UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU

Extreme weather hazards

Educational subject description sheet

Basic information

Study programme Geohazards and Climate Change **Speciality** - **Organizational unit** Faculty of Geographical and Geological Sciences **Study level** Second-cycle programme **Study form** Full-time **Education profile** General academic	**Didactic cycle** 2023/24 **Subject code** 07GCCS.28P.02892.23 **Lecture languages** English **Course type** Elective **Block** Basic subjects

Subject coordinator	Mateusz Taszarek
Lecturer	Mateusz Taszarek

Period	**Activities and hours**	**Number of ECTS points**
Semester 4	• Lecture: 15, Graded credit	2

Goals

Code	Goal
C1	Providing basic knowledge at the university level in the field of atmospheric sciences involving better understanding of synoptic and mesoscale physical processes leading to development of extreme weather hazards.
C2	Developing abilities to properly interpret, process and understand meteorological and climatological data, including the use of numerical weather prediction models, ground-based and radiosonde observations, and remote sensing data.

Entry requirements

Basic knowledge from geography, meteorology, climatology and physics is required.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	knows and understands the natural processes occurring in the natural environment, their causes, mechanisms and effects as well as geohazards associated with them;	GCC_K2_W01	Test
W2	knows and understands the functioning of the climate and the mechanisms of atmospheric phenomena and the impact of anthropogenic activity on their formation;	GCC_K2_W02	Test
W3	knows and understands to an in-depth degree the student understands and is able to characterize climatic variability in different time scales (annual, ten-year, hundred-year, thousand-year) and their causes;	GCC_K2_W06	Test, Essay
W4	knows and understands the impact of climate change, extreme phenomena and geohazards on socio-economic phenomena and processes to an in-depth degree;	GCC_K2_W08	Test
W5	knows and understands to an in-depth degree the relationship between climate and environmental changes and the need to develop adaptation strategies;	GCC_K2_W09	Test
W6	knows and understands the advanced conceptual apparatus regarding climate change, natural environment and geohazards;	GCC_K2_W15	Test
W7	knows and understands to an in-depth degree the literature concerning the studied field and the basic literature of specific sciences (natural or social) related to this field of study;	GCC_K2_W17	Essay
W8	knows and understands to an in-depth degree the latest trends in the development of scientific research in the world and the application of scientific achievements in practice in the field of study.	GCC_K2_W18	Essay
Skills – Student:			
U1	differentiates the natural and anthropogenic causes of climate change and the resulting changes in the natural environment and geohazards;	GCC_K2_U01	Test
U2	critically assesses future scenarios of climate change and related changes in the natural environment and geohazards;	GCC_K2_U02	Essay
U3	uses specialized terminology in English to an extended degree and reads advanced scientific publications with understanding;	GCC_K2_U05	Test, Essay
U4	finds and selects the necessary information from professional literature and other sources in English;	GCC_K2_U07	Essay

Code	Outcomes in terms of	Learning outcomes	Examination methods
U5	applies in practice the principles of environmental management to improve the quality of human life;	GCC_K2_U13	Test
U6	describes in depth the components of the geographical environment and the interdependencies between them;	GCC_K2_U14	Test
U7	cooperates in crisis planning teams and resolve conflict situations.	GCC_K2_U16, GCC_K2_U17	Essay
Social competences – Student:			
K1	is ready to recognize the impact of natural phenomena (including extreme ones) on the socio-economic sphere, as well as anthropogenic activity on various components of the natural environment in various time and spatial scales;	GCC_K2_K02	Essay
K2	is ready to think and act creatively;	GCC_K2_K06	Test, Essay

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Introduction to extreme weather hazards (definitions, data sources).	W1, W2, U3, U4, K1	Lecture
2.	Discussion of the basic processes and laws concerning the development of extreme weather hazards in the synoptic and mesoscale.	W2, W3, U1, U3, U6, K1	Lecture
3.	The influence of the vertical profile of wind, humidity and temperature on the occurrence of convective hazards.	W3, W4, W6, U3, U6, K2	Lecture
4.	Methods of forecasting and monitoring extreme weather hazards.	W5, W6, W8, U3, U4, U5, K2	Lecture
5.	Climatological aspects of extreme weather hazards and their relationship to climate change.	W3, W5, W6, U1, U2, K1	Lecture
6.	Methods of literature review and proper interpretation of research results. Evaluation of available data sources used in the study of climate trends of extreme phenomena and discussion of their advantages and disadvantages.	W6, W7, W8, U4, U5, U7, K2	Lecture

Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues, Conversation lecture, Case study, Solving tasks (e.g. computational, artistic, practical), Research method (scientific inquiry), Work in groups

Activities	Credit conditions
Lecture	Passing a final test with score of at least 60% and writting an essay. Final grade consists of 50% of test results and 50% of essay evaluation. Grading scale of test and essay: 1. very good (5.0) - from 90% of points, 2. good plus (4.5) - from 80% of points, 3. good (4.0) - from 70% of points, 4. sufficient plus (3.5) - from 60% of points, 5. satisfactory (3.0) - from 50% of points, 6. unsatisfactory (2.0) - below 50% of points.

Literature

Obligatory

1. Markowski P. and Richardson Y., - Mesoscale meteorology in midlatitudes. John Wiley & Sons.

Optional

1. Holton, J. R. - An introduction to dynamic meteorology. American Journal of Physics.
2. Glickman T. S. - Glossary of Meteorology. American Meteorological Society.
3. Schultz D.M. - Eloquent Science: A Practical Guide to Becoming a Better Writer, Speaker and Scientist. American Meteorological Society
4. Lackmann G., - Midlatitude Synoptic Meteorology: Dynamics, Analysis, and Forecasting. American Meteorological Society.

Calculation of ECTS points

Activities	Activity hours*
Lecture	15
Reading the indicated literature	10
Preparation for the assessment	25
Semester paper preparation	10
Student workload	**Hours** 60
Number of ECTS points	**ECTS** 2

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_K02	The graduate is ready to identify the influence of environmental processes onto the socio-economic processes, and also influence of anthropogenic activities onto the various components of the natural environment in various timescales
GCC_K2_K06	The graduate is ready to think and act creatively
GCC_K2_U01	The graduate can vary between natural and anthropogenic causes of climate change and associated environmental changes and geohazards
GCC_K2_U02	The graduate can critically assess future climate change scenarios and associated environmental changes and geohazards
GCC_K2_U05	The graduate can an extended degree use the scientific terminology and vocabulary, read the advanced scientific literature with understanding
GCC_K2_U07	The graduate can look for and select the necessary information from the scientific literature and other written sources and based on that learm and continuously update the knowledge throughout the life
GCC_K2_U13	The graduate can use in practice the environmental management principles leading to improvement of quality of life
GCC_K2_U14	The graduate can describe in extended degree environmental components and their relationships
GCC_K2_U16	The graduate can transparently and accessibly present the Earth and environmental sciences topics
GCC_K2_U17	The graduate can cooperate in the team, efficiently plan the work for her/himself and the research/task team
GCC_K2_W01	The graduate knows and understands thoroughly, the processes operating in the natural environment, their causes, mechanisms, consequences and associated geohazards
GCC_K2_W02	The graduate knows and understands thoroughly, climate functioning and mechanisms of atmospheric processes and the anthropogenic influence on the climate
GCC_K2_W06	The graduate knows and understands thoroughly climatic changeability in various time-scales (yearly, decadal, centennial and millennial) and its causes
GCC_K2_W08	The graduate knows and understands thoroughly, the influence of the climate change, extreme environmental events and geohazards on the socio-economic processes
GCC_K2_W09	The graduate knows and understands thoroughly, relationship between climate and environmental change and necessity of formulation of the adaptation strategies
GCC_K2_W15	The graduate knows and understands advanced vocabulary associated with climate change, natural environment and geohazards
GCC_K2_W17	The graduate knows and understands thoroughly, the literature in the field of climate change, geohazards as well as basic environmental and social research
GCC_K2_W18	The graduate knows and understands thoroughly, the most up to date trends in science and implementation of the newest scientific achievements in studies field