1. GENERAL INFORMATION					
Study programme title	Undergarduate study of Geological engineering				
Course title	Technical Petrography 1			**Semester**	6
Teacher	Ana Maričić			**Course code**	
Course type	☒ obligatory ☐ elective			**ECTS**	4
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	Assistant Professor Ana Maričić	Tuesday 08.30 – 10.00	P6 112	ana.maricic@rgn.hr
Practice	1	Assistant Professor Ana Maričić	Tuesday, 10.00 – 11.00	P6 112	ana.maricic@rgn.hr
Field lecture	0,5	Assistant Professor Ana Maričić			ana.maricic@rgn.hr
E-learning level		1	**Percentage of on-line class (max. 20%)**		

2. COURSE DESCRIPTION	
Course aims	Objectives of the course are to introduce students with: 1. natural (building) stone and aggregate stone; 2. mineralogical and petrographical propertis, physical and mechanical properties, technical and technological properties of stone and durability of stone to weathering – essential to its usability.
Requirements for applicants	
Programme level learning outcomes with course contribution	
Expected course level learning outcomes (4-10 outcomes)	After successfully mastering a course, students will be able to: 1. Classify rocks regarding application as aggregate stone (including pebbles and sand for engineering purposes) and natural (building) stone. 2. Determine all mineralogical and petrographical properties, physical and mechanical and technical properties of stone.

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	3. Explain which the basic factors of physical, chemical and biological damage to the stone that is built-in the stone construction. 4. Corelate the influence of mineralogical and petrographical properties with physical and mechanical properties, durability of stone to the action of salt crystallization, freezing and thermal changes and possible usability of stone in construction. 5. Calculate and graphically show the values of the physical and mechanical properties of the stone and the durability to the action of salt crystallization, freezing and thermal changes.

Course contents by individual lessons	
Class	Practice
P1 Getting to know the students. The criteria and requirements for obtaining signature and passing the exam. Mandatory and additional literature. Consultations. Schedule Colloquium and oral examinations. Course structure. The importance of the subject Technical petrography for students of geology.	V1 Tour of the buildings, stone constructions and the facades around the RGNF building.
P2 The basic classification of rocks. Classification of stone during utilization on natural (building) stone and aggregate stone. Basic characteristics of the deposit. Evaluation of natural stone according to five criterions.	V2 Repeating – classification of rocks (igneous, metamorphic and sedimentary rocks). The most commonly used stone samples in Croatia.
P3 Introduction to mineralogical and petrographical properties of stone. Introduction to physical and mechanical properties of rocks or stone. Importance of determination of properties and its influence on the quality of the stone. Standards (norms) by which physical and mechanical properties are determined.	V3 Continuation to acquainting with the most common rocks in use. Getting acquainted with norms or standards for testing of physical and mechanical properties of stone.
P4 Colour of minerals and stone. Definition and method of determination of real and apparent density, and open and total porosity of stone.	V4 Calculation of real and apparent density, open and total porosity of stone according to the given data.
P5 Water in stone and minerals. Definition and method of determination of water absorption at atmospheric pressure. Capillary absorption of water.	V5 Determining the real density of stone in the laboratory using a pycnometer method.
P6 Definition and methods for determining durability to freezing, durability to the effect of salt crystallization and the effect of thermal changes.	V6 Calculation of water absorption and capillary absorption of water. Calculation of the resistance of stone to freezing and the effect of salt crystallization.

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P7 Hardness of stone. Definition of hardness towards the Knoop method. Resistance of natural stone to abrasion – Böhme's method.	V7 Visit to the Laboratory for natural stone and aggregate.
P8 Thermal properties of stone. Acoustic properties of stone. Electrical properties of stone. Magnetic properties of the stone. Radioactive properties of stone.	V8 Calculation of the hardness value of the stone by abrasion – Böhme's method. Calculation of ultrasound speed progradation through the stone.
P9 Mechanical properties of stone. Compressive and flexural strength of stone. The Treton method and Los Angeles method.	V9 Repetition and preparation for First Colloquy.
P10 Deformation of minerals and rocks in geological conditions.	V10 First Colloquium.
P11 Elastic and plastic deformations of stone.	V11 Calculating the compressive and flexural strength of the stone. Calculation of Los Angeles coefficient.
P12 Mineral crystallization forces.	V12 Continuation in getting acquainted with the most common rocks in use.
P13 Durability of stone. The main factors of chemical damage to the stone. The basic factors of physical damage to stone.	V13 Introduction to norms (standards) for testing of physical and mechanical properties. Preparation and repetition of material for a second colloquy.
P14 The devastating effects of water. Physical activity of salts dissolved in stone. The activity of plants and microorganisms on the durability of stone.	V14 Continued tour the building and the facade around the building of RGNF.
P15 Repetition and preparation for oral exam.	V15 Second Colloquium.

Students' obligations	Students are obligated to regularly attend the lectures, laboratory exercises and field work, and to actively participate during the practical work.			
Students' work track *(indicate share in ECTS points for each activity so that overall ECTS number corresponds to class credits score):*	Class attendance	0,5	Research	
	Project		Report	
	Colloquium	1	Seminar paper	
	Practical work	0,5	Oral exam	2
	Written exam		(Extra)	
Type of exam, grades and evaluation of students work during class and on final exam	Classes and examination Regular presence at the class (maximum absence 3 + 1). Mark is generated from two colloquies (50 percent) and oral examination (50 percent). During the oral examination student will answer the whole			

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	course content. Both colloquies must be evaluated positively (at least with the mark 2).
Mandatory literature (available in the Library and via other media)	*Technical petrography*: learning materials attached in the e-course at LDS Merlin. *(in Croatian and English)* Tomašić, I. (2006): Tehnička petrografija I. Skripta za studente geologije. 103 p. *(in Croatian)*
Aditional literature (at the moment of study program proposition application)	Winkler, E.M. (1997): Stone in Architecture, Properties, Durability. Third edition, Springer-Verlag Berlin Heidelberg New York. 313 p. Latham, J.P. (1998): Advances in aggregates and armourstone evaluation. Geological society, 201 p, London.
Examination terms	
Other	

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