functions* specialisation because it provides an understanding of biophysical processes of climate change, which, along with land use, is an important stressor for biodiversity and ecosystem services. The social, political and economic systems' responses to global ecological changes are addressed in the *Global Policies, Economies, Civil Society and Environment* specialisation. This provides insight into the causes and consequences of climate change in biophysical spheres, as well as the necessary consequences for societies.

Career opportunities

Many NOGs, government institutions, and consultancies offer job in the context of climate change, its links to systems, and adaptation to and mitigation of the changes

Contact persons and further information

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GCE Webpage: <https://www.bayceer.uni-bayreuth.de/gce>

GCE Blog: <https://globalchangeecology.com>

Instagram: <https://www.instagram.com/gcebayreuth>