

## Basic Knowledge Course

### Physics of the Climate System

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*MARUM – Center for Marine Environmental Sciences, University of Bremen*

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#### Objectives

The Earth is a rotating planetary object that is covered by oceans and an atmosphere. At the same time, the Earth constantly receives short-wave radiation from the Sun. These two processes alone imply a whole series of physical mechanisms that have important effects on our climate system. For example, clouds or ice surfaces reflect sunlight, whereas air above dark land heats up quickly. Also, the uneven distribution of solar energy and the rotation of the Earth set fluids -i.e. the atmosphere and oceans- in motion, which generates heat transport and therefore influences the climate.

During this course, we will discuss the most important laws of physics that affect Earth's climate system. More specifically, this course will focus on atmospheric processes: the Earth's radiation balance, the greenhouse effect, energy transport in the atmosphere, and large-scale atmospheric circulation on Earth. Special emphasis will be on timescales of variability in the climate system, as one needs to combine the fundamental physics taught during this course with the correct time-scales of variability to correctly understand the current global warming and climate change.

The general aim of the course is to provide a basic understanding of the most important physical processes in Earth's climate system. The course will be composed of one theory session and one practical session.

#### Topics

Day 1:

- Earth's radiation balance and the greenhouse effect
- General atmospheric circulation: latitudinal and longitudinal circulation features

Day 2:

- Practical in relation to the Earth's radiation balance.

#### Methods

Theory and practical. Participants can choose to solve the problem at hand in MATLAB or in R.

#### Target Group

Everyone who is interested in the topic

Prior knowledge in MATLAB or R is beneficial for the practical.

### Location and Time

MARUM, University of Bremen, Leobener Str. 8, 28359 Bremen, Germany  
MARUM I (main) building, room 0190

09.00 – 12.30 hrs.

### Registration

To register for this course, please visit the [course webpage](#).

*Please note that your registration will be binding.*

The registration deadline for this course is **18 November 2018**.

Any enquiries regarding the course should be addressed to [early-career@marum.de](mailto:early-career@marum.de).