Course guide
310724 - 310724 - Workshop 4: Building Analysis

Last modified: 04/10/2023

Unit in charge: Barcelona School of Building Construction
Teaching unit: 753 - TA - Department of Architectural Technology.
752 - RA - Departamento de Representación Arquitectónica.
732 - OE - Department of Management.

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Gomez Soberon, José Manuel Viceente

Others: Capellà Llovera, Joaquim; Ruiz Gandullo, Javier; Crespiera Olle, Roma; Ruiz Mérida, Francisco; Gómez Xaudiera, Laia; Díaz Mediavilla, Estela; Pavón García, Susana; García Rodríguez, Francisco Javier; Gordillo Bel, Didac

PRIOR SKILLS

Previous knowledge required:
Construction of structures; Steel and concrete structures; Surveys and stakeout in the building; Underground construction
Desirable prior basic knowledge notions:
Prevention of risks at work; Budgets and cost control

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
FB-03. FB-3 Ability to apply the systems of spatial representation, the development of the sketch, the proportionality, the language and the techniques of the graphical representation of the constructive elements and processes.
FE-07. FE-7 Ability to identify the constructive elements and systems, define its function and compatibility, and its implementation to construction in the construction process. Plan and solve constructive details.
FE-13. FE-13 Ability to apply the technical regulation to the construction process, and generate documents of technical specification in the constructive procedures and methods of buildings.
FE-15. FE-15 Aptitude for the pre-measuring, design, calculation and verification of structures and manage its materials execution.
FE-17. FE-17 Ability to schedule and organise the constructive processes, the construction teams, the technical and human means for its execution and maintenance.
FE-23. FE-23 Ability to draft and calculate basic prices, auxiliary prices, single and split prices of the construction units; analyse and control the costs during the construction process; make budgets.

Transversal:
04 COE N1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
05 TEQ N2. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
06 URI N2. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.
04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

TEACHING METHODOLOGY

Teaching praxis will be developed through the use of problem-project-based learning (PBL or ABP). This will be deployed in small teams (3 to 4 members) promoting interaction between members, self-learning inside and outside the classroom, and the implementation of the teaching content of subjects of the degree. In the development of the project, the students will have direct contact with the teaching staff (developing an important part of the work with them).
The PBL to be developed will consist of establishing the constructive-structural solution of a building building proposed at the beginning of the course. Said solution will include aspects such as stakeout, earthworks, equipment to be used, structural behavior, foundations, retaining walls, structural system (columns, beams and floors or roofs) and, volumetric and economic quantification.
Teaching is expected to take place in classrooms that allow student mobility, with access to the WEB network, the use of computer equipment (occasionally in computer rooms), and the use of software currently available at the EPSEB.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the workshop, the student will be able to:

- Establish the requirements for implementation on site graphically.
- Prescribe and quantify the excavation and earthworks process, including the necessary equipment for its realization. Express the result in a graphic-constructive way.
- Establish the diagrams of moments, shear and axial actions of the analyzed structural system (use and application of a computer program).
- Establish the type and suitable construction solutions of the structural system to be applied. Express the result in a graphic-constructive way.
- Establish the type and suitable constructive solutions of the foundations and retaining walls to be applied. Express the result in a graphic-constructive way.
- Quantify the volume and establish the budget for the construction-structural project (use and application of a computer program).

Throughout the workshop, the transversal competences of:

- Self learning
- Team work
- Oral, written and graphic expression.
- I use computer programs specific to the degree profile.

STUDY LOAD

Type	Hours	Percentage
Self study	67,5	60.00
Hours small group	45,0	40.00

Total learning time: 112.5 h

CONTENTS

Module 1: Preliminary Studies

Description:
Starting from the initial data provided from the study building, the students will establish the necessary requirements to establish the initial organization of the work (structural work elements); Among which will be the accesses, the work safety requirements and signaling, the location of fixed equipment such as cranes, the storage areas and the excavation process: access ramps (slopes and widths), construction equipment (machinery) , excavation and land transport process, landfill management, etc.
On the other hand, the loads and actions acting in the building will be established, application of coefficients of increase and reduction of materials, etc .; in order to carry out the study and determination of the structural behavior of the building (diagrams of Md, Vd and Nd, through the use of WinEva software or similar).
The work of this module will serve as the basis for the development of the work of the rest of the modules.

Specific objectives:
That the students acquire the skill to propose in written and graphic form an initial proposal that provides a solution to the constructive-structural problem of a building; allowing them to achieve technical knowledge and discernment of the structural behavior of the work under study. The results of the activities carried out will serve as a reference for the rest of the workshop activities.
The ability of written and graphic expression and the use of computer programs typical of the professional profile will be worked on as a transversal competence

Related activities:
Activity 1. Implementation of work and earthworks (ACT1)
Activity 2. Structure behavior (ACT2)

Full-or-part-time: 39h 23m
Laboratory classes: 15h 45m
Self study : 23h 38m

Module 2: Construction-structural definition of building elements

Description:
Following the work carried out in Module 1, and taking into consideration the geotechnical information, the environment and constructive feasibility, the students will carry out the constructive definition of the structural elements of the study building; among the main ones will be:
- The proposal of the appropriate structural solution, as well as the type of columns, beams and floors / roof.
- In the same way, they will do so with respect to the building foundation elements (foundation typology) and suitable retaining walls.

Specific objectives:
The student will technically and graphically demonstrate the value of their proposal for a constructive-structural solution for the study building; highlighting their ability to establish concepts such as: the geometry and dimension of elements, the desertification between the main steel (Asp) and the secondary (Ass), the minimum reinforcement criteria (minimum amounts), the steel anchors (Lb), and overlaps (Ls), bar covers (r), etc.
In the same way, they will demonstrate their ability to choose the ideal component to use (concrete, steel, mixed), the constructive solutions to be applied, such as: unidirectional or bidirectional slabs, superficial or deep foundations, as well as isostatic or hyperstatic retaining walls. (in any of their possible respective variables), etc.
The results of the activities carried out will serve as a reference for Module 3 of the workshop.
The ability to work in a group, self-learning, written and graphic expression and use of computer programs typical of the professional profile will be worked on as a transversal competence.

Related activities:
Activity 3. Constructive definition of building structure elements (ACT3)
Activity 4. Constructive definition of building foundation elements (ACT4)

Full-or-part-time: 56h 15m
Laboratory classes: 22h 30m
Self study : 33h 45m

Module 3: Volumetric and budgetary evaluation of structural elements of buildings

Description:
Using the information from the previous activities, the student will demonstrate the ability to extract and transform technical and graphic information from constructive-structural solutions, to create and generate the economic and bidding aspects of the building.

Specific objectives:
The student will have the ability to establish the most important economic aspects of a project, such as: Establish the generating numbers, the unit prices, the works units, the definition of the items, the cubing and cutting of reinforcement, consider the admissible losses , establish the so-called Material Execution Price (PEM) and Contract Price (PC), including taxes to be applied, General Expenses (GG), and Industrial Profits (BI), etc.
The capacity for self-learning and use of computer programs typical of the professional profile will be worked on as a transversal competence.

Related activities:
Activity 5. Generating numbers, definition of items and budget (ACT 5)

Full-or-part-time: 16h 52m
Laboratory classes: 6h 45m
Self study : 10h 07m

GRADING SYSTEM

The evaluation system that will be applied is continuous evaluation throughout the course; all evaluations will have rubrics that will establish the weighting criteria of the type: formal and format, as well as technical and content. The rubrics will have a minimum progressive scale of three levels for each item.
The types of evaluations will be:
- Deliveries of the activities: technical memory and/or graphic documentation that constitute separate parts of the integrated global transversal project (virtual campus)
- Self-assessment of peers and / or self-assessment (virtual workshop)

Activity Definition of Activity % of the final grade *
1 Implementation of work and earthworks (ACT1) 15%
2 Structure behavior (ACT2) 20%
3 Constructive definition of building structure elements (ACT3) 30%
4 Constructive definition of building foundation elements (ACT4) 20%
5 Generating numbers, definition of items and budget (ACT 5) 15%

Note: * It is an approximate function of the time of dedication foreseen in each activity

FINAL NOTE = (ACT1 * 0.15) + (ACT2 * 0.2) + (ACT3 * 0.3) + (ACT4 * 0.2) + (ACT5 * 0.15)

SPECIAL NOTE:
1.- Since the subject is eminently practical, the work to be developed in the PBL can only be evaluated in the scheduled deliveries, there will NOT be a recovery exam for the same.
2.- For the proper functioning and teaching quality, it will NOT be accepted that a student has enrolled in the subject in a group; and attend classes, submit work or take assessments in a different group.

EXAMINATION RULES.

If any of the activities of the continuous evaluation are not carried out, it will be considered as not scored.
Demonstrable attendance is required during face-to-face classes (80% minimum to validate grade)

BIBLIOGRAPHY

Basic:
- Calavera Ruiz, José. Muros de contención y muros de sótano . 3ª ed. [Madrid] : Instituto Técnico de Materiales y Construcciones, DL 2001. ISBN 9788488764102.
- Jiménez Montoya, P; ; Morán Cabré, Francisco. Hormigón armado . 11ª ed., ajustada a la instrucción EH-80. Barcelona : Gustavo Gili, DL 1981. ISBN 9788425207594.
- Espanya. EHE-08 : instrucción de Hormigón Estructural : con comentarios de los miembros de la Comisión Permanente del Hormigón. Madrid : Ministerio de Fomento, Secretaría General Técnica, 2008. ISBN 978-8449808999.
- DB SE, seguridad estructural, bases de cálculo ; DB SE-AE, acciones en la edificación. Madrid: Agencia Estatal Boletín Oficial del Estado, 2008. ISBN 8434017393.
- Alonso Durá, Adolfo. Introducción a las estructuras de edificación . Valencia : Universidad Politécnica de Valencia, DL 2005. ISBN 8497058909.
- Calavera Ruiz, José. Proyecto y cálculo de estructuras de hormigón armado para edificios . 2ª ed. [Madrid?] : INTEMAC, 1984-1985. ISBN 843981108X.
- Andrés Baroja, B.; Baringo Sabater, P.. Presupuestos de obra: análisis y metodología. Barcelona: UPC, 1998.
- Ribera Roget, Albert; Gifra Bassó, Ester; Castellano i Costa, Jordi; Sáez Pérez, María Paz. Presupuestos de proyecto y ofertas económicas de obra : cómo tratar y evaluar los costes de construcción . Morata de Tajuña : Manuscritos, 2011. ISBN 978-84-92497-71-3.
- Neufert, Ernst. Arte de proyectar en arquitectura : fundamentos, normas, prescripciones sobre recintos, edificios ... : manual para arquitectos, ingenieros, arquitectos técnicos, profesionales y estudiantes... . 15ª ed. totalmente renovada y ampl. Barcelona : Gustavo Gili, 2006. ISBN 84-252-2051-3.
- Neufert, Ernst. Arte de proyectar en arquitectura : fundamentos, normas, prescripciones sobre recintos, edificios ... : manual para arquitectos, ingenieros, arquitectos técnicos, profesionales y estudiantes... . 15ª ed. totalmente renovada y ampl. Barcelona : Gustavo Gili, 2006. ISBN 84-252-2051-3.
- Canosa Reboredo, S.. Grafismo y proyecto básico. Baarcelona: EPSEB, 2007.

Complementary:
- CTE-SE-C : seguridad estructural : cimientos : aplicación a edificios de uso residencial vivienda-DAV . Madrid : Consejo Superior de Colegios de Arquitectos de España, DL 2007. ISBN 978-84-922609-6-6.

RESOURCES

Other resources:
Audiovisual material:
- Virtual Guide
- Visual dictionary of construction. http://www.artifexbalear.org/diccon.htm />
Link:
- Library. http://bibliotecnica.upc.es/ />
Another resources:
Virtual campus.