1. GENERAL INFORMATION					
Study programme title	Undergraduate study of Geological Engineering				
Course title	Structural Geology			**Semester**	
Teacher	Prof. Dr. sc. Bruno Tomljenović			**Course code**	27079
Course type	☒ obligatory ☐ elective			**ECTS**	4
Location	University of Zagreb, 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	Prof. Dr. sc. Bruno Tomljenović	Tuesday 12-14 p.m.		bruntom@rgn.hr
Practice	2	Prof. Dr. sc. Bruno Tomljenović	Tuesday 12-14 p.m.		bruntom@rgn.hr
Field lecture	0,5	Prof. Dr. sc. Bruno Tomljenović Doc. Dr. sc. Bojan Matoš			bojan.matos@rgn.hr
E-learning level		Basic level	**Percentage of on-line class**		

2. COURSE DESCRIPTION	
Course aims	To introduce undergraduate student to basic principles and methods in structure geology that are used in description, kinematic and dynamic analysis of structures in rocks and in regions.
Requirements for applicants	Knowledge and skills achieved in General or Physical Geology
Programme level learning outcomes with course contribution	
Expected course level learning outcomes (4-10 outcomes)	Students are expected to be able: - to recognize and describe the most of brittle and ductile deformational structures in rocks and in regions based on

UČINKOVITI LJUDSKI POTENCIJALI
www.esf.hr
Europska unija "Zajedno do fondova EU"
EUROPSKI STRUKTURNI I INVESTICIJSKI FONDOVI
Projekt je sufinancirala Europska unija iz Europskog socijalnog fonda.

	structural analysis on outcrops, on satellite images and on reflection seismic sections; - to perform structural analysis and measurements in the field with a geological compass and to present measured data in maps and in stereoplots; - to perform kinematic and dynamic analysis of shear fractures and faults - to recognize structural and tectonic elements on a geological map and to interpret a structural architecture and tectonic history of analyzed region

Course contents by individual lessons	
Class	Practice
C1 – Introduction to the course schedule, presentation of the course literature and web sources, the schedule of writing exams and the criteria used for evaluation of students work. Structural geology and connection with other disciplines in geosciences. Stress in the lithosphere.	P1 – Introduction to structural analysis of reflections seismic sections: recognition of basic types of geologic contacts between different rock bodies and formations. Exercise no. 1.
C2 – Introduction to rock deformation and experimentally observed relationships between stress and strain in rocks and in minerals.	P2 – Introduction to stereographic projection of planes and lines. Exercises no. 2 and 3.
C3 – The basic concepts in descriptive, kinematic and dynamic structural analysis. Introduction to structural elements, rigid body deformation and strain in rocks.	P3 – Stereographic projection of a line onto a plane. Exercise no. 4. Use of stereographic projection in solving commonly observed problems in structural geology (part 1)
C4 – The concept of strain in two and three dimensions. Introduction to a pure and simple shear and their scale dependence.	P4 – Rotation about a horizontal axis in stereographic projection. Use of stereographic projection in solving commonly observed problems in structural geology (part 2). Exercise no. 5.
C5 – Joints and shear fractures (part 1): descriptive fracture analysis, morphological characteristics and classification.	P5 – 1st Colloquium
C6 – Joints and shear fractures (part 2): Relationship between fractures and large-scale cogenetic structures (folds and faults).	P6 – Descriptive analysis of joints and fractures. Exercise no. 6

UČINKOVITI LJUDSKI POTENCIJALI
www.esf.hr
Europska unija "Zajedno do fondova EU"
EUROPSKI STRUKTURNI I INVESTICIJSKI FONDOVI
Projekt je sufinancirala Europska unija iz Europskog socijalnog fonda.

C7 - Introduction to rock mechanics in Structural geology and principles of dynamic structural analysis.	P7 - Descriptive analysis of joints and fractures. Exercise no. 7
C8 – Faults (part 1): Fault terminology, anatomy and classification. Transition from faults into ductile shear zones. Fault rock types.	P8 – Calculation of paleostress from fault slip data using stereonet and software. Exercise no. 8.
C9 – Faults (part 2): Identifying faults in the field, satellite images, in reflection seismic sections and in geological maps. Interpretation of fault activity identifying pre- syn- and post-tectonic strata.	P9 – Interpretation of faults in reflection seismic sections. Exercises no. 9 and 10.
C10 – Folds (part 1): Fold terminology, descriptive analysis and classification. The concept of cylindrical fold.	P10 – 2nd Colloquium
C11 – Folds (part 2): Principles of construction β and π -diagrams to calculate fold axis. Order of folds (parasitic folds) and refolded folds. Major types of fault-related folds (decollement, fault-bend and fault-propagation folds).	P11 – Descriptive analysis of folds. Exercises no. 11 and 12.
C12 – Foliations and lineations in tectonites (part 1): Basic terminology and classifications.	P12 – Recognizing foliations in photographs and in thin-sections. Exercise no. 13.
C13 – Foliations and lineations in tectonites (part 2): Cleavage formation and relations to folds. Boudinage formation and classification.	P13 – Recognizing foliations in photographs and in thin-sections. Exercise no. 14.
C14 – Introduction to structural characteristics and tectonic history of a region selected for the field work exercises	P14 – 3rd Colloquium
C15 – Field work exercises	P15 – Field work exercises

Students' obligations	Regular attendance to class lectures and practices (maximum allowed absence from practices is limited to 3 times),			
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		Report	
	Colloquium	2	Seminar paper	
	Practical work	1	Oral exam	1

www.esf.hr
Projekt je sufinancirala Europska unija iz Europskog socijalnog fonda.

	Written exam		(Extra)	
Type of exam, grades and evaluation of students work during class and on final exam	Three pre-oral written exams (colloquiums) as 50 % of the final grade, 14 exercises as 10 % of the final grade and oral exam as 40 % of the final grade			
Mandatory literature (available in the Library and via other media)	B. Tomljenović: Structural Geology (2016), teaching material available at the course web site			
Aditional literature (at the moment of study program proposition application)	Haakon Fossen: Structural geology, Cambridge Univ. Press, 2010.			
Examination terms	On Wednesdays during exam periods			
Other				

www.esf.hr
Projekt je sufinancirala Europska unija iz Europskog socijalnog fonda.