Wrocław University of Science and Technology
Doctoral School

COURSE CARD

1. Basic information

Course name in English:	Natural Geohazards	
Course name in Polish:	Geozgrożenia Naturalne	
Number of hours:	15	
Type of course:	Elective course	
Form of course:	mixed forms (combination of lecture, seminar and laboratory)	
Code of course:		
Course leader:	Jurand Wojewoda, DSc, PhD, Prof@WUST	
Faculty of the course leader:	W6 Faculty of Geoengineering, Mining and Geology	
Email address of the course leader:	jurand.wojewoda@pwr.edu.pl	
Scientific discipline(s) assigned to the course (doctoral students representing the marked disciplines can participate in the course):	Architecture and urban planning	☐
	Automation, electronic, electrical engineering and space technologies	☐
	Information and communication technology	☐
	Biomedical engineering	☐
	Chemical engineering	☐
	Civil engineering, geodesy and transport	☒
	Materials engineering	☐
	Mechanical engineering	☐
	Environmental engineering, mining, and energy	☒
	Mathematics	☐
	Chemical sciences	☐
	Physical sciences	☐
	Management and quality studies	☐

2. Objectives

Obtaining knowledge about the methodology of categorizing processes and phenomena, stochastic and phenomenological categorization of natural events and events and ways of describing them; the ability to predict geohazards based on available evidence; learning about ways to prevent or convert threats; review of engineering and organizational practices in geohazard situations.

The **lectures** are intended to familiarize students with the most important geohazards and their consequences, both on a geological and historical scale, as well as on the scale of currently occurring processes.

The **projects** are aimed at familiarizing students with methods of recognizing events based on the geological record in sedimentary rocks.

The s**eminar** aims to familiarize students with selected cases of catastrophic (cataclysmic) geoevents in terms of: causes, effects and preventive actions.

3. Content

Detailed information about the course content, including topics and form of classes.

No.	Topic	Number of hours	Form of classes
1	**Introduction** - processes, phenomena and events: physical, stochastic, phenomenological and social categorization	1	lecture
2	**Geodynamic hazards** (seismic activity - earthquakes, causes, history, monitoring, effects and prevention of the effects, active fault zones - location, kinematic characteristics, the geological and engineering effects and prevention)	2	lecture
3	**Tsunami** (history, causes, physics of the trigger process and tsunami monitoring, effects and prevention)	2	lecture
4	**Hydrological hazards** (storm rain floods - effects & prevention; river's valleys floods - causes, monitoring systems, methods of flood protection - static and dynamic retention, stimulating the flood wave, water management in the drainage basin; storm surges - coastal lithodynamics and coastal erosion)	2	lecture
5	**Geotechnical hazards** (landslides - creeping, rock falls, slumps and mass flows) - physics of the processes and trigger mechanisms, monitoring, and prevention of the effects of legal and social aspects)	2	lecture
6	Recognition and categorization of **energetic events** in the sedimentological record	2	project
7	Recognition and categorization of **spatial events** in the sedimentological record	2	project
8	The **largest**, i.e. the most catastrophic or cataclysmic events in the history of Earth and Man - review and discussion	2	seminar

4. Prerequisites

List of prerequisites relating to knowledge, skills and other competences for course participants.

Basic knowledge in the field of geology, geography and descriptive statistics

5. Learning outcomes

List of learning outcomes at level 8 of the Polish Qualifications Framework assigned to the course (mark the learning outcomes in the last column).

Symbol	**Learning outcome**	

	KNOWLEDGE. Doctoral student knows and understands:	
SzD_W3	the main trends in the development of the scientific or artistic disciplines covered in the curricula;	☒
SzD_W4	research methodology;	☒
SzD_W5	the rules for the dissemination of scientific results, including in open access mode;	☒
SzD_W6	the fundamental dilemmas of modern civilization;	☒
SzD_W7	the legal and ethical conditions of scientific activity;	☒
SzD_W8	the economic and other relevant conditions of scientific activity;	☒
SzD_W9	basic principles of knowledge transfer to the economic and social spheres and commercialisation of results of scientific activity and know-how related to these results.	☒
	SKILLS. Doctoral student is able to:	
SzD_U2	use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: - define the purpose and subject of scientific research, formulate a research hypothesis, - develop research methods, techniques and tools, and use them creatively, - draw conclusions on the basis of scientific research; critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development; transfer the results of scientific activities to the economic and social spheres;	☒
SzD_U3	communicate on specialised topics to the extent that they enable an active participation in the international scientific community;	☒
SzD_U4	disseminate research results, including in popular forms;	☒
SzD_U5	initiate debates and participate in a scientific discourse;	☐
SzD_U6	be able to speak a foreign language at B2 level of the Common European Framework of Reference for Languages to a level that enables them to participate in the international scientific and professional environment;	☒
SzD_U7	plan and implement an individual or collective research or creative activity, including in an international environment;	☐
SzD_U8	independently plan and act for one's own development and inspire and organize the development of others;	☐
SzD_U9	plan classes or groups of classes and implement them using modern methods and tools.	☒
	SOCIAL COMPETENCES. Doctoral student is ready to:	
SzD_K3	fulfilling the social obligations of researchers and creators, initiate public interest activities, thinking and acting in an entrepreneurial way;	☒
SzD_K4	maintaining and developing the ethos of research and creative environments, including: - carrying out scientific activities in an independent manner, - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection.	☐

6. Evaluation

Short description of the method(s) used to evaluate the learning outcomes assigned to the course, e.g., exam, test, report, presentation, etc.

Active participation and presentation of issues during the seminar and evaluation of completed project reports

7. Teaching methods

Short description of the teaching methods used during the course, e.g., multimedia presentation, discussion, literature studies, developing written documents, own work, etc.

The lecturer presents richly illustrated topics and animations. Participants independently prepare seminar presentations on topics assigned by the teacher based on the source materials provided. Students independently and individually carry out projects and prepare reports.

8. Literature

List of primary and secondary literature used to prepare the course and including additional knowledge for participants, e.g., books, textbooks, research papers, standards, web pages, etc.

Author's lecture in digital version (pdf) [1] and methodological explanations for the implementation of projects (pdf) [2] and additional literature [3]:

Coch, N.E., 1995. Geohazards: Natural and Human. Prentice-Hall, Englewood Cliffs, 481 pp.

Keller, E.A., 1999. Introduction to Environmental Geology. Pearson Prentice Hall, 383 p.

Maund, J. G., Eddleston, M., 1998. Geohazards in Engineering Geology. Geological Society Publ. House, 448 pp.

Zilinga de Boer, J., Sanders, D.T., 2005. Earthquakes in Human History. Princeton University Press, 278 pp.

Keller, E.A., Blodget, R.H., 2008. Natural Hazards – Earth's Processes as Hazards, Disasters, and Catastrophes. Pearson Prentice Hall, 488 pp.

9. Other remarks

Additional remarks, comments, (e.g., language of the course)

English