250251 - ELEURBGMA - Urbanization and Management of Urban Environment

Coordinating unit: 250 - ETSECCPB - Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering
Academic year: 2018
Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
ECTS credits: 4,5
Teaching languages: Catalan, Spanish, English

Teaching staff
Coordinator: ELISABETH ROCA BOSCH
Others: JOSEP MERCADÉ ALOY, ELISABETH ROCA BOSCH

Opening hours
Timetable: Theory: Monday: 11:00-13:00
Workshop: Tuesday: 18:00-19:00

Degree competences to which the subject contributes

Specific:
3093. Knowledge of the regulatory framework of urban management
3094. Knowledge of the influence of infrastructures on town and country planning enabling participation in the urbanisation of urban public space, and on plans for urban services and utilities such as water distribution, sewage disposal, waste management, transport systems, traffic, lighting, etc

General:
3105. Students will learn to identify, formulate and solve a range of engineering problems. They will be expected to show initiative in interpreting and solving specific civil engineering problems and to demonstrate creativity and decision-making skills. Finally, students will develop creative and systematic strategies for analysing and solving problems.
3106. Students will learn to assess the complexity of the problems examined in the different subject areas, identify the key elements of the problem statement, and select the appropriate strategy for solving it. Once they have chosen a strategy, they will apply it and, if the desired solution is not reached, determine whether modifications are required. Students will use a range of methods and tools to determine whether their solution is correct or, at the very least, appropriate to the problem in question. More generally, students will be encouraged to consider the importance of creativity in science and technology.
3107. Students will learn to identify, model and analyse problems from open situations, consider alternative strategies for solving them, select the most appropriate solution on the basis of reasoned criteria, and consider a range of methods for validating their results. More generally, students will learn to work confidently with complex systems and to identify the interactions between their components.
3111. Students will learn to plan, design, manage and maintain systems suitable for use in civil engineering. They will develop a systematic approach to the complete life-cycle of a civil engineering infrastructure, system or service, which includes drafting and finalising project plans, identifying the basic materials and technologies required, making decisions, managing the different project activities, performing measurements, calculations and assessments, ensuring compliance with specifications, regulations and compulsory standards, evaluating the social and environmental impact of the processes and techniques used, and conducting economic analyses of human and material resources.
3112. Students will develop an understanding of the different functions of engineering, the processes involved in the life-cycle of a construction project, process or service, and the importance of systematising the design process. They will learn to identify and interpret the stages in preparing a product design specification (PDS), draft and optimise specifications and planning documents, and apply a systematic design process to the implementation and operation of
phases. Students will learn to write progress reports for a design process, use a range of project management tools and prepare final reports, and will be expected to show an awareness of the basic economic concepts associated with the product, process or service in question.

3113. Students will learn to identify user requirements, to draft definitions and specifications of the product, process or service in question, including a product design specification (PDS) document, and to follow industry-standard design management models. Students will be expected to show advanced knowledge of the steps involved in the design, execution and operation phases and to use the knowledge and tools covered in each subject area to the design and execution of their own projects. Finally, students will assess the impact of national, European and international legislation applicable to engineering projects.

**Transversal:**

586. ENTREPRENEURSHIP AND INNOVATION - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.

589. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.

594. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

584. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

**Teaching methodology**

The course consists of 2 hours per week of theoretical sessions and 1 hours weekly of workshop sessions.

The 1.5 hours are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, and 0.5 hours for evaluation and support activities.

The 1 hour weekly is devoted to solving 4 practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

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**

Introducción al concepto d’Urbanisme sostenible. Introdució als models urbans i de serveis urbans associats a una lectura de l'ecologia urbana i dels cicles de l'agua, l'energia i els materials. Mecanismes i processos de gestió dels sistemes urbans d'èpoc de la sostenibilitat. Elements constructius d'urbanització associats a un model sostenible.

Introducción al concepto de Urbanismo sostenible. Introducción a los modelos urbanos y de servicios urbanos asociados a una lectura de la ecología urbana y de los ciclos de agua, energía y materiales. Mecanismos y procesos de gestión de los sistemas urbanos desde la sostenibilidad. Elementos constructivos de urbanización asociados a un modelo sostenible.

Introduction to the concept of sustainable urbanism. Introduction to urban models and urban services related to a reading of urban ecology and cycles of water, energy and materials. Management mechanisms and processes of urban systems from sustainability. Residential construction elements associated to a sustainable model.
## Study load

<table>
<thead>
<tr>
<th>Study load</th>
<th>Time (h)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time:</td>
<td>112h 30m</td>
<td></td>
</tr>
<tr>
<td>Theory classes:</td>
<td>24h</td>
<td>21.33%</td>
</tr>
<tr>
<td>Practical classes:</td>
<td>12h</td>
<td>10.67%</td>
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<tr>
<td>Laboratory classes:</td>
<td>9h</td>
<td>8.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>4h 30m</td>
<td>4.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>63h</td>
<td>56.00%</td>
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Content

1. The elements of urban planning on time

<table>
<thead>
<tr>
<th>Learning time: 14h 23m</th>
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<tbody>
<tr>
<td>Theory classes: 2h</td>
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<tr>
<td>Practical classes: 4h</td>
</tr>
<tr>
<td>Self study : 8h 23m</td>
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</table>

Description:
The elements of urbanization
Gradual and survival in building networks
Reference levels of urbanization
Toward a sustainable territorial vision
Functionalist approach versus complementary network services

Presentation of the Workshop. The student performs a set of 4 workshops on various aspects of development related to urban infrastructure and transport services, their relationship to the urban area and its management from the perspective of urban sustainability. The 4 workshops will be based in the same town or neighborhood freely chosen by the student.

Workshop 1: Regional framework of the case study selected by each student in relation to mobility infrastructure networks and other landscape peculiarities.

Exercise 1.1: Practical Utilization of the main digital on-line sources to download topographical maps and updated territorial and urban planning information.

Workshop 1: Regional framework of the case study selected by each student in relation to mobility infrastructure networks and other landscape peculiarities.

Exercise 1.2: Elaboration of a holistic document representing the city in its regional framework.

Workshop 1: Regional framework of the case study selected by each student in relation to mobility infrastructure networks and other landscape peculiarities.

Exercise 1.3: Elaboration of a holistic document representing the city in its regional framework.

Workshop 2 Presentation: Drainage network graphical representation in relation to topography. Proposal for the implementation of a lagooning system to improve wastewater quality.

Specific objectives:
Introduce students an evolutionary view of urbanization
Highlight the contradiction between a normative view compartmentalized for each service and maximalist on the requirements of each element of urbanization, and the need of action who consider complementarity between services
Consider the 4-workshops as an opportunity to gradually implement the knowledge acquired during the theoretical lessons in a known context for students
Production of self-made graphical documents by editing available cartographic products.
Framing the case study in a much broader context by means of a synthetic and expressive map.
Framing the case study in a much broader context by means of a synthetic and expressive map.
### 2. Urban ecology and metabolism

**Description:**
Approaching from urban ecology to the urban management.
The city as ecosystem. The urban metabolism: the energy and resource consumption (water, land, etc.).
Environmental issues.
Management Strategies: The compact city, complex, diverse and efficient.
BCN Ecology Model.

**Specific objectives:**
To introduce the student in the urban management thinking and ecosystem perspective for urban management. Understand and apply the desirable criteria in sustainable urban models.

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### 3. Environmental assessment of urbanism

**Description:**
Elements of sustainability in urban legislation
Environmental assessment in the urban planning
The measure of sustainability and environmental indicators.
Application of indicators in urban contexts.

**Specific objectives:**
To recognize the legal instruments applicable to planning practice in order to assess their environmental impact and improve their sustainability.
Learning to use indicators in the analysis of urban sustainability.
4. Eco-towns in perspective

**Description:**
- Eco-neighbourhoods Concept
- Environmental elements, a social and economic ecobarrio
- Analysis of reference Eco-neighbourhoods experiences (Vauban (Freiburg))
- Potential and Limits of Eco-neighbourhoods
- Comparison between Eco-neighbourhoods: Vauban and Vallbona.

**Specific objectives:**
- Submit eco-neighbourhoods experiences as reference points shift to a more environmentally friendly development pattern.
- Introduce environmental aspects, social and economic concept of eco-neighbourhood
- Compare experiences to evaluate the degree of change towards a model of ecological development can be a eco-neighbourhood.

**Learning time:** 4h 48m
- Theory classes: 2h
- Self study: 2h 48m
5. Water cycle and sustainable urbanization

Learning time: 12h
- Theory classes: 2h
- Practical classes: 2h
- Laboratory classes: 1h
- Self study: 7h

Description:
Introduction to the water cycle in urban systems.
The reduction of cycles in areas nearby.
Assessment of flood zones and their coexistence with urban uses and activities.
Technologies to reduce water consumption.
Water reuse technologies.
Examples of alternative development, including drainage and wetlands.

Workshop 2 Presentation: Drainage network graphical representation in relation to topography. Proposal for the implementation of a lagooning system to improve wastewater quality.
Exercise 2.1. Diagrammatic scheme of the urban drainage network

Workshop 2 Presentation: Drainage network graphical representation in relation to topography. Proposal for the implementation of a lagooning system to improve wastewater quality.
Exercise 2.2.: 
* Identification of locations suitable for implementing a lagooning system within a residential fabric. Graphic representation of the adopted solution.
* Report writing

Specific objectives:
Understanding the water cycle and the possibility of water reuse with urban elements.
Comprehending the relationship between urban form/evolution and natural/artificial drainage structure.
Highlighting drainage system improvement projects as a real tool for city planning.
6. Materials cycle: the urban solid management

<table>
<thead>
<tr>
<th>Learning time: 4h 48m</th>
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<tr>
<td>Theory classes: 1h</td>
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<tr>
<td>Laboratory classes: 1h</td>
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<tr>
<td>Self study: 2h 48m</td>
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**Description:**
The cycle of materials and its impacts on urban planning.
Principles of sufficiency, proximity and polluter pays.
Technologies and systems for urban waste collection.
Municipal experiences of urban waste collection and management.

The management of urban waste in the municipality studied in workshops.
Advantages and disadvantages of different types of waste collection.

**Specific objectives:**
To understand the cycle of materials and waste management in urban contexts.
To assess the urban effects of the existing models of waste collection.

Knowing the problems of waste management in a particular town.
Compare and analyze diverse cases of waste collection of the municipalities studied in the workshops.
7. Mobility, energy and sustainable urbanization

Learning time: 28h 47m

- Theory classes: 2h
- Practical classes: 6h
- Laboratory classes: 4h
- Self study: 16h 47m

Description:

Sustainable Mobility
Criteria for sustainable mobility
Sustainable Mobility Act
Generated mobility studies
Evaluation of energy consumption, pollution generation, noise generation
Experiences of restructuring of the transport and mobility associated with public transport
Experiences of restructuring of the transport associated with pedestrian and bicycle paths

Workshop 3 Presentation: Identification and delimitation of feasible possible environmental areas based on a sustainable mobility system.
Workshop 3: Identification and delimitation of feasible environmental areas based on a sustainable mobility system
Exercise 3.1: Mobility infrastructures hierarchical representation in relation to the urban context.

Workshop 3: Identification and delimitation of feasible environmental areas based on a sustainable mobility system
Exercise 3.2: Environmental area delimitation
Preparation of a mobility map
Environmental area rearrangement proposal based on a sustainable mobility model
Report writing
Workshop 4 Presentation: Rearrangement of a road network element from a water cycle and mobility
Workshop 3: Identification and delimitation of feasible environmental areas based on a sustainable mobility system
Exercise 3.3: Environmental area delimitation
* Preparation of a mobility map
* Environmental area rearrangement proposal based on a sustainable mobility model
* Report writing
Workshop 4 Presentation: Rearrangement of a road network element from a water cycle and mobility management sustainable approach.

Workshop 4 Presentation: Rearrangement of a road network element from a water cycle and mobility management sustainable approach.
Exercise 4.1:
* Justification of the study area
* Mobility and water cycle proposal evaluation for the study area.

Workshop 4 Presentation: Rearrangement of a road network element from a water cycle and mobility management sustainable approach.
Exercise 4.2:
* Floor plan, elevation and section drawing of the study area (present)
* Floor plan, elevation and section drawing of the study area (proposal)
* Report writing.
Specific objectives:
Introduce students to the analysis of the close correlation between mobility model and sustainable energy model. Introduce to the students to use key indicators to evaluate the model of energy and mobility.

Considering the sequence: theoretical approach, urban analysis, urban planning and urban project as a feedback tool
Relating urban form and Spatial structure to the evolution of mobility
Implementing sustainable mobility solutions as quality public space projects.
Implementing sustainable mobility solutions as quality public space projects.
Sustainable urban street design as a contribution to urban landscape quality.

Acquire basic skills in public space design.
Acquire basic skills in public space design.

8. Atmosphere management: Noise and air quality planning

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

Description:
The management of air quality: legislative framework and strategies for planning and management of air pollution.
Plans to improve air quality in the Metropolitan Area of Barcelona.

Specific objectives:
To learn management strategies and planning tools to appraise atmospheric problems such as noise and air pollution.

9. Public spaces, landscape and urban biodiversity

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

Description:
Quality of public spaces. Uses, activities and design.
Urban parks and green corridors
Planning and management of urban beaches.

Specific objectives:
To provide the students with criteria for assessing the quality of public spaces.
To be able to elaborate proposals for planning and management of public spaces.
### 10. Public spaces and urban mobility. Parks and anthropic practices

**Description:**
Analysis of the relationship of mobility in public spaces and character of the spaces
Design criteria of the squares and parks from the perspective of the relationship between public spaces
Interaction between natural parks and urban systems
Measuring accessibility to natural areas
Anthropic pressure of public spaces and urban parks.

**Specific objectives:**
To provide the students with criteria for assessing the quality of public spaces.
To be able to elaborate proposals for planning and management of public spaces.

### 11. Urban environmental management and energy cycle

**Description:**
Infraestructuras urbanas para la eficiencia energética y de aprovechamiento local de los recursos energéticos renovables.
Los elementos de urbanización y de gestión favorables a los recursos energéticos renovables.
Los Planes de Acción de Energía Sostenible (PAES)
Evaluación de las acciones más eficaces para la reducción de la generación de CO2.

Urban environmental management and the energy cycle on the workshop municipality.
Analyse of Agenda 21 of Workshop municipality

**Specific objectives:**
To understand the energy cycle in urban contexts and the elements of urban planning and management pro-renewable energy resources.
To assess the urban effects of the existing models of energy and the Action Plans Sustainable Energy (PAES).
To understand the energy cycle in urban contexts and the elements of urban planning and management pro-renewable energy resources on the Workshop municipality.
## 12. Cost and management of urban sprawl

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

**Description:**  
Causes and trends of urban sprawl in the RMB  
Economic, social and environmental costs of urban sprawl.  
Policies and ways of intervention in low-density urbanization.

**Specific objectives:**  
To understand the urban sprawl phenomena in metropolitan areas and their economic, social and environmental costs associated to them.

## 13. Access to urbanization networks and social equity

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

**Description:**  
Infrastructures and social segregation  
Urban Regeneration: Diversity and social stability.

**Specific objectives:**  
To understand the processes of social segregation caused by unequal access to transport infrastructure and urban services.  
To provide the student with analytical capacity to assess urban regeneration plans to improve social inequities.

## 14. Participatory processes in planning and urban management

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

**Description:**  
Agenda 21 and citizen participation.  
Consultation and participatory processes in urban planning.  
Participatory experiences in Catalonia.

**Specific objectives:**  
To know the background on citizen participation for environmental management of the city.  
To meet and analyse experiences that enhance participatory planning practice.
The mark of the course is obtained from the ratings of continuous assessment.

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 teachings of the laboratory grade is the average in such activities.

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, and a part with a set of application exercises.

Criteria for re-evaluation qualification and eligibility: Students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

The final mark consists on a written test which counts for 40%, four practical assignments which correspond to 50% and the remaining 10% correspond to the participation and attendance to class.

The four practical assignments are considered essential to pass the course.

It planned a fieldtrip during the course and a review should be deliver as a compulsory activity to pass the course. At the end of the course, there will be an extraordinary test for those who, having delivered the 4 exercises, were unable to pass the course with the continuous assessment.
Bibliography

Basic:


Complementary: