1. GENERAL INFORMATION

Study programme title	Graduate study Programme in Mining Engineering		
Course title	Applied Geophysics 1	**Semester**	winter
Teacher	Assoc. Prof. Jasna Orešković, PhD	**Course code**	27128
Course type	o obligatory ☐ elective	**ECTS**	6
Location	Faculty of Mining, Geology and Petroleum Engineering, Pierottijeva 6, Zagreb		
Language	☐ Croatian ☐ English		

Class type	Weekly hours	Teaching staff	Office hours	Room	E-mail
Class	2	Assoc. Prof. Jasna Orešković, PhD		V219	jasna.oreskovic@rgn.hr
Practice	2	Assoc. Prof. Jasna Orešković, PhD		V219	jasna.oreskovic@rgn.hr
Field lecture	1				

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

2. COURSE DESCRIPTION

Course aims	Introduction to surface geophysical research with practical application of methods in defining geological structure and terrain composition.
Requirements for applicants	Basic courses in physics.
Programme level learning outcomes with course contribution	
Expected course level learning outcomes (4-10 outcomes)	Students will be able to: 1. Demonstrate understanding of theoretical principles that are base for geophysical methods. 2. Define research methodology and data to be used. 3. Process and analyse collected geophysical data (electric, seismic and magnetic). 4. Apply appropriate modelling methodology. 5. Infer physical properties of the underground by surface geophysical methods.

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Course contents by individual lessons	
Class	Practice
C1 Introduction. Structure of the course and course content.	P1 Introduction. Electrical methods.
C2 Electrical methods – theoretical background. Electrical properties of rocks.	P2 Electrical sounding.
C3 Electrical resistivity methods – electrical sounding	P3 Electrical sounding. Interpretation of electrical sounding curve.
C4 Electrical resistivity methods – electrical profiling. Spontaneous potential.	P4 Electrical sounding. Interpretation – modelling and inversion.
C5 Gravimetry - theoretical background, instruments and measurements	P5 Gravimetry – Bouguer anomaly map transformation (part 1)
C6 Gravimetry – gravity corrections and interpretation of gravity anomalies	P6 Gravimetry – Bouguer anomaly map transformation (part 2)
Colloqium 1	P7 Gravimetry - calculate the gravity anomaly for the given geological model.
C8 Magnetometry - theoretical background, instruments and data acquisition.	Field work
C9 Magnetometry – data processing and interpretation.	P9 Preparation of field exercise report seminar papers and.
C10 Seismic methods – basic theory. Elastic waves, seismic wave velocities. Data acquisition, seismic sources, sensors and recording equipment.	P10 Magnetometry – interpretation of magnetic anomalies
C11	P11

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Seismic refraction – Head waves and diving waves. First arrivals. Wave equation. Seismic arrays and data processing.	Magnetometry – interpretation of magnetic anomalies
C12 Seismic refraction – interpretation methods. Velocity models	P12 Seismic refraction – picking of first arrivals, time-distance graph for multi-layered model.
C13 Seismic reflection - Reflection and transmission at interface. Measurement, 2D and 3D data acquisition and processing.	P13 Seismic refraction – interpretation of interface depths and average velocities for multi-layered model.
C14 Seismic reflection – basic interpretation	P14 Presentation of seminar papers.
C15 Presentation of seminar papers.	Field exercise
Colloquium 2	P15 Instructions for field report preparation.

Students' obligations	Regular presence at the class (maximum absence: 3), completed written exercises. Completed field exercise.			
Students' work track *(indicate share in ECTS points for each activity so that overall ECTS number corresponds to class credits score):*	Class attendance	1	Research	
	Project		Report	
	Colloquium		Seminar paper	
	Practical work	1.5	Oral exam	2
	Written exam		Field work	1.5
Type of exam, grades and evaluation of students work during class and on final exam	Mark is generated from practical written exercises and field task (20 %) and oral examination (80 %). During the oral examination student will answer the whole course content.			
Mandatory literature (available in the Library and via other media)	Šumanovac, F.: Osnove geofizičkih istraživanja. Sveučilište u Zagrebu, Rudarsko-geološko-naftni fakultet, 2012.			
Aditional literature (at the moment of study program proposition application)	Lowrie, W.: Fundamentals of Geophysics. Cambridge University Press, 2nd ed., 2007. Parasnis, D.S.: Principles of Applied Geophysics. Chapman & Hall, 1997.			
Examination terms	During winter and summer examination period.			

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