

Course guide

2500053 - GECAPLASUB - Administration, Urban Planning and Public Services

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Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Optional subject).
Academic year: 2023 **ECTS Credits:** 7.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: PERE MACIAS ARAU
Others: PERE MACIAS ARAU, DANIEL RODRIGUEZ ARANDA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

14424. Knowledge of the urban management regulation framework. (Specific technology module: Urban Transport and Services)
14425. Knowledge of the influence of infrastructure in the planning of the territory and to participate in the urbanization of urban public space, such as water distribution, sanitation, waste management, transport systems, traffic, lighting, etc. (Specific technology module: Urban Transport and Services)
14426. Knowledge of the design and operation of infrastructures for modal exchange, such as ports, airports, railway stations and transport logistics centers. (Specific technology module: Urban Transport and Services)

Generical:

14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.
14383. Ability to project, inspect and direct works, in their field.
14385. Ability to carry out territorial planning studies and environmental aspects related to infrastructure, in its field.
14386. Capacity for maintenance, conservation and exploitation of infrastructure, in its field.
14389. Knowledge of the history of civil engineering and training to analyze and assess public works in particular and construction in general.
14390. Identify, formulate and solve engineering problems. Pose and solve construction engineering problems with initiative, decision-making skills and creativity. Develop a systematic and creative method of analysis and problem solving. (Additional school competition).
14391. Conceive, project, manage and maintain systems in the field of construction engineering. Cover the entire life cycle of an infrastructure or system or service in the field of construction engineering. (Additional school competition).

TEACHING METHODOLOGY

The course consists of 5 hours per week of classes in the classroom during a semester, of which four will be in large group and 1 hour (dedicated to the works or exercises intended) to the group average.

It is dedicated to lectures and 4 hours of problems in large group, in which the teacher explains the concepts and basic materials of the subject, presents examples and exercises.

We spend an hour (group average), the resolution of practical course (lab planning and project services) led by the classroom teacher and a greater interaction with students in order to consolidate general and specific learning objectives of the course.

The course is divided into two modules, I and II:

Module I - consists of 15 sessions of 2 hours / week, which combines theoretical explanations (with appropriate visual support) and carrying out practical activities related to the theme of the day. These activities must be completed individually by each student, with the delivery of work in the following class. The exercises are announced:

- 1 - Research information for the preparation, planning, surveying, geographic data, statistics, ... to different sources.
- 2 - Comparison of levels of accuracy in spatial planning.
- 3 - Study of the POUM of a municipality.

.- Module II consists of 15 sessions of 3 hours per week, of which 2 hours / week spent mostly in the theoretical explanations and visual support for the resolution of practical exercises to consolidate the objectives of general and specific learning and 1 hour / week in the resolution of coursework dirigts with personalized assistance, the student performs individually and continuously throughout the course to it until the day of delivery. Specifically four complementary work with partial deliveries complete theory, and prepare for the professional practice of projecting the various services of the estate. The work conducted in this part of the course are:

- 4 - Analysis and design of the plane parts of the different characteristics of each of the urban fabric of a city average, the articulated skeleton of the road network and mobility management proposal il'aparcament to create an "Area pedestrian "in the historic center of town.
- 5 - Draft a section of the collector in an urban area of new development.
- 6 - Design and dimensioning of a distribution network of drinking water in an urban area of new development ..
- 7 - Design and calculation of lighting and electrical installation of lighting the streets of an area of new development.

Support materials used in the form of detailed educational plan through the virtual campus ATENEA: content, programming and evaluation activities directed learning 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.

LEARNING OBJECTIVES OF THE SUBJECT

Knowledge of administration and urban planning. Ability to participate in the development of urban public space, as well as in urban services projects such as water distribution, sewage, waste management, transport systems, traffic, lighting, etc., and acquire an understanding of the urban management regulation framework.

1 Ability to participate in the urbanization of urban public space and in urban services projects, such as water distribution, sewage, waste management, transport systems, traffic, lighting, etc.

Knowledge at the level of specialization in urban planning and administration and ability to participate in the urbanization of urban public space and in urban service projects, such as water distribution, sanitation, waste management, transportation systems, traffic, lighting, etc. and knowledge of the regulatory framework for urban management. The course is divided into two modules I and II:

.- Module I: "Planning and urban management and municipal administration". The main objective of this module will explain the contents of urban intervention as a social need for regulation of property rights and the relationship should be with the construction of urban infrastructure services, for each of the different levels of intervention urban planning. And see how the local government especially in the area of recruitment, the modalities of service delivery, and adoption of the various figures of urban planning.

.- Module II: "Urban Infrastructure Services." The basic objective of the module is the technical study of the infrastructure of different urban services which characterize the development of the modern city from an urban perspective, ie the service of the conformation and good use of the city and its physical elements (public spaces, land and buildings), to integrate and play the functional aspects, calculation, design and provision of each service together in public spaces.

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.- Module I: "Planning and urban management and municipal administration". The main objective of this module will explain the contents of urban intervention as a social need for regulation of property rights and the relationship should be with the construction of urban infrastructure services, for each of the different levels of intervention urban planning. And see how the local government especially in the area of recruitment, the modalities of service delivery, and adoption of the various figures of urban planning.

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This requires that students understand and read previous urban plans, through the differentiation of different forms of urban growth and structure of road network (additional objective of the course).

Finds the work to summarize the technological concepts from other fields within the race to transmit from this new service shared vision of building the city and its elements. It is intended that the student understands that the design and dimensioning of the infrastructure of urban services is more than a mere exercise in calculating the functional variables, and that they are relegated to the final outcome of a process of design and assembly design public space.

STUDY LOAD

Type	Hours	Percentage
Hours large group	37,5	20.00
Guided activities	7,5	4.00
Hours medium group	37,5	20.00
Self study	105,0	56.00

Total learning time: 187.5 h



CONTENTS

MODULE I UNIT I.- Introduction to urban planning and regulatory system

Description:

- 1.1.- Organic growth in the planned city. Urban streams in the nineteenth century. Evolution of the planning regulations in Spain since the first extensions. The Land Act 1956.
- 1.2.- Urban development, the principles of the policy and regulatory system of urban planning.

Specific objectives:

- .- To understand the need for planning and regulating urban growth from the urban planning and development of the foreground of urban design and urban expansion ordinance to regulate all municipal land.
- .- Also see the need of urban planning regulation in response to the demand for urban growth at the time of the emergence of widespread urban services and urban surplus.
- .- To introduce the basics of the skeleton is based on the regulatory system in force planning in Catalonia.
- .- From the legal logic to understand the legal basis on which legislation governing urban development and rights.
- .- To understand the concept of regulating the right to property from the standpoint of the public.

Full-or-part-time: 9h 36m

Theory classes: 4h

Self study : 5h 36m

MODULE II. UNIT 1.- The construction of the modern city. The urban services.

Description:

1.1.- Concept urban situation. Potential and vocations of places. Application to Catalan territorial framework: general physical structure of the territory: the maze of ridges and troughs Catalan takes form and structure through gaps Besós-Congost-Ter and the Llobregat-Cardener. The situation of places throughout recent human history: Catalonia refuge and corridor. The privileged location of Barcelona and the vocation of capital. The formation of transport networks and 8 Catalan.

1.2.- Concept of urban location. Description of the place through the terrain, landscape, employment and human activity. Room sizes. Application to Barcelona in the Eixample projects (of Cerdà) and Sanitation (from Pedro Garcia Faria)

1.3.- The different forms of urban growth explained as a temporary combination of the elements, the importance of the element and the type of agent that embodies the physical elements of urban construction, land development (subdivision P), construction of infrastructure (Private U), and Building E: Antigua and Gotham City, Suburban Growth, the Eixample, the Garden City, the housing estate, and the Marginal Private.

.- Assignment 4: Analysis and design of the plane of the most characteristic of each of the different urban fabric of a medium city, articulated by the skeleton of the road network, and proposed management of mobility and parking to create an "Area Pedestrian" in the Historic Center of town

Work 4.- Part 1: Draw the level of tissues or urban forms of the city and the road skeleton, differentiating itself through the design of the urban fabric.

1.4.- Characteristics urban plans Eixample, the urban part of the construction of urban services. Application to Barcelona. The case of Catalan Minor extensions. Morphological characteristics of the extensions.

Specific objectives:

.- To facilitate the student's understanding of the geomorphological conditions, historical, scenic, which determine: 1) the provision of urban systems and infrastructure networks applied to the case of Catalonia and described through maps (situation), 2) the description of the place and location through the planes, and 3) the morphology of urban forms (urban fabric) through the urban model of the forms of urban growth.

.- Understanding the location and plans, and expressed through the different level of urban fabric of the city articulated skeleton of the road network as necessary diagnosis to intervene in planning proposals, such as the proposed establishment of a pedestrian area in the old city.

Work 4 .Part 1: Understand that the design of the urban form is the main diagnostic element of any urban intervention in the city.

1.4.- To understand the role of articulating and ranking of urban growth that have been building different networks of urban services, applied to the case of construction of the Eixample in Barcelona.

1.4.- Check the layout and infrastructure such as ferrocarril, roads, channeling of streams, bridges, or has had a particular orientation of the plot of the new growth of urban extensions minors.

Full-or-part-time: 14h 23m

Theory classes: 4h

Laboratory classes: 2h

Self study : 8h 23m

MODULE I. UNIT 2 .- The background information and concepts in urban planning.

Description:

2.1.- La informació de base: El coneixement del LLOC on es realitza el planejament. Els trets fonamentals, la cartografia com a element imprescindible. El medi natural, el medi social, l'entorn econòmic.

Paper 1.- Presentation and documentation work required: Internet Research basic information for making urban planning work: topographic maps, geographical data, statistical ... the municipality to different sources. Students have the characteristics of the selected municipalities.

.- Work 1: Students have the characteristics of the selected municipalities.

2.2 .- Basic concepts in planning. Classification and grading of the soil. Areas and systems, land use and other planning concepts.

.- 2.3 .- The municipal ordinances, the provision of the building in line with the road, for isolated buildings or specific volumetric definition. Regulatory elements of the building: the floors, decks, outgoing items, the courtyards, ...

Specific objectives:

.- Understand that planning is a cross-function activity in urban and as such the need for a multiplicity of data and mapping resources, statistical, economic and social (urban information) for the preparation of various development plans.

- Show the most common sources where this information.

.- Paper 1: The student practice with the media's current information technology, collection of all resources mapping, statistics, etc., necessary for the preparation of different plans.

.- To assess the ability to synthesize or select the data most relevant to the operation and consistency in the presentation of them.

.- Insert the urban concepts of soil classification and legal status and qualifications in different areas and systems.

.- To present the different types of plans that make up the current planning system in Catalonia

.- Describe the three major types of construction or methods of disposition of the building on the plot and block

.- Defining the parameters of regulation of the building that will be appearing in various types of plans that will be introduced later.

Full-or-part-time: 19h 12m

Theory classes: 5h

Laboratory classes: 3h

Self study : 11h 12m

MÓDULE II. UNIT 2.- Construction the urban public space: streets, squares and parks.

Description:

2.1 .- Basic functions of the street side access to space parceled out and built, the pass-through infrastructure, public space of social relationship. Character of the street as the management, development, functions and uses, and the container side. Street types for its definition of urban fabric patterns or (rounds, boulevards, walls, connecting roads), for his insight into the urban fabric (avenues, avenues, walks, trips, breaking open streets existing urban fabric) or by belonging to a specific road network (passages, alleys, streets frames,...).

2.2 .- Concept of mobility. Explanatory variables and effects on the formation of urban growth. Participation and development of different forms of mobility in the metropolitan areas.

2.3 .- In the adaptation of the city in the car to adapt the car to the city. The report "Traffic in the cities" of C. Buchanan, and concepts of environmental capacity and Environmental Area. Increasing environmental capacity for urban renewal or restrictions and traffic calming. The traffic calming to be in the streets: streets and pedestrian areas, residential streets, coexistence or reverse priority (S-28 and the Dutch woonerf); streets of Zone 30. Elements of moderation of speed.

.- 4 Work conducted in the classroom by the teacher: Formalizing the road skeleton and typological categories of city streets.

2.4 .- Urban Mobility Plans (PMU). Prioritizing network traffic and ranking for each form of mobility. Traffic areas of peacekeeping. Reference to Catalan legislation mobility.

2.5 .- The project of road space: Planning and development of streets. Criteria and mechanisms for management of different areas of the road: requirements and measures of each form of mobility in the cross-sectional design, urban conditions to the layout plan and longitudinal profile of the street. Elements of the urbanization of the streets: urban pavements boundaries of urbanization, vegetation, trees and street furniture. Lane problems and longitudinal profiles in the streets resulting modified

topography. Elements of the urbanization of the streets: urban pavements boundaries of urbanization, vegetation, trees and street furniture.

2.5 .- Problems of fit of longitudinal profiles and streets resulting modified topography.

Work 4 .- Second part of the work: Proposal for management of mobility and parking to create a "pedestrian area" in the historic city center.

2.5 .- Elements of the urbanization of the streets: urban pavements boundaries of urbanization, vegetation, trees and street furniture.

Specific objectives:

2.1 .- 2.2 .- It takes the analysis of the post started, but now understood from the road way to understand the role of each of the streets of the plot, to allow proper projective intervention in the organization of urban mobility , management and development of the road.

2.3 .- That the urban road project is not a closed issue rigid and authoritarian imposed on a sectoral determination for some of the functions or uses to which they should serve, unlike an open problem to be met so many different integrated requests and demands a proper context for environmental quality and good urban use in the intervention.

.- To understand the urban form of the city from the shape of the skeleton of the road network and the role played by different types of streets set out in class.

.- To enable the different forms of mobility in the city by creating networks for each of them from nesting on the roads and creating traffic calming areas.

.- Understanding urban road project as a result of the resolution of conflicts among requests of different users and functions of the street.

.- Exercises 2.5.: Mastering the analytical fit the profile shape in vertical agreements and the resulting modified plant topography of combining cross-sectional profile.

.- Work 4, part 2: Emphasize that this type of intervention proposals on mobility are mainly the outcome of the analysis and translation of the urban form of the city that has drawn in the plane of the first part of this work 4.

.- To facilitate constructive solutions portfolio with different materials of urban pavements, adapted to different requests and users.

.- Concern provide students with the lace in the layout of the various items of furniture, plants and trees, and other records or items of service facilities in the urban road project, to ensure their proper use.

Full-or-part-time: 24h

Theory classes: 6h

Practical classes: 1h

Laboratory classes: 3h

Self study : 14h

MODULE II. UNIT 3 .- The system of urban sanitation and potable water distribution.

Description:

3.1 .- Disposal and phases: collection and transport (sewage and types), treatment or purification, and discharges to the environment.

3.2 .- The drainage net: Sizing of pipes. Urban hydrology concepts and calculation of runoff flow by applying the rational method and the formulation of Témez: calculation of runoff coefficients in urban areas, aggregation of river runoff through the analysis of the fragmentation, the time of runoff , aggregation of travel times to calculate the time of concentration and determination of the intensities of precipitation. Waste water demand for different end uses and urban coefficients. Hydraulic calculations of free surface scheme for the Manning formula, applied to the case of circular ducts. Earrings and optimum speeds. Mechanical dimensioning circular ducts: optimal depth, longitudinal profile section I trench and pipe materials and joints.

.- Delivery work 4.

.- Work 5: Draft a section of the collector in an urban area of new development to incorporate an overflow of excess stormwater to a stream. Work directed by the teacher in the classroom.

.- Delimitation and aggregation of watersheds and times for calculating runoff hydrologic flow. Manning Hydraulic calculation for pipes, scuppers and overflows.

3.3 .- Network elements: functions, layout and construction of the different work units. Wastewater collection and storm: building connections and valves, scuppers, cross bars and boxes (absorption capacity); sandbox header.

Manholes and hydraulic jump. Jump spillway side, height and length of the lip. Siphons. Gates.

3.4 .- Designing alternative systems of urban drainage based on the retention, storage and infiltration of rain water: theoretical basis, calculation of retention capacity and techniques. Filter ditches, reservoirs, ponds and porous surfaces.

5.- Work in the classroom by students led by the teacher.

3.5.- Wastewater treatment. Physical, chemical and bacteriological wastewater. Measurement parameters.

Autonomous systems or extensive: Design, dimensioning of the elements and urban areas of application. Pretreatment elements: the septic tank and settling tank digester. The filtration treatment: trenches and filter beds with natural soil, sand filters providing vertical or horizontal, earth mounds contribution. Impoundment.

Intensive or conventional systems: The treatment plant activated sludge. And design elements. Reference to the Treatment Plan of Catalonia

3.6.- Daily potable water demand, consumption trends and tips for each of the urban uses: residential, tertiary, industrial, facilities, services and watering gardens.

3.7.- Elements prior to distribution, collection, transportation, treatment and control tanks. Brief description of each of the types of deposits of regulation.

3.8.- Constraints hydraulic operation of the network: optimal regimen of pressures and speeds. The phenomenon of water hammer and pipe ring. Hydraulic calculation of flow distribution in meshed networks, the method of Hardy Cross and the Bernoulli Theorem.

Check pressures and speeds. Checking the conditions of fire.

.- To design and test flow rates, pressure drops and speeds in a network of looped water distribution using Bernoulli's theorem in the iterative method of Hardy Cross.

3.9.- Functional elements of the network of water distribution: Description, functions and available on the network. Piping Materials and unions. Civil Works ditch in the road layout, easements for parallels and intersections with other services. Valves, backflow, cupping, reducing pressure, drainage, fire hydrants, hydrants, manholes, anchors, connections, sources, special pieces. Special case of the irrigation system, sprinklers, nozzles and drip.

.- Work 6: Design and dimensioning of a network of water distribution in an urban area of new development. Presentation and assistance

Specific objectives:

.- Synthesizing technological expertise in hydrology and hydraulics for playback from a planning perspective, ie the service of building the city and its components: development of the street, I plots buildings, layout and arrangement of functional elements sewerage, construction details, connections to the building. Introduce students.

.- Constructive concern from the time formalize the project, carefully defining the different units of work and how to proceed in developing measures and budget.

.- To familiarize the student with techniques and tools of the construction project, especially in the implementation of plans at different scales and the successful establishment of correspondence between design, calculation, construction process, materials, construction units, measurements and budget.

.- To apply the method of formation of rational flow of rain water and the sizing of the different elements of the sewer.

.- Provide and properly size conventional functional elements of the network as well as those new elements intended to infiltrate into the ground and stored in origin or elements of high-capacity peak flows before reaching the sewer system operators with lower flow .

.- Resolution of questions and corrections to the execution of work 5.

- Apply autonomous sanitation techniques "naturalized" in urban areas and sparsely scattered population.

.- Design, measure, and verify proper hydraulic operation of a distribution network of drinking water.

.- To facilitate the process of defining the parameters of solicitation and design in a meshed distribution network of drinking water and check that the calculation is a tool to validate the usefulness of design outcomes.

.- Understand the roles and adequately the various elements (valves) of the distribution network of drinking water.

.- Apply the parameters of solicitation and design of a network of water distribution in a real case of sector specific new development, and verification of results with the implementation of the iterative method of Hardy Cross.

Full-or-part-time: 28h 47m

Theory classes: 6h

Practical classes: 2h

Laboratory classes: 4h

Self study : 16h 47m

MODULE I. UNIT 3 .- Master planning instruments.

Description:

3.1 .- The guideline Planning: The planning instruments, the reference to the plan and the planning system in force in Catalonia. The planning guideline or territory: the General Territorial Plan of Catalonia and the different master plans. The sectoral planning. Presentation of specific cases of each type of regional and sectoral plans.

.- Presentation work 2 Module I: Analysis of the Master Plan of Catalonia and comparison with the contents of the various sectoral planning.

Specific objectives:

.- Exhibit different types of plans that make the planning system structured and ordered "falls" from the territory's largest to the smallest, from the original plans and plans to derivatives.

.- Differentiate between levels of territorial planning and city management, which relies on those coherence in planning and forecasting their formal organization of the city and the definition of property rights of each portion of soil.

.- See how the master plans indicate the broad guidelines that would guide the urban development of a territory, with due consideration to environmental issues, and establish the physical framework in which the forecasts are to be developed, spatially localized, of economic and social planning.

.- Demand increased accuracy in the content of the plans and determinations as it is based on the geographical scope of the document.

.- Check if the existing hierarchy in the different territorial plans is respected when drafting regional plans derivatives, or in sectoral plans approved after the General Territorial Plan of Catalonia.

Full-or-part-time: 9h 36m

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h 36m

MODULE I. UNIT 4 .- Instruments for urban planning and implementing urban development.

Description:

4.1 .- The general planning. The Urban Master Plans and Plans of Municipal Urban Planning. Regulation and management of urban land. Management units (sectors) and action (polygons) on urban land and building. Specific concepts of urban planning: the standards of land reserves and transfer systems for the urban use il'edificabilitat. The complementary studies of mobility, flood, social ... The catalog of items protected. The study program of economic and financial performance

4.2 .- The urban planning derivative. Plans Partial development sectors of land. Plans to Improve Urban Development sectors of urban land. Other plans for special planning. Presentation of specific cases for each type of urban planning derivate.

.- Work 3: Analysis of an Urban Development Plan in a given municipality.

.- Work 2 delivery: Analysis of General Territorial Plan of Catalonia and comparison with the contents of Partial Territorial Planning and the various sector plans later

4.3 .- The urban management as a transformation of the legal structure of land ownership according to the requirements of planning and the expression of the principle of equity in the distribution of rights and urban loads. Types of land management by involving the administration. The proposed land subdivision. The compensation systems, cooperation and expropriation. The agreement required the delineation of polygons in action. The assessment of soil and the distribution according to urban use. Presentation of a case of land subdivision project.

4.4 .- The project for development and realization of the physical transformation of public space planning in the planning. Differentiation with ordinary works projects. Structure development and provision of various service networks. Measurements, pictures, prices and budget. Presentation of a proposed development.

.- Assistance to students in the resolution of questions and corrections to work 3.

Specific objectives:

.- Apply the concept of cascading planning in urban areas, proper planning and general planning.

.- Describe the planning for excellence, the POUM, the constraints imposed territorial planning and the time the concept of municipal independence in writing as original plan.

- To differentiate the legal regime of property rights between systems and areas, and between the classification and the classification of land.
- To understand the general systems as shapers of the urban structure (concrete skeleton of a city organization, consisting of those elements that predetermine the configuration of urban growth and ensure the operation of a whole).
- To understand the rating categories of land zoning, indicating the uses and intensities of occupation allowed, and planning regulations as a tool for application to the qualification zone.
- Define the findings and planning the content of lead in accordance with overall planning, transfer standards, ...
- Understanding Partial Plan as a development plan for the detailed planning of a sector of the city.
- Define the rights and obligations that each property has to undertake in order to fulfill the destiny of the floor, which is the Plan for each type of soil, with special reference to determinations and developable urban land.
- Work 3: Know the content of the POUM in a given municipality, interpreting the different actions of urban growth expansion or upgrading of existing urban fabric, capturing the final picture of the city, see how this affects urban growth and reform and assess the suitability of the approaches made.
- To understand the need for reorganization of land ownership imposed by the transformation of rural land to urban requires mechanisms and instruments for equitable distribution of property right.
- To present the different systems of urban development, transforming the legal structure of rural property to urban and reforms undertaken within the existing urban fabric.
- Synthesize other content appearing on course design and dimensioning of the road system and other urban services to apply them to the execution of urban planning derived.
- Orient the student to discern the documentation that most influences the POUM materialize the objectives of urban planning and urban renewal proposals.

Full-or-part-time: 21h 36m

Theory classes: 7h

Laboratory classes: 2h

Self study : 12h 36m

MÓDULE II. UNIT 4.- Lighting the urban public space.

Description:

- 4.1.- Functions of urban lighting. Brief description of lighting and urban public service: the torch to discharge lamps. The safe use of urban space at night and the creation of the urban night. Project requirements, mechanisms and techniques. Guiding principles of a lighting project: steering, road character and place, morphological integration in the environment, maintenance and operation.
- 4.2.- Parameters and lighting units: flow Φ , E light, luminous efficiency lm / w , intensity I , luminance or brightness L , uniforms or medium and minimum. Needs and levels of street lighting and other public spaces. The spectrum of sunlight.
- 4.3.- Elements of the installation: photometric characteristics of different lamps for outdoor lighting: VMCC, VSAP, VSBP, fluorescent, halogen, LED. The auxiliary power, starter, condenser, ballast. The dual-flow reduction reactor. Luminaires: Elements. Classification according to concentration or dispersion of flow and rates of IP protection. Representation of the photometric characteristics: polar diagram, utilization factors, isolux curves, curves isocandela. Lighting calculations. Dazzling comfort index (G and TI).
- Apply the curves of the factors used for exterior lighting predimensioning and verifying the results through the methods of the 9 or 12 points on the curves isolux.
 - Presentation of computer lighting calculations.
- 4.4.- Design of the facility. Lighting levels and uniformities for different intensities of use, types of streets and public spaces. Street width relations, provision of lighting, height, flow and separation of the points of light.
- 4.5.- Electrical Calculations lines for heating the criteria (I_{max}) and maximum voltage drop (ΔU 4.6.- Elements of civil works. The trench and the pipe, grounding, boxes and staves foundations.
- Work 7: Design and electric lighting calculations and installation of street lighting in the streets of an area of new development.
 - Resolution of case studies of electrical calculations by the size of the sections of lines of outdoor lighting.

- .- Corrections and resolution of questions work 7.
- .- Correction and resolution of individual questions by the teacher in the classroom.
- .- Correction and resolving individual questions by the teacher in the classroom

Specific objectives:

- .- The development of the student the importance of lighting in the creation of urban space at night, and as such largely condition that will use this space at night.
- .- Fleeing only quantitative concerns to which we are accustomed to use in the form of standards and manuals that make lighting a problem for vehicle traffic, which only dimensioned according to the maximum intensity of movement in and night time velocity of circulation, with the only concern of ensuring traffic safety.
- .- Understanding the urban public space as their use of different users, by the way she has, routes and urban elements to highlight, for the relationship with the built space, the lighting project requires a more open and rich concern that this month determines to which we referred. Calls for an effort to understand the place of intervention and to ensure good quality, composition and nighttime use.
- .- To know the techniques and materials from these facilities to adapt to the values and good use of urban space.
- .- Provide the student with the characteristics of the diverse range of materials commonly used in outdoor lighting and lighting calculation methods to verify the expected results of the previous design
- .- To exercise the student in mastering the application of lighting calculations for different photometric performances
- .- To identify ways to arrange and fix the lighting design variables in the streets and the need for coordination with the trees and building.
- .- Soak the student's concern for the constructive elements of the construction of the pipeline, manholes and foundations of canes.
- .- To understand the deployment and distribution power lines to feed the different points of light.
- .- To exercise the student in the sectional dimensions of lines and estimates of the power grid.
- .- Understanding the behavior of the costs of implementation and operation of the facility.
- .- To assist the student in the decision to choose the design variables of the lighting, putting them into the floor plan of the development and application of the methods of electric lighting calculations and check the correct sizing of the facilities.
- .- To exercise the student in the calculation of electric lines of outdoor lighting.
- .- Project road lighting correctly.
- .- Design, urban and check the fit calculation results of an installation of street lighting
- .- Design, urban and check the fit results of the calculation of a proposed street lighting.

Full-or-part-time: 24h

Theory classes: 4h

Practical classes: 2h

Laboratory classes: 4h

Self study : 14h

MODULE II. UNIT 5 .- Other networks of urban technical services: provision and coordination.

Description:

- 5.1 .- The distribution of electricity. Generation, transmission and processing of blood: Power generation, types and participation in the production of electricity. Air transport networks to very high voltage and high voltage. Easements. Substations. The network of medium voltage distribution transformers and centers. MT network types (linear and ring) and BT. The power demand of the various urban uses and the reduction of concurrency. Electrical calculations and low voltage by the criteria of maximum intensity and maximum voltage drop (ΔU)
- .- Forms of having urban development and design of electrical distribution lines in medium and low voltage and electrical calculations of voltage drop.
- 5.2 .- The gas distribution network.
- Type of gas and calorific value. The transport networks in high-pressure chambers and cabinets regassificació reduced pressure. The distribution in medium and low pressure. Claims and urban coefficients simultaneitat. Dimensioning of the network: flow calculations, quadratic load losses and maximum speeds. Materials and pipes together. Elements of the installation and civil works.
- 5.3 .- The telecommunications network cable.

Types of services: voice, data, image. Types of cables and transmission capabilities id'atenuació: pairs of copper wires (Cu) and technology _DSL; hybrid network with fiber optics and coaxial cable (HFC) optical fiber (POF) to the subscriber.

Structure network deployment of conventional copper wire pairs. Type plants and interconnections network supply, registration and first quarters urban distribution, interconnection cabinets, distribution network and the types of boxes, connection cabinets and dispersion, and the ravages of pairs cables to the subscribers. Type of piping and civil works.

The HFC network hybrid. Structure of deployment: the HUB, the nodes of power (NP), opto-electrical nodes (or NOE IS) with optic network, the network backbone with coaxial cable, radio frequency amplifiers, distribution network and referral to subscribers. Civil works and pipe boxes.

5.4 .- services recullida pneumatic solid waste, and transmission of heat and cold.

5.5 .- easements and provision of networks of urban services.

Type of the conventional network services: air and / or buried by road or sidewalk; servitude of parallelisms and crossings in underground networks. Section buried: Sidewalk needs minimal space. The shortage of road space available in galleries and services: types of galleries, cost and financing of civil works.

Specific objectives:

.- Communicate to students the skills necessary to understand the basic technology requirements of the project from these other networks of urban services operated by private companies, not necessarily to be self-sufficient in the drafting of projects, but that at the time to discuss with the technicians responsible for the suitability of the sizing companies and the implementation and configuration of networks, for proper coordination with the provision of other services.

.- To refer to more global aspects of the structure and deployment of the grid, from different generating stations to the subscriber service: the generation, transmission and substations high, assessment of service demand different urban uses, especially for stopping the sizing, calculation, layout and development in the urban public space of the distribution network and low voltage to the subscriber.

.- transparency Pioneering technology to other technicians are not linked to the respective service companies must increasingly act referees decisions implementing these services in public or unit coordinators in development projects.

.- To provide proper layout and arrangement of lines and elements of medium and low voltage in coordination with the subdivision, building and public space.

.- Understand the scope urban power supply of conventional sections of the lines in middle and low voltage transformer centers

.- To understand the need to establish a spatial order of the provision of services, and ultimately is an economic order in the construction of the city.

.- Equip the future construction engineer minimum technological skills that enable technical dialogue with those responsible for services companies to achieve optimal coordination in the implementation and provision of these networks in public spaces.

.- Open the way for technological transparency to other technicians are not linked to the respective service companies must increasingly act referees decisions implementing these services in public or unit coordinators in development projects.

.- Arbitrate in the planning and coordination of decisions by public companies, the coordination in the implementation of services in the road space.

.- Claiming the need to move towards the future solution gallery services where the density of services and the timing of new projects in the construction of urban space so require.

Full-or-part-time: 7h 11m

Theory classes: 2h

Practical classes: 1h

Self study : 4h 11m

MODULE I UNIT 5: City Administration

Description:

5.1 .- Municipal powers under the population threshold in the provision of services, goods and activities. Skills in urban planning approval.

5.2 .- Administrative organization of the governing bodies and staff to management.

5.3 .- Financing arrangements in the provision of different services: taxes, public fees, special levies.

5.4 .- The forms of management in providing administrative services and procurement: works, supplies, utilities management, services, consulting and technical assistance, public works concession.

Clauses in the pleats of the administrative and economic specifications.

The maintenance and preservation of urban services. The corrective maintenance, preventive regulations. Application to the case of lighting services, and public transport.

Specific objectives:

.- To know the functioning of local government especially in the field of urban design, procurement and service delivery arrangements, and approval of the various figures of urban planning.

.- Knowing how to relate to it as service providers such as engineering or professional staff at your service (staff).

.- To know the different ways of managing the provision of municipal public services and various forms of administrative contracting.

.- Present case recruitment service lighting maintenance, and management of urban public transport service in terms of modes of management, organization, and financing costs.

Full-or-part-time: 12h

Theory classes: 3h

Laboratory classes: 2h

Self study : 7h

MODULE II. UNIT 6. The cost of development. The environmental costs.

Description:

6.1 .- Differentiation between service and associated infrastructure for each service center.

6.2 .- Explanatory variables in the cost of development: Levels of minimum reference standard for each service. The efficiency of surface management, linear and land allocation. Economies of scale size of the performance: cost assessment by the method MSV (INCASOL) and others. The density of use and the unit cost of production of floor and ceiling urbanized.

6.3 .- Participation of the various services in the production cost of conventional residential streets. Galleries introduce additional costs and network services pneumatic collection of municipal solid waste.

6.4 .- The environmental costs of the infrastructure provision of services. Ruralise the city in the S XXI

Specific objectives:

.- Facilitate the provision of urban services over time, as it strengthens the action and the income level of residents.

.- Search more flexible and resilient to the consolidation of the elements of urbanization with the possibility of additions over time.

.- Relate variables of management of urban development with the cost of urbanization.

.- To demonstrate the strong impact on unit costs referred to clean soil and the plot has taken physical management, efficiency of the road surface and line the floor overall performance.

.- To evaluate the cost of urbanization according to the size of the action as road surface, in recognition of economies of scale in production of urbanized road, or a combination of variables of length of road surface and urbanized.

.- To highlight the influence of low density residential use or if you want the gross floor area of the sector in the variation of unit cost of production of urbanized land.

.- To introduce the concepts of environmental costs for sustainability of urban development and claim the need to "ruralise" the city to make it more environmentally sustainable.

Full-or-part-time: 9h 36m

Theory classes: 2h

Laboratory classes: 2h

Self study : 5h 36m

GRADING SYSTEM

The rating of the course is obtained from continuous assessment scores and the corresponding laboratory.

Continuous assessment is to do different activities, both individual and group additive and formative in nature, made during the course (classroom and beyond.)

The qualification of teaching in the laboratory is the average of such activities.

Screening tests consist of a part with questions on concepts related to the learning objectives of the course in terms of knowledge or understanding, and a set of exercises.

Module I. - The evaluation module consists of two sets of notes:

.- The average of course work that counts 50% of the final grade.

.- The average of the exams (or final exam in the event that the suspended student per course), which scored another 50%.

Failure to reach the approved (5.0), the student can rebuild and improve some of the work before the final examination date and / or submitted also to the final examination session. In this case the note of the module will be the average of the highest notes of the work and tests (average of the partial or final exam).

Module II .- The evaluation module consists of two sets of notes:

.- The average work, which scored 50% of the final grade.

.- The average of the midterms or final exam that counts another 50%.

Failure to reach the approved (5.0), the student can rebuild and improve some of the work before the final examination date and / or submitted also to the final examination session. In this case the note of the module will be the average of the highest notes of the work and tests (average of the partial or final exam).

The mark will be obtained giving a weight of 50% in the note module I and module II 50%.

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.

EXAMINATION RULES.

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

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