

Extreme events in changing climate - study of compound events 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		Didactic cycle 2023/24 Subject code 07GCCS.24P.02855.23 Lecture languages English Course type Elective	
Study form Full-time Education profile General academic		Block Basic subjects	
Subject coordinator	Karolina Leszczyńska		
Lecturer	Karolina Leszczyńska		
Period Semester 3	Activities and hours • Lecture: 15, Graded credit		Number of ECTS points 2

Goals

Code	Goal
C1	The aim of the course is to present with the most current goehazards associated with the occurrence of compound events caused by extreme weather and hydrological events.
C2	Students will be presented with the most recent case-study of the compound events and their influence on the socio-economic sphere of the societies influenced by these phenomena.

Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
Knowledge - Student:			
W1	knows what is the compound events, what is their characteristics and how are they unique and different from extreme weather and hydrological events;	GCC_K2_W01, GCC_K2_W04, GCC_K2_W05, GCC_K2_W08, GCC_K2_W15, GCC_K2_W17, GCC_K2_W18	Essay
W2	knows the most up to date examples of case studies of compound meteorological and hydrological events.	GCC_K2_W04, GCC_K2_W17, GCC_K2_W18	Essay
Skills - Student:			
U1	differentiates between extreme weather and hydrological conditions and compound events;	GCC_K2_U01, GCC_K2_U14	Essay
U2	identifies the devastating influence of the compound events on the local environment and the society;	GCC_K2_U13, GCC_K2_U14	Essay
U3	identifies the most suitable methods of mitigation of the effects of compound events on the environment and society based on the most up to date case studies.	GCC_K2_U13, GCC_K2_U14	Essay
Social competences - Student:			
К1	is prepared to communicate what are the biggest challenges associated with mitigation of the influence of the compound events on the local society.	GCC_K2_K02, GCC_K2_K03, GCC_K2_K05, GCC_K2_K06, GCC_K2_K07	Essay

Study content

No.	Course content	Subject learning outcomes	Activities
1.	What is the compound events and how it differs from weather and hydrological event? What is unique and characteristic for compound event?	W1, U1	Lecture
2.	Examples of most recent devastating compound events and their influence on environment and local society.	W2, U2	Lecture
3.	The most up to date trends in mitigation of the consequences of compound events and methods of preparation of local society for their devastating influence on the local environment and socio-economic situation of the area.	W2, U2, U3, K1	Lecture

Additional information

Activities	Teaching and learning methods and activities	
Lecture	Lecture with a multimedia presentation of selected issues, Problem-based lecture	

Activities	Credit conditions
Lecture	The final grade is the result obtained from the assessment of the essay written by the student (100% of the assessment). Grading scale: 1 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. Zscheischler, J.: The emergence of compound event analysis as a new research frontier, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-7784, https://doi.org/10.5194/egusphere-egu22-7784, 2022
- 2. Zscheischler, J., Westra, S., van den Hurk, B.J.J.M. et al. 2018. Future climate risk from compound events. Nature Clim Change 8, 469–477
- Leonard, M., Westra, S., Phatak, A., Lambert, M., van den Hurk, B., McInnes, K., Risbey, J., Schuster, S., Jakob, D., Stafford-Smith, M. 2013. A compound event framework for understanding extreme impacts. Wires Climate Change, 5, 113-128
- 4. Zscheischler, J., and F. Lehner, 2022: Attributing Compound Events to Anthropogenic Climate Change. Bull. Amer. Meteor. Soc., 103, E936–E953, https://doi.org/10.1175/BAMS-D-21-0116.1.
- 5. Ridder, N.N., Ukkola, A.M., Pitman, A.J. et al. Increased occurrence of high impact compound events under climate change. npj Clim Atmos Sci 5, 3 (2022). https://doi.org/10.1038/s41612-021-00224-4
- 6. Zscheischler, J., Martius, O., Westra, S. et al. A typology of compound weather and climate events. Nat Rev Earth Environ 1, 333–347 (2020). https://doi.org/10.1038/s43017-020-0060-z

Optional

 Ribeiro, A. F. S., Brando, P.M., Santos, L., Rattis, L., Hirschi, M., Hauser, M., Seneviratne, S. I. and Zscheischler, J. A compound event-oriented framework to tropical fire risk assessment in a changing climate. Environ. Res. Lett. 17 065015 DOI 10.1088/1748-9326/ac7342

Calculation	of ECTS	points
-------------	---------	--------

Activities	Activity hours*
Lecture	15
Reading the indicated literature	20
Other	20
Student workload	Hours 55
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_K03	The graduate is ready to communicate, discuss and argue burning issues, hazards and problems associated with the climate, climate and environment changes for wider, non-scientific audience
GCC_K2_K05	The graduate is ready to prioritize in order to successfully complete of the task
GCC_K2_K06	The graduate is ready to think and act creatively
GCC_K2_K07	The graduate is ready to undertake the cooperation within the crisis management teams and solve the conflicts
GCC_K2_U01	The graduate can vary between natural and anthropogenic causes of climate change and associated environmental changes and geohazards
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_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