



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Natural Hazards	

Academic staff	Core academic unit(s)
Coordinator: prof. Ilya V. Buynevich	Faculty of Chemistry and Geosciences Institute of Geosciences Department of Hydrology and Climatology

Study cycle	Type of the course unit
Last year of first cycle / Second cycle	Compulsory

Mode of delivery	Semester or period when it is delivered	Language of instruction
Lectures: Virtual/synchronous	Fall (I semester)	English

Requisites	
Prerequisites:	Co-requisites (if relevant):

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	133	48 (32 – lectures; 16 – seminars)	85

Purpose of the course unit		
This course focuses on the science behind disasters and geohazards, from deep geologic time, to historic events, to modern day. Students will learn the geoscience principles behind key catastrophic events and the ways society mitigates the risks. Topics include asteroid impacts, volcanoes, earthquakes, tsunamis, floods, coastal storms, droughts, wildfires, and their role in mass extinctions. We will review case studies of natural hazards, with examples from the Baltic region and around the world, including the use of journal articles, media coverage, and even popular movies!		
Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
<i>Fundamental knowledge:</i> System-based approach to geo-scientific understanding of natural hazards (disasters and geohazards). <i>Cognitive skillset:</i> Ability to identify and analyze event-scale phenomena, both of exogenic and endogenic origin. <i>Practical skillset:</i> Database search and analysis of scientific literature sources, as well as critical evaluation of public information sources. <i>Transferable skillset:</i> Ability to locate and assess interdisciplinary information sources, and acquisition of skills to integrate relevant data in order to analyze and/or solve a scientific problem.	Lectures (online/synchronous), problem-based learning; seminars following each lecture; self-study of reference materials.	Evaluation of the activeness in seminars and self-study oral material presentation, two written examinations.

Content: Topics	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	Contact hours, total	Individual work	Tasks for individual work
Module 1 – Weeks 1-2 Introduction: Course Overview / Geo-Literacy - Introduction to Earth / Disaster vs Geohazard / Probability vs Risk	4		2				6	10	(1) Chapter 1 + slides on portal
Module 2 – Weeks 3-4 Disasters: Extraterrestrial Impacts (Recent activity and ancient asteroid impacts) / Role in Mass Extinctions (P/Tr vs K/Pg events: differences and similarities)	4		2				6	10	(1) Chapter 17 + slides on portal
Module 3 – Weeks 5-6 Volcanic Hazards: Volcanism and Volcanic Hazards (pyroclastic flows, landslides, lahars, caldera lake drainage) / Role in Mass Extinctions	4		2				6	10	(1) Chapters 6, 7 + slides on portal
Module 4 – Weeks 7-8 Seismic Hazards: Earthquakes (seismogenic processes, magnitude vs. intensity) / Prediction and Mitigation Exam 1: Modules 1-4 covered	4		2				6	10	(1) Chapters 3, 4 + slides on portal
Module 5 – Weeks 9-10 Multi-Origin Hazards: Tsunamis triggers and propagation) / Prediction and Survival (subduction vs. impact generation, regional strategies)	4		2				6	10	(1) Chapter 5 + slides on portal
Module 6 – Weeks 11-12 Climate-Related Disasters 1: River Dynamics (global fluvial systems and local examples / Flood Hydrology and Sedimentology (recurrence intervals) Presentation (during seminar)	4		2				6	12	(1) Chapters 12, 13 + slides on portal
Module 7 – Weeks 13-14 Climate-Related Disasters 2: Cyclones (formation and impact) / Paleotempestology (geomorphic and sedimentological indicators) Presentation (during seminar)	4		2				6	12	(1) Chapters 14,15 + slides on portal
Module 8 – Weeks 15-16 Climate-Related Disasters 3: Desertification (causes and consequences) / Droughts / Heat Waves / Wildfires (geoindicators of past activity) Exam 2: Modules 5-8 covered	4		2				6	11	(1) Chapters 10, 11,16 + slides on portal
Total	32		16				48	85	133

Assessment strategy	Weight %	Deadline	Assessment criteria
Examinations	65	During the semester	Two exams are assessed: Mid-way through semester: Exam 1 – 32% End of semester: Exam 2 – 33% (non-cumulative) The total score of each exam - 100 points + 5 extra-credit.

Seminars (Oral presentations during seminars)	35	During the semester	Each student makes an on-line presentation (35 points total) 15-20 points . The presentation is of high quality and comprehensive. Student clearly understands presented problem and can answer questions. 6-14 points . The presentation is superficial or not well prepared and/or student does not fully understand the content. 0-5 points . Assignment is not presented or is low quality.
Final grade	100		Final grade is the sum of examinations and presentation. 100-91 points – 10; 90-81 points – 9; 80-71 points – 8; 70-61 points – 7, 60-51 points – 6, 50-41 points – 5; 40-31 points – 4; 30-21points – 3; 20-11points – 2; 10-1 points – 1.

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading (available online)				
Hyndman, Donald and Hyndman, David	2014 PDF online	Natural Hazards and Disasters (1)	4	Brooks/Cole CENGAGE Learning
Recommended reading (available online and as PDF in course documents)				
Wisner, B., Blaikie, P., Cannon, T., Davis, I.	2003 e-book	At Risk : natural hazards, people's vulnerability and disasters	2	Routledge
United Nations	2010 PDF online	Natural Hazards, UnNatural Disasters	1	The World Bank
Bas van Bavel, B., Curtis, D.R., Dijkman, J., Hannaford, M., de Keyzer, M., van Onacker, E., Soens, T.	2020 PDF online	Disasters and History: The Vulnerability and Resilience of Past Societies	1	Cambridge University Press