



## Methods of climate change reconstruction

### Educational subject description sheet

#### Basic information

<b>Study programme</b> Geohazards and Climate Change		<b>Didactic cycle</b> 2023/24	
<b>Speciality</b> -		<b>Subject code</b> 07GCCS.22KU.05740.23	
<b>Organizational unit</b> Faculty of Geographical and Geological Sciences		<b>Lecture languages</b> English	
<b>Study level</b> Second-cycle programme		<b>Course type</b> Elective	
<b>Study form</b> Full-time		<b>Block</b> Complementary major subjects	
<b>Education profile</b> General academic			
<b>Subject coordinator</b>	Krzysztof Pleskot		
<b>Lecturer</b>	Krzysztof Pleskot		
<b>Period</b> Semester 2	<b>Activities and hours</b> • Lecture: 15, Graded credit	<b>Number of ECTS points</b> 2	

#### Goals

Code	Goal
C1	The aim of the course is to give the students the overview of the techniques applied in qualitative and quantitative climate change reconstruction and indicate their advantages and disadvantages. Above that sources of uncertainty in climate reconstructions will be presented as well as the overview of the future development this branch of science.

## Entry requirements

Basic knowledge in Earth science.

## Subject learning outcomes

Code	Outcomes in terms of	Learning outcomes	Examination methods
<b>Knowledge - Student:</b>			
W1	knows in depth what climate reconstruction methods can be applied to various timescales;	GCC_K2_W02, GCC_K2_W06, GCC_K2_W10, GCC_K2_W11, GCC_K2_W12, GCC_K2_W15, GCC_K2_W17, GCC_K2_W18	Written colloquium
W2	knows the limitations of the climate reconstruction methods;	GCC_K2_W01, GCC_K2_W02, GCC_K2_W10, GCC_K2_W11, GCC_K2_W17, GCC_K2_W18	Written colloquium
W3	knows the impact of the development of the climate reconstruction methods for the understanding of the climate changes in the past.	GCC_K2_W01, GCC_K2_W02, GCC_K2_W06, GCC_K2_W10, GCC_K2_W11, GCC_K2_W12, GCC_K2_W17, GCC_K2_W18	Written colloquium
<b>Skills - Student:</b>			
U1	interprets paleoclimatic data based on various proxies;	GCC_K2_U03, GCC_K2_U04, GCC_K2_U06, GCC_K2_U08, GCC_K2_U09, GCC_K2_U11, GCC_K2_U14	Written colloquium
U2	reconstructs various elements of paleoclimate based on the raw data sourced from selected proxies;	GCC_K2_U03, GCC_K2_U04, GCC_K2_U06, GCC_K2_U08, GCC_K2_U11, GCC_K2_U14	Written colloquium
<b>Social competences - Student:</b>			
K1	is prepared to critically assess the current state of knowledge on climate changes in the past.	GCC_K2_K04	Written colloquium

## Study content

No.	Course content	Subject learning outcomes	Activities

No.	Course content	Subject learning outcomes	Activities
1.	Theoretical introduction into the topic of climate reconstruction.	W1, W2, W3, K1	Lecture
2.	Presentation of selected qualitative and quantitative climate reconstruction methods.	W1, W2, W3, K1	Lecture
3.	Examples of calculations of paste temperatures and quantification of hydroclimate based on raw proxy data.	W1, W2, W3, U1, U2, K1	Lecture
4.	Discussion of uncertainty of selected climate reconstruction methods.	W1, W2, W3, K1	Lecture
5.	Presentation of selected validation methods of the climate reconstruction.	W1, W2, W3, U1, U2, K1	Lecture

### Additional information

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

Activities	Credit conditions
Lecture	The final grade is the result obtained from the written colloquium. Grading scale: 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

- Ramstein, G., Landais, A., Bouttes, N., Sepulchre, P., Govin, A., (Eds.) (2021). Paleoclimatology. Springer. (selected fragments)
- John, K. S., Leckie, R. M., Pound, K., Jones, M., & Krissek, L. (2012). Reconstructing Earth's climate history: inquiry-based exercises for lab and class. John Wiley & Sons. (selected fragments)

#### Optional

- Bradley, R. S. (1999). Paleoclimatology: reconstructing climates of the Quaternary. Elsevier. (selected fragments)

### Calculation of ECTS points

Activities	Activity hours*
Lecture	15
Reading the indicated literature	20

Preparation for the assessment	15
<b>Student workload</b>	<b>Hours</b> 50
<b>Number of ECTS points</b>	<b>ECTS</b> 2

\* academic hour = 45 minutes

## Efekty uczenia się dla kierunku

Kod	Treść
GCC_K2_K04	The graduate is ready to use reliable sources of information associated with environmental hazards and climate and critical assessments of these sources
GCC_K2_U03	The graduate can conclude based on the data and information from various sources and geographical and environmental information
GCC_K2_U04	The graduate can formulate the research hypotheses and conduct environmental research: to plan, to manage and to document
GCC_K2_U06	The graduate can critically assess the sources of information on climate and environmental change and associated geohazards
GCC_K2_U08	The graduate can apply advanced laboratory methods and techniques used for environmental research
GCC_K2_U09	The graduate can apply advanced fieldwork methods and techniques used for environmental research
GCC_K2_U11	The graduate can apply mathematical and statistical methods for analysis, interpretation and visualization of the environmental data
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_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_W10	The graduate knows and understands thoroughly, the statistical and mathematical tools and methods necessary for the description and interpretation of environmental processes and forecasting environmental changes
GCC_K2_W11	The graduate knows and understands advanced laboratory methods and techniques used in the research on the elements of the environment and the environmental processes
GCC_K2_W12	The graduate knows and understands advanced field methods and techniques used in environmental studies
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