Geology in Anthropocene: alternative raw materials, human influence, climate change and other topics-challenges in the modern world
– COURSE SYLLABUS

1.	**Course title:**	
	Geology in Anthropocene: alternative raw materials, human influence, climate change and other topics-challenges in the modern world	
2.	**Lecturer:**	
	Łukasz Kruszewski, Ph.D., associate professor IGS PAS	
3.	**Field, type and level of studies, year of study:**	
	geochemistry, mineralogy, generalized geology, ecology, all years of study	
4.	**Course character:**	
	GeoPlanet interdisciplinary lecture	
5.	**Teaching method:**	
	LECUTRE, on-line	
6.	**Language:**	*depending on the audience (English or Polish)*
7.	**Course type and number of hours:**	
	lecture, 30h / semester	
8.	**Estimated load of student's independent work:**	*20h*
9.	**Total workload and number of ECTS points:**	*50h, 3 ECTS*
10.	**Short description and main focus of the course:**	
	We have oficially entered the Anthropocene era (at least this is what we were told...). Things change: no longer is plutonium treated as a solely synthetic element, no longer are just 8 oxidation states recognized, minerals do not necessarily form just crystals... and simple compositional element-to-element diagrams may „no longer" show true correlations. As such, it is good to compare how geology changed. We will try to answer the questions: what are its current and future challenges, how „plastiglomerates" may be used, and what are the current social expectations towards geology? Within the course proposed we will look into recent discoveries in both geochemistry and mineralogy, and methodology. In the light of intense search for new sources of ores, and the relatively modern idea of raw materials' criticality, we will also learn sophisticated techniques addressing precise quantitative phase analysis and determination of processes behind compositional impurities.	
11.	**References:**	

	- https://mineralogy-ima.org *- www.reuters.com/science/canadian-lake-sediments-reveal-start-earths-anthropocene-age-scientists-say-2023-07-11/* *- https://mineralchallenge.net* *- www.mindat.org* *- https://arsenal.art.pl/product/diana-lelonek-wasteplants-atlas-atlas-smiecioroslin/* *- Walters, C.N., Zalasiewicz, J., Summerhayes, C., ... (2015). The Anthropocene is Functionally and Stratigraphically Distinct from the Holocene. Science, 351, 137-147* *- Bińczyk, E. (2021). Nowe zarządzanie pieniądzem w epoce antropocenu. Ekologia człowieka Alfa Hornborga* *- Bińczyk, E. (2018). Troska o postprzyrodę w epoce antropocenu* *- Bennett, J. – Życie w antropocenie; https://polonistyka.uj.edu.pl* *- Musat, N., Halm, H., Winterholler, B., Hoppe, P., Peduzzi, S., Hillion, F., Horreard, F., Amann, R., Jørgensenm B.B., Kuypers, M.M.M. (2008). A single-cell view on the ecophysiology of anaerobic phototrophic bacteria. PNAS, 105(46), 17861-17866.*	
12.	**Prerequisites:** *at least a basic interest in modern geology and the geosphere/biosphere interface*	
13.	**Educational outcomes:**	**PQF level 8 codes:**
	Knowledge: *it will span from systematic mineralogy, modern mineralogy nomenclature, recent (geo)technological achievements & troubleshooting, to challenges of extraterrestrial geology/migration*	*P8S_WG, P8S_WK*
	Practical Skills: *the students will learn TOPAS (v. 3.0), CALCMET (related to precise gas-phase analysis), and how to resolve issues with data transformation (e.g., into empirical formulae)*	*P8S_UO, P8S_UU*
	Social Skills: *the lecture naturally concerns issues related to the fact of living in the Anthropocene era. This has to do with both social expectations towards geology in general and art-related topics including usage of plastic-bearing rocks in the art*	*P8S_KO*
14.	**Evaluation of the educational outcomes:** *written exam, 3 practical homeworks*	
15.	**Criteria to complete the course:** *at least 80% attendance, final grade depends on the evaluation of the (1) three homeworks, (2) exam (must have at least 65% for a positive note)*	
16.	**Contact with the lecturer:** *email: lkruszewski@twarda.pan.pl*	