UNIWERSYTET IM. ADAMA MICKIEWICZA W POZNANIU

Extreme hydrological phenomena

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.24P.02883.23 **Lecture languages** English **Course type** Elective **Block** Basic subjects

Subject coordinator	Leszek Sobkowiak
Lecturer	Leszek Sobkowiak

Period	**Activities and hours**	**Number of ECTS points**
Semester 3	• Lecture: 15, Graded credit	2

Goals

Code	Goal
C1	Familiarizing the student with the knowledge on extreme hydrological phenomena, and the influence of the natural environment of various geographical zones on shaping these phenomena on various scales.
C2	Developing the ability to assess the importance of natural conditions and human activity on the basin and global scales on the course of extreme hydrological phenomena, with special regard to droughts and floods.
C3	Developing the ability to properly interpret the causes and effects of extreme hydrological phenomena.
C4	Developing the ability to apply suitable methods of analysis and assessment of extreme hydrological phenomena, their course and magnitude.
C5	Developing the ability to choose the most suitable adaptation strategies in mitigation of the consequences of extreme hydrological phenomena.

Entry requirements

Proven knowledge and skills in the field of hydrology and water management, climatology, applied hydrology and hydrological processes in the catchment.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge – Student:			
W1	understands the influence of the natural environment and human activities on the development of extreme hydrological phenomena (droughts and floods) on different scales;	GCC_K2_W01, GCC_K2_W04	Written colloquium
W2	understands an increasing role of extreme hydrological phenomena in shaping the directions of socio-economic development;	GCC_K2_W05, GCC_K2_W08	Written colloquium
W3	understands the importance of adaptation strategies in mitigation of the consequences of extreme hydrological phenomena on different scales;	GCC_K2_W09	Written colloquium
W4	knows the latest scientific achievements related to the course of extreme hydrological phenomena and methods of their control.	GCC_K2_W15, GCC_K2_W17, GCC_K2_W18	Written colloquium
Skills – Student:			
U1	analyzes and interprets the causes and course of extreme hydrological phenomena and predicts their effects based on the obtained knowledge in the field of natural and socio-economic sciences;	GCC_K2_U05, GCC_K2_U07	Written colloquium
U2	proposes solutions of mitigating the impacts of extreme hydrological phenomena on the socio-economic development;	GCC_K2_U12, GCC_K2_U13	Written colloquium
U3	determines the importance of the physico-geographical features of the catchment, climate change and human activity in shaping the spatio-temporal differentiation of extreme hydrological phenomena in different geographical zones.	GCC_K2_U14	Written colloquium
Social competences – Student:			

Code	Outcomes in terms of	Learning outcomes	Examination methods
K1	is prepared to engage in science communication, teaching and popularization the knowledge on extreme hydrological phenomena;	GCC_K2_K01, GCC_K2_K02	Written colloquium
K2	is prepared to find solutions aiming to mitigate the impacts of extreme hydrological phenomena on the socio-economic development.	GCC_K2_K05, GCC_K2_K07	Written colloquium

Study content

No.	Course content	Subject learning outcomes	Activities
1.	Introduction to extreme hydrological phenomena: research subject and tasks.	W1, W4	Lecture
2.	Analysis of the impact of natural conditions and human activity on extreme hydrological phenomena.	W1, U1, U3	Lecture
3.	Extreme hydrological phenomena from the Polish perspective - threats, impacts and solutions.	W2, W3, U1, U2, K2	Lecture
4.	The predicted directions of development of extreme hydrological phenomena in the light of latest scientific achievements.	W1, W4, U1, K1, K2	Lecture

Additional information

Activities	Teaching and learning methods and activities
Lecture	Lecture with a multimedia presentation of selected issues

Activities	Credit conditions
Lecture	The final grade consists of the result obtained in the written colloquium. Grading scale: 1. very good (bdb; 5.0) - >90% of points, 2. good plus (db plus; 4.5) - >80% of points, 3. good (db; 4.0) - >70% of points, 4. sufficient plus (dst plus; 3.5) - >60% of points, 5. satisfactory (dst; 3.0) - >50% of points, 6. unsatisfactory (ndst; 2.0) - <50% of points.

Literature

Obligatory

1. Hare F.K., 1993. Climate variations, drought and desertification (WMO-No. 653). World Meteorological Organization. ISBN 92-63-12653-4.
2. IPCC, 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Cambridge University Press. Cambridge University Press, Cambridge-New York.
3. Menne B., Murray V. (eds.), 2013. Floods in the WHO European Region: health effects and their prevention. World Health Organization, Regional Office for Europe.
4. O'Connor J.E., Grant G.E., Costa J.E., 2002. The Geology and Geography of Floods. Water Science and Application, 5: 359-385.
5. Zhao L.L., Xia J., Sobkowiak L., Wang Z.G., Guo F.R., 2012. Spatial Pattern Characterization and Multivariate Hydrological Frequency Analysis of Extreme Precipitation in the Pearl River Basin, China. Water Resources Management, 26: 3619-3637.

Optional

1. Environment Agency, 2009. Flooding in England: A National Assessment of Flood Risk.
2. Mazzoleni, M.,Odongo V.O., Mondino E., Di Baldassarre G. 2021. Water management, hydrological extremes, and society: modeling interactions and phenomena. Ecology and Society, 26(4):4.
3. Prokurat S., 2015. Drought and Water Shortages in Asia as a Threat and Economic Problem. Journal of Modern Science, 3(26), 235–250.

Calculation of ECTS points

Activities	**Activity hours***
Lecture	15
Reading the indicated literature	15
Preparation for the assessment	20
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* academic hour = 45 minutes

Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_K01	The graduate is ready to implement and popularize actions serving the environmental protection
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_K05	The graduate is ready to prioritize in order to successfully complete of the task
GCC_K2_K07	The graduate is ready to undertake the cooperation within the crisis management teams and solve the conflicts
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_U12	The graduate can apply qualitative methods for solving the human-environment conflicts
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_W01	The graduate knows and understands thoroughly, the processes operating in the natural environment, their causes, mechanisms, consequences and associated geohazards
GCC_K2_W04	The graduate knows and understands thoroughly, the role of surface and ground water in the natural environment and the anthropogenic influence on their functioning
GCC_K2_W05	The graduate knows and understands thoroughly, the causes and the evolution of extreme hydro-meteorological events in global, regional and local scale and their influence on the socio-economical processes
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