

# Planning and Operation of Road Networks (250451)

## General Information

<b>School</b>	ETSECCPB
<b>Departments</b>	Departament d'Enginyeria Civil i Ambiental (DECA)
<b>Credits</b>	5.0 ECTS
<b>Programs</b>	MÀSTER UNIVERSITARI EN ENGINYERIA DE CAMINS, CANALS I PORTS (pla 2012) MÀSTER UNIVERSITARI EN ENGINYERIA DE CAMINS, CANALS I PORTS (pla 2012) PARS: ENGINYER/A DE CAMINS, CANALS I PORTS (pla 2022)
<b>Course</b>	2025/26

## Main teaching language at each group

- Group 11Q2 Spanish (Q2)
- Group 12Q2 Spanish (Q2)

## Faculty

Responsible Faculty: Adriana Haydee Martinez Reguero

Faculty: Xavier Espinet Alegre, Teresa López Montero, Adriana Haydee Martinez Reguero, Jose Rodrigo Miro Recasens

## Objectives of Education

Specialization subject in which knowledge on specific competences is intensified.

Knowledge and skills at specialization level that permit the development and application of techniques and methodologies at advanced level.

Contents of specialization at master level related to research or innovation in the field of engineering.

## Competencies

### Especific

The ability to plan, manage and operate civil engineering infrastructure.

### Transversal

**ENTREPRENEURSHIP AND INNOVATION:** Being aware of and understanding the mechanisms on which scientific research is based, as well as the mechanisms and instruments for transferring results among socio-economic agents involved in research, development and innovation processes.

**SUSTAINABILITY AND SOCIAL COMMITMENT:** Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

**TEAMWORK:** Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

## Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	25.5 h	56.67 %
	Medium group	9.75 h	21.67 %
	Laboratory classes	9.75 h	21.67 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

## Contents

### 1. Road networks. Planning, financing and management in Spain.

Introduction  
The Spanish road network. Organization, financing and management

### 2. Pavements. Basic principles.

Road pavements. Types and characteristics  
Distress mechanisms and factors  
Pavement types and distress modes

### 3. Pavement surface characteristics

Introduction  
Adherence  
Noise produced by vehicle circulation  
Surface roughness  
Optical characteristics

### 4. Pavement design

Structural pavement design  
Experimental and analytical methods  
Exercises of flexible and rigid pavement design

### 5. Pavement auscultation

Auscultation  
Visual inspection  
Determination of pavement surface characteristics  
Determination of pavement mechanical characteristics

### 6. Maintenance of flexible pavements

Pavement condition, diagnosis and decision making  
Ordinary conservation. Local repairs and small failures  
Pavement reinforcement exercises

### 7. Maintenance of rigid pavements

Introduction  
Repair of local failures  
Surface rehabilitation  
Reinforcement and structural rehabilitation

### 8. Pavement recycling

Introduction  
Cold in place recycling  
Hot mix asphalt in plant recycling

## **9. Pavement management systems**

Pavement management systems  
Structure of a management system  
Benefits of implementation  
Exercises of management systems

## **Teaching Methodology**

The course consists of 1,5 hours per week of classroom activity (large size group) and 0,8 hours weekly with half the students (medium size group).

The 1,5 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0,8 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

## **Grading Rules**

*(\*) The evaluation calendar and grading rules will be approved before the start of the course.*

The grade for the subject will be obtained on the basis of the marks obtained in two partial evaluations and some directed activities carried out during the course.

The directed activities, which may be both individual and group, of an additive and formative nature, will be carried out during the course, both inside and outside the classroom.

The final mark will be the weighted arithmetic average with 40% of the mark for each partial assessment and 20% for the directed activities.

In order to pass the course, the grade must be equal to or higher than 5 (five).

In addition, once the course has been completed, there will be a re-evaluation exam to which students who, having obtained a numerical mark for the subject, do not obtain a mark equal to or higher than 5.0 will be entitled.

Grading criteria and admission to the re-evaluation: students failed in the ordinary assessment who have regularly taken the assessment tests of the failed subject will have the option of taking a re-evaluation test in the period set in the academic calendar. Students who have already passed the re-evaluation test of a subject and students who have been marked as failed may not take the re-evaluation test of a subject. The maximum grade in the case of taking the re-evaluation exam shall be five (5.0) and shall be the grade obtained only in the re-evaluation exam. The non-attendance of a student summoned to the re-evaluation test, held in the fixed period, may not give rise to the holding of another test at a later date. Extraordinary assessments will be carried out for those students who, due to accredited reasons of force majeure, have been unable to take any of the continuous assessment tests.

These tests must be authorised by the corresponding Head of Studies, at the request of the teacher responsible for the subject, and will be held within the corresponding academic period.

## Test Rules

Failure to perform a supervised activity or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

## Office Hours

Contacting the teacher beforehand.

## Bibliography

### Basic

- Pérez, F.E.; Miró, R.; Martínez, A. [Proyecto, conservación y gestión de firmes](#). Madrid: Asociación Española de la Carretera, 2007. ISBN 975-84-89875-71-5.
- Huang, Y.H. [Pavement analysis and design](#). 2nd ed. Upper Saddle River: Pearson Prentice Hall, 2012. ISBN 9780132726108.
- Dirección General de Carreteras. [Norma 6.1 IC: secciones de firmes](#). Madrid: MOPU. Secretaría General Técnica. Centro de Publicaciones, 2003.
- Ministerio de Fomento. [Rehabilitación de firmes: instrucción de carreteras: Norma 6.3 IC](#). Madrid: Ministerio de Fomento. Dirección General de Carreteras, 2003. ISBN 8449806968.
- De Solminihaç T., Herná'n; Echaveguren Navarro, Toma's; Chamorro Gine', Marcela Alondra. [Gestión de infraestructura vial](#). 3a ed. Santiago, Chile: Ediciones Universidad Católica de Chile, 2018. ISBN 9789561422759.

### Complementary

- Yoder, E.J.; Witczak, M.W. [Principles of pavement design](#). New York, [NY] [etc.]: John Wiley & Sons., 1975. ISBN 0471977802.

## Resources

<https://www.transportes.gob.es/carreteras>