250450 - MOBURB - Urban Mobility

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN CIVIL ENGINEERING (PROFESSIONAL TRACK) (Syllabus 2012). (Teaching unit Optional)
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ECTS credits: 5  Teaching languages: English

Teaching staff
Coordinator: FRANCESC SORIGUERA MARTÍ
Others: FRANCESC SORIGUERA MARTÍ

Opening hours
Timetable: Friday from 16.30 to 18.30h.
Always by appointment by e-mail.

Degree competences to which the subject contributes

Specific:
8169. The ability to plan, manage and operate civil engineering infrastructure.
8234. Knowledge of transport engineering and planning, transport types and functions, urban transport, management of public transport services, demand, costs, logistics, and financing of transport infrastructure and services.

Transversal:
8559. 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.
8560. 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.
8561. 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.

Teaching methodology
The course consists of 3 hours per week of lectures in the classroom (large group).
2 hours are lectures, in which the teacher presents the basic concepts and materials.
1 hour is devoted to present examples and exercises with a greater interaction with students.
Support material will be provided on campus ATENEA: content, programming and evaluation, activities and relevant references.
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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.

The course aims to train students in the planning and management of urban mobility. The focus of the course is conceptual. It gives greater importance to the concepts and ideas to the detriment of facts, statistics and other descriptive aspects. This requires a significant degree of abstraction, which is balanced by the assignments with a more practical focus.

After an introductory session, the course consists of 3 main parts. The first aims to convey the fundamental concepts of planning public transport systems, regardless of their technological support. The conceptual design of the Barcelona new bus network is presented as a paradigmatic case study.

The second section deals with paratransit systems, flexible public transportation systems not subject to routes, and with the more innovative strategies of shared vehicles.

Finally, the third section addresses the urban traffic management.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 19h 30m</th>
<th>15.60%</th>
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</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>9h 45m</td>
<td>7.80%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>9h 45m</td>
<td>7.80%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>6h</td>
<td>4.80%</td>
</tr>
<tr>
<td>Self study:</td>
<td>80h</td>
<td>64.00%</td>
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</tbody>
</table>
# Introduction to Urban Mobility

**Learning time:** 7h 11m  
Theory classes: 1h  
Practical classes: 1h  
Laboratory classes: 1h  
Self study: 4h 11m

**Description:**  
Analysis of the mobility data of the city of Barcelona.  
Deliver of Assignment 1.  

**Specific objectives:**  
- Present the basic concepts.  
- Understand the data sources and mobility patterns for the city of Barcelona.

## Collective Transportation

**Learning time:** 40h 48m  
Theory classes: 13h  
Practical classes: 4h  
Self study: 23h 48m

**Description:**  
Vickrey model for the morning commute. Shuttle systems - collective transportation. Time independent demand.  
Time dependent demand. Transit & cars together.  
Idealized analysis. Limits to door-to-door speed. What we can do about it? Realistic analysis and optimization.  
Assignment 1 correction  
Generalization to simple service. One or two directional service. Local bus routing possibilities.  
Assignment 2 correction  

**Specific objectives:**  
- Understand the shuttle systems.  
- Extending the model to corridors.  
- Generalize the ideas of simple service to a service with hierarchies.  
- Understand the two-dimensional systems.  
- Constraints for practical implementations.  
- Final discussion on 2D systems
### 3-Transit network design - Barcelona case study

**Learning time:** 9h 36m  
- Theory classes: 1h  
- Practical classes: 3h  
- Self study: 5h 36m

**Description:**  
The hybrid concept. LCF & constraints. Solution.  
Assignment 3 correction

**Specific objectives:**  
Understand in more depth the concept of the hybrid network.  
Present concepts that support the design of the new bus network in Barcelona.

### 4-Paratransit - Flexible transit and vehicle sharing strategies

**Learning time:** 21h 36m  
- Theory classes: 7h  
- Practical classes: 2h  
- Self study: 12h 36m

**Description:**  
Benefits of flexible routes. Ways of delivering flexibility.  
Mini - Project solution

**Specific objectives:**  
Introduction to transportation systems on demand.  
Modeling taxis and dial-a-ride systems.  
Modeling shared vehicle systems.

### 5-Urban traffic management

**Learning time:** 7h 11m  
- Theory classes: 2h  
- Practical classes: 1h  
- Self study: 4h 11m

**Description:**  
MFD - Example for the city of San Francisco (CA).

**Specific objectives:**  
Understand the regulation according to the MFD.  
Application of the method.
The grade of the course is obtained from the marks of 3 homework assignments (each one accounts for 15% of the final mark), 1 group mini-project (20% of the final mark) and a final exam (open notes, open book, 35% of the final mark).

These assignments and mini-project will be held during the course (outside class). All of them will be corrected during class hours.

The final exam will be held during the last programmed lecture for the subject.

**Regulations for carrying out activities**

If any of the evaluation activities is not handed in in the scheduled period, it will be marked with zero.

**Bibliography**

**Basic:**


**Complementary:**


