

Level: master				
Course title: Modelling of global changes				
Status: elective				
ECTS: 9				
Requirements: none				
Learning objectives Synthesis of knowledge achieved in the frame of expertise courses from meteorology and its applications on modelling of global climate changes. Developing the interests for contemporary problems of global warming, especially anthropogenic influence on global climate changes, as well as modes to prevent them.				
Learning outcomes After taking the course, students should have developed: General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects. Subject-specific abilities: getting familiar with the basic factors which influence global climate changes and the simplest climate models. Applying methods and techniques adopted in the frame of the course for modelling global changes.				
Syllabus <i>Theoretical instruction</i> Global changes of environment. Changes of environment caused by global changes of the climate: indicators of changes and its reliability. Possible courses of global changes. Modelling of global changes. Short-term and long-term consequences of changes. Changes of climate as global problem: multilateral international actions. (4) Climate changes. Astronomical factors of climate changes. Geological factors of climate changes. Anthropological factors of climate changes. Numerical modelling of climate changes. Climate changes and society. (4) Circulation on the Earth. Ocean circulations. Structure and stratification of ocean. Atmospheric circulations. Classification of atmospheric circulations. Heat balance of land and ocean (El Nino). Numerical modelling and simulation of circulations. (5) Climate changes in 20th century. Changes in the temperature and variables connected to it. Changes in the precipitation and variables connected to it. Changes in atmosphere-ocean circulations. Changes in extreme climate events. Regional climate changes. Changes in the sea level. Climate changes in 21st century. (6) Gas layer of the Earth (atmosphere). Composition of atmosphere. Cycles of certain gases in the atmosphere. Water steam in the atmosphere. Energy balance in the atmosphere. Energy balance of system Earth-atmosphere. Energy balance in the layer of air next to Earth surface. (4) Process of interaction and its modelling. Interaction of the Sun and the Earth. Interaction of land and atmosphere. Interaction of ocean and land. Interaction of living world and geological processes. Mathematical formalism and review of models of different interactions. Theory of chaos in the theory of global changes. (7) <i>Practical instruction</i> Working at computer: getting familiar with the MAGICC program; Problem solving sessions and seminars.				
Weekly teaching load				Other:
Lectures: 3	Exercises: 1	Other forms of teaching: 1	Student research:	