

1.	Course title: <i>Environmental changes during Quaternary</i>
2.	Lecturers: <i>prof. dr hab. Joanna Mirosław-Grabowska, dr Milena Obremska, dr hab. Elwira Sienkiewicz, dr Marta Wojewódka-Przybył, dr hab. Edyta Zawisza, dr Greta Brancaleoni, dr hab. Maciej Krajcarz (course coordinator: dr hab. Maciej Krajcarz)</i>
3.	Field, type and level of studies, year of study: <i>Quaternary geology, ecology, geochemistry, paleontology, paleoclimatology – full-time doctoral studies, all years</i>
4.	Course character: <i>compulsory lectures</i>
5.	Teaching method: ONLINE (interactive contact with lecturers in real time) <i>The lecture will be held every Wednesday at 10:00, starting on 21 October 2026</i>
6.	Language: English
7.	Course type and number of hours: Lecture with seminar elements (30h)
8.	Estimated load of student's independent work: 10 h
9.	Total workload and number of ECTS points: 2 ECTS
10.	Short description and main focus of the course: The Quaternary is the last epoch in the history of Earth – the time of turbulent climatic and environmental changes. The aim of the course is to familiarize students with the basics of geological proxies of those changes. The stratigraphic subdivision of the Quaternary will be discussed, as well as an outline of terrestrial paleogeography and paleoclimatology of that period. Selected types of settings will be presented, with a focus on those which are of the greatest importance as carriers of paleoenvironmental information, including paleontological and archaeological sites. Then, various research methods used in the analyses of Quaternary paleoenvironments and paleoecology will be presented, primarily those that are crucial for understanding changes of flora, fauna, and anthropogenic activity. Human impact on past ecosystems and its geological record will be also discussed. Schedule: 1) Introduction to Quaternary geology – 2h, J. Mirosław-Grabowska 2) Outline of palaeogeography and palaeoclimatology of the Quaternary – 2h, J. Mirosław-Grabowska

	Students are able to identify the most important Quaternary terrestrial sedimentary environments and their characteristic sediments. They are able to choose appropriate research methods for specific types of deposits and specific research problems. They can use geological data. They are able to present graphically and numerically the analytical results. They are able to interpret the results of the most basic analyzes of Quaternary sediment in terms of determining the environmental conditions (paleoclimate, paleoecology) and the stratigraphic position of the studied sediments.	
	Social Skills: Students understand the impact of climate change on the ecosystem. They are able to assess the impact of the economy and industry on the environment and climate change. They are aware of the durability of changes introduced to the natural environment and the natural consequences of human activities. They are ready to critically evaluate the received information, critically assess their knowledge, recognize the importance of the knowledge in solving cognitive and practical problems; they are ready to work in a team in the field of professional tasks.	P8S_KK
14.	Evaluation of the educational outcomes: Student's commitment during the classes, written exam.	
15.	Criteria to complete the course: Minimum 80% of attendance, final grade depends on the exam results.	
16.	Contact with the course leader/lecturer: <i>dr hab. Maciej Krajcarz e-mail: mkrajcarz@twarda.pan.pl– course coordinator</i>	