SUBJECT TEACHING GUIDE

1490 - Continuum Mechanics

Master's Degree in mining engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Master's Degree in mining engineering			Type and Year	Compulsory. Year 1
Faculty	School of Mines and Energy Engineering				
Discipline					
Course unit title and code	1490 - Continuum Mechanics				
Number of ECTS credits allocated	3	Term		Semester based (1)	
Knowledge Field	Architecture, construction, building and urban planning, civil engineering				
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ESTRUCTURAL Y MECANICA
Name of lecturer	JOSE RAMON IBAÑEZ DEL RIO
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Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 2. DESPACHO (2063)
Other lecturers	HAYDEE BLANCO WONG

4. OBJECTIVES

Be able to solve a linear elasticity problem (stress and strain analysis, basic linear elasticity problems)
Be able to solve a plastic calculation problem at the section level and at the structure level considering the axial and the bending.

6. SUBJECT PROGRAM

CONTENTS	
1	Review of previous knowledge necessary to follow the subject
2	1.- Analysis of stresses and deformations: • Concept of tension • Intrinsic stresses for a point and a plane • Stress tensor • Principal stresses and stress invariants • Graphic approach to Mohr's circles in 3D and Mohr's circumference in the flat study • Stress ellipsoid • Concept of deformation • Similarities in stress and deformation studies.
3	Linear elasticity: • Hooke's law. • Generalization of Hooke's law (constitutive equations) for two-dimensional and three-dimensional situations • Stresses and deformations of thermal origin. Linear expansion coefficient. • Resolution of linear elasticity problems
4	Elasto-plastic behavior and plastic behavior. • Study of the elasto-plastic behavior of a section. • Resolution in plastic calculation of a structure that works axially. • Form factor in bending behavior • The plastic kneecap. Resolution of simple beams and frames through plastic calculation • Breakage and plasticization criteria.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Test 1	Written exam	No	Yes	35,00
Test 2	Written exam	No	Yes	35,00
Exercise report	Work	No	No	10,00
End of topic test	Activity evaluation with Virtual Media	No	No	10,00
Classroom exercises	Work	No	No	10,00
TOTAL				100,00

Observations

To pass the subject, a final grade equal to or greater than 5.0 is required.
Students with a grade in a midterm higher than 4.0 and lower than five will be able to offset their grade with that of the other midterm and opt for passing per course.
In the final and extraordinary exams, whose dates are proposed by the Center, those tests that were not passed in the course grade may be recovered (tests with a grade lower than 4.0 or when the average of the group does not reach the grade of 5.0)

Observations for part-time students

Part-time students will be evaluated through the two midterms, which will have a value of 45% each and will submit the exercise report (10%).

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

1. Mecánica de los Medios Continuos I. Díaz del Valle, Julián. Servicio de Publicaciones de la E.T.S. de Ingenieros de Caminos, C. y P. Santander. 1993.
2.- Mecánica de los Medios Continuos II: Elasticidad y Plasticidad. Problemas. Díaz del Valle, Julián. Servicio de Publicaciones de la E.T.S. de Ingenieros de Caminos, C. y P. Santander. 1989.
3. Elasticidad. L. Ortiz berrocal. Universidad Politécnica de Madrid. Madrid 1985.
4. Apuntes aportados por el profesor en Moodle