SUBJECT TEACHING GUIDE

620 - Numerical Methods in Geotechnics

Master's Degree in civil Engineering, Canal and Port Engineering

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Master's Degree in civil Engineering, Canal and Port Engineering			Type and Year	Optional. Year 2
Faculty	School of civil Engineering				
Discipline	SPECIALITY IN STRUCTURES, MATERIALS AND GEOTECHNICS				
Course unit title and code	620 - Numerical Methods in Geotechnics				
Number of ECTS credits allocated	3	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES
Name of lecturer	JORGE CASTRO GONZALEZ
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Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO (1061)
Other lecturers	

3.1 LEARNING OUTCOMES
- To use numerical methods to solve geotechnical problems.
- To know the main characteristics of the constitutive models for soils and rocks.
- To understand the key features of applying numerical methods to geotechnical problems.

4. OBJECTIVES
The student will know the main constitutive models for soils and rocks.
The student will understand the key features of numerical methods in geotechnical engineering.
The student will learn how to use numerical methods to design solutions to geotechnical problems such as seepage, slopes, embankments, foundations, retaining walls and tunnels.

6. SUBJECT PROGRAM	
CONTENTS	
1	Introduction to numerical methods in geotechnics
2	Distinctive features in geotechnical problems
3	Constitutive models for soils and rocks
4	Practical exercises (seepage, slopes, foundations, retaining walls and tunnels) (hands-on training)

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written exam about numerical methods in geotechnics (Units 1-3)	Written exam	No	Yes	50,00
Project on numerical tools applied to seepage and slope problems (Unit 4a)	Work	No	Yes	25,00
Project on numerical tools applied to geotechnical structures (Unit 4b)	Work	Yes	Yes	25,00
TOTAL				100,00

Observations

If the minimum grade required for the written exam is not obtained, the final grade will be the weighted average of all evaluation activities, with a maximum value of 4.9, in accordance with Article 35 of the University of Cantabria's Evaluation Regulations.
Grades obtained in the different sections will be valid for the entire academic year.
The written exam can be retaken in the final ordinary assessment period.

Observations for part-time students

Part-time students will be assessed on the same activities, but may request to submit projects and take the written exam during the official final exam period. In this case, both the project statement and the written exam will be new.

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Apuntes y diapositivas de la asignatura.
Geotechnical Finite Element Analysis: A practical guide. A. Lees. London: ICE Publishing. 2016.
Finite element analysis in geotechnical engineering. D.M. Potts y L. Zdravkovic. London: Thomas Telford, 2001.
Guía para el proyecto de cimentaciones en obras de carretera con Eurocódigo 7. Ministerio de Fomento, 2019.