1. GENERAL INFORMATION					
Study programme title	University graduate study programme in mining engineering				
Course title	Explosion proof techniques			**Semester**	2
Teacher	Assoc. Prof. Dalibor Kuhinek, PhD			**Course code**	
Course type	☐ obligatory ☒ elective			**ECTS**	3,5
Location					
Language	☒ Croatian ☒ English				

Class type	Weekly hours	Teaching staff	Office hours	Room	E-mail
Class	2	Assoc.prof. Dalibor Kuhinek, PhD	Thursday 14-16 p.m.	P6 208	dalibor.kuhinek@rgn.hr
Practice	1	Ana Hanić, PhD	Thursday 14-16 p.m.	P6 207	ana.hanic@rgn.hr
Field lecture					

E-learning level	1	**Percentage of on-line class (max. 20%)**	5 %

2. COURSE DESCRIPTION	
Course aims	Understanding basic concepts, fundamental laws and principles relating to explosion protection. To learn the physical quantities on the formation of a mixture or atmosphere, the effect of temperature and pressure on explosive limits and the conditions for preventing explosion. Understand the impact of ventilation on hazard reduction and the principle of explosion transfer through joint. Differentiate between different types of Ex protection and the physical principles that are used.
Requirements for applicants	
Programme level learning outcomes with course contribution	
Expected course level learning outcomes (4-10 outcomes)	Find flammable substances properties from available literature. Analyze the properties of flammable substance and air mixture with known release rate and ventilation parameters and calculate how to achieve primary explosion protection. Be

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	able to calculate the required initial ventilation requirements. Calculate the spread of hazardous zones and make an area classification on simple examples. Recognize the meaning of designation on explosion-proof devices.

Course contents by individual lessons	
Class	Practice
P1 – Introduction to explosion protection	V1 – Flammable substances properties (data from literature). Finding, purpose, use of data.
P2 – Flammamable and explosive mixtures	V2 – Solved problems and discussion
P3 – Properties of flammable and explosive mixtures. Density. Evaporation. Ignition energy.	V3 – Limits of flammabillity
P4 – Ignition temperature. Flammable and explosive dusts. Classification of explosive gases and vapors.	V4 – Source of release. Ventilation. Concentration of flammable substance in micture with air
P5 – Formation of explosive atmosphere by flow, diffusion and breathing. Hazardous area classification	V5 – Hazardous zones.
P6 – Ventilation. Non-electrical ignition sources.	V6 – Initial ventilation calculation for primary explosion protection..
P7 – Electrical igniton sources.	V7 – Hazardous area classification.
P8 – Atmospheric discharges. Nonequalized potentials. Cathodic protection. Static electricity. High frequency and electromagnetic radiation.	V8 – Analysis of hazardous area classification.
P9 – Protective measures to reduce the risk of explosive mixture formation.	V9 – Labeling of the devices and examples of equipment.
P10 – Physical properties of explosion	V10 – Project explanation and guidelines
P11 – Transfer of explosion through joints	V11 – Project work.
P12 – Types of protection of electrical and non-electrical devices	V12 – Project work.
P13 – Flameproof exposion protection	V13 – Project work.
P14 – Other types of proetction.	V14 – Project work.

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P15 – Device labeling and certification	V15 – Overview of made projects. Discussion on interesting parts. Comments of good parts and mistakes that were made.

Students' obligations	Attending lectures and exercises. Project work.			
Students' work track *(indicate share in ECTS points for each activity so that overall ECTS number corresponds to class credits score):*	Class attendance		Research	
	Project	30 %	Report	
	Colloquium	40 %	Seminar paper	
	Practical work	20 %	Oral exam	10 %
	Written exam		(Extra)	
Type of exam, grades and evaluation of students work during class and on final exam				
Mandatory literature (available in the Library and via other media)	1. Marinović, N.: Electrotechnology in Mining, Elsevier, Amsterdam, 1990.			
Aditional literature (at the moment of study program proposition application)	1. ATEX Directives 2. EN 1127-1 3. IEC 60079-10-1 4. Various companies explosion protection brochures (Baseefa, Draeger, Tepex, Siemens, Stahl) 5. Various guides (API RP 505, Biogas handbook)			
Examination terms				
Other				

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