

## SUBJECT TEACHING GUIDE

### 611 - Advanced Geotechnical Engineering

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

Academic year 2024-2025

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	611 - Advanced Geotechnical Engineering				
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				
E-mail	jorge.castro@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 3. DESPACHO 3-FUNDACION TORRES QUEVEDO (3031B)				
Other lecturers					

3.1 LEARNING OUTCOMES
- To describe the construction methods for tunnels, understanding their pros and cons.
- To use the design methods for tunnels and ground anchors.
- To describe the methods to monitor tunnels and to verify flexible earth retaining structures.

4. OBJECTIVES
Main construction techniques and design methods for tunnels.
Main design methods for ground anchors and flexible earth retaining structures.

6. SUBJECT PROGRAM	
CONTENTS	
1	Tunnels
1.1	Typology
1.2	Construction without TBM
1.3	Construction with TBM
1.4	Geomechanical classifications
1.5	Classic calculation methods
1.6	Analytical solutions
1.7	Ground-structure interaction
1.8	Settlements
1.9	Monitoring
2	Deep excavations
2.1	Retaining wall checks
2.2	Hydraulic failure
2.3	Typology and design of anchors

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written exam about ground anchors and flexible earth retaining structures	Written exam	Yes	Yes	25,00
Weekly quizzes about tunnels	Others	No	Yes	30,00
Written exam on tunnel design and calculation	Written exam	No	Yes	20,00
Project about tunnel construction methods	Work	No	Yes	25,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
The grades of the different parts will be kept during the whole academic year . The first written exam could additionally be resit at the final ordinary evaluation period.				
<b>Observations for part-time students</b>				
Part time students will be evaluated through the same activities, but they may ask to hand in the projects and to take the tunnel quizzes in the official period for final exams . In this latter case, the project statements and the quizzes will be new for part time students.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
Apuntes de Túneles. César Sagaseta Millán. 2020.
Guía para el proyecto de cimentaciones en obras de carretera con Eurocódigo 7. Ministerio de Fomento, 2019.

