Level: bachelor

Course title: Modelling of physical processes in the atmosphere I

Status: elective

ECTS: 6

Requirements: none

Learning objectives

Students get knowledge about modelling and parameterization of surface processes. Main aim of this course is to inform student about basic equations of atmospheric boundary layer, schemes for parameterization of surface processes, dry and wet convective adjustment and modelling of atmospheric radiation. After graduation, one is well-educated expert prepared for practical work, with high level of understanding of the essentials of atmospheric physics and capable to follow state of art in the field.

Learning outcomes

Ability to understand and analyze processes in the Earth-atmosphere system and competence for current problems in modelling atmospheric processes. Ability to use known solutions in new problems and to use atmospheric and climate change models. Students become qualified to work in various scientific institutes, agricultural institutes and institutes for monitoring and environmental protection. They become able for independent work and further improvements.

Syllabus

Modelling of surface processes. Vertical transport of water in soil. Equation for Fick's diffusion. Darcy's law. Parameterization of water potential and water properties of soil in the schema for the interaction of soil and atmosphere. Parameterization of the horizontal and surface outflow. Methods of treatment of moisture transport. Transport of water within the plant canopy. Resistance representation.

Parameterization schemes for surface processes. The basic classification. Parameterization of the processes within the vegetation and bare soil, and above the bare soil. Parameterization of hydrology in different schemes. Implementation of surface schemes in atmospheric, hydrological models and models for environmental protection.

The basic equations of atmospheric boundary layer. The coefficient of roughness. The surface fluxes based on the theory of similarity. Height of the atmospheric boundary layer in an unstable atmosphere. Height of boundary layer in a stable atmosphere.

Weekly teaching load				Other:
Lectures: 3	Exercises: 3	Other forms of teaching:	Student research:	