250451 - PLAEXOXACA - Road Network Planning and Operation

**Coordinating unit:** 250 - ETSECCPB - Barcelona School of Civil Engineering
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering
**Academic year:** 2015
**Degree:**
- MASTER’S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
- MASTER’S DEGREE IN CIVIL ENGINEERING (RESEARCH TRACK) (Syllabus 2009). (Teaching unit Optional)
**ECTS credits:** 5
**Teaching languages:** Spanish

### Teaching staff

- **Coordinator:** FELIX-EDMUNDO PEREZ JIMENEZ
- **Others:** FELIX-EDMUNDO PEREZ JIMENEZ

### Degree competences to which the subject contributes

**Specific:**

8169. The ability to plan, manage and operate civil engineering infrastructure.

### 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.

### Learning objectives of the subject

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.
## Study load

<table>
<thead>
<tr>
<th><strong>Total learning time:</strong> 125h</th>
<th>Theory classes: 19h 30m 15.60%</th>
<th>Practical classes: 9h 45m 7.80%</th>
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<tbody>
<tr>
<td></td>
<td>Laboratory classes: 9h 45m 7.80%</td>
<td>Guided activities: 6h 4.80%</td>
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<td>Self study: 80h 64.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Learning time</th>
<th>Description</th>
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</table>
| **1. Road networks. Planning, financing and management in Spain.**     | 2h 24m        | **Description:** Introduction  
The Spanish road network. Organization, financing and management |
| **2. Pavements. Basic principles.**                                     | 4h 48m        | **Description:** Road pavements. Types and characteristics  
Distress mechanisms and factors  
Pavement types and distress modes |
| **3. Pavement surface characteristics**                                 | 10h 48m       | **Description:** Introduction  
Adherence  
Noise produced by vehicle circulation  
Surface roughness  
Optical characteristics |
| **4. Pavement design**                                                 | 21h 36m       | **Description:** Structural pavement design  
Experimental and analytical methods  
Exercises of flexible and rigid pavement design |
### 5. Pavement auscultation

**Description:**
- Auscultation
- Visual inspection
- Determination of pavement surface characteristics
- Determination of pavement mechanical characteristics

**Learning time:** 6h
- Theory classes: 2h 30m
- Self study: 3h 30m

### 6. Maintenance of flexible pavements

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

**Learning time:** 19h 12m
- Theory classes: 2h
- Practical classes: 3h
- Laboratory classes: 3h
- Self study: 11h 12m

### 7. Maintenance of rigid pavements

**Description:**
- Introduction
- Repair of local failures
- Surface rehabilitation
- Reinforcement and structural rehabilitation

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m

### 8. Pavement recycling

**Description:**
- Introduction
- Cold in place recycling
- Hot mix asphalt in plant recycling

**Learning time:** 3h 35m
- Theory classes: 1h 30m
- Self study: 2h 05m
9. Pavement management systems

Description:
- Pavement management systems
- Structure of a management system
- Benefits of implementation
- Exercises of management systems

Learning time: 20h 24m
- Theory classes: 2h 30m
- Practical classes: 3h
- Laboratory classes: 3h
- Self study: 11h 54m

Qualification system

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and exercises.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding.

Regulations for carrying out activities

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

Bibliography

Basic:
- Huang, Y.. Pavement analysis.

Complementary: