

SUBJECT TEACHING GUIDE

M1446 - Railway Systems

Master's Degree in Civil Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Master's Degree in Civil Engineering			Type and Year	Compulsory. Year 1
Faculty	School of civil Engineering				
Discipline	Transport Infrastructures				
Course unit title and code	M1446 - Railway Systems				
Number of ECTS credits allocated	3	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS				
Name of lecturer	BORJA ALONSO OREÑA				
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Other lecturers	LUIGI DELL'OLIO				

3.1 LEARNING OUTCOMES
- Knowing fundamentals on rail signalling systems and rail traffic management and control
- To know the main ATP systems on spanish and european railways and interoperability issues as well
- To identify rail signalling systems and their influence on capacity
- To know the on-board equipment and track equipment of rail signalling systems
- Sizing mass rail transit services: signalling and control, capacity, exploitation and demand

4. OBJECTIVES
Advanced concepts on urban, metropolitan, commuter and Long-distance rail systems

6. COURSE ORGANIZATION

CONTENTS	
1	Basic concepts of railways signaling systems
2	Track circuits and interlocking
3	Rail Traffic Control Center
4	Automatic Train Protection
5	ETCS (ERTMS)
6	Level crossing
7	Performance
8	Metropolitan railways (Mass Rapid Transit) part I: planning, infrastructure, rolling stock and facilities.
9	Metropolitan railways (Mass Rapid Transit) part II: metro stations, operation and capacity.
10	Final deliverable

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final deliverable	Work	No	No	30,00
Final Exam	Written exam	Yes	Yes	60,00
Classroom exercises	Others	No	No	10,00
TOTAL				100,00
Observations				
Evaluation criteria according to University of Cantabria procedures regulated on RD 1125/2003 and on 'evaluation activities' approved by the Civil Engineering School Assembly on june, 10th, 2010				
Observations for part-time students				
Final deliverable is mandatory to pass the course				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Alonso, B., dell'Olio, L. Ibeas, A. (2019) "Sistemas ferroviarios. Apuntes de la asignatura"