Universitat de Lleida

DEGREE CURRICULUM

BUILDING PROCESS

Academic year 2015-16

Subject's general information

Subject name	Building Process
Code	101420
Semester	2nd
Typology	Compulsory
ECTS credits	6
Groups	Big group
Theoretical credits	3
Practical credits	3
Office and hour of attention	Arrange an appointment by email
Department	Computer and Industrial Engineering
Teaching load distribution between lectures and independent student work	40% h lectures 60% h independent student work
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	Catalan
Degree	Degree in Technical Arquitecture
Distribution of credits	Josep M Burgués Solanes
Office and hour of attention	Arrange an appointment by email
E-mail addresses	jburgues@diei.udl.cat

Josep M Burgués Solanes

Subject's extra information

The subject Building Process brings together the knowledge acquired in different subjects already taken as a prerequisite, trying to finish a trajectory throughout the race in the application of these theoretical knowledge in the execution of the work with practical.

Therefore, each of the subject matter requires precise knowledge of the following subjects:

- ECONOMY AND BUSSINES. 101407
- BUDGETS AND MEASUREMENTS. 101425
- CONSTRUCTION SYSTEMS AND TYPOLOGY. 101413
- QUALITY CONTROL AND REGULATIONS. 101424
- WORK EQUIPMENT, FACILITIES AND AUXILIARY MEANS. 101422
- TOPOGRAPHY AND RESTATED. 101411
- SAFETY AND HEALTH. 101423
- PLANNING, PROGRAMMING AND CONTROL. 101421
- SUSTAINABLE BUILDINGS 1. 101431

The course is run in the 2nd semester of the 3rd year of degree. It belongs to the module "Specific training", specifically in the field "management process."

Learning objectives

1. General aim

The subject is a theoretical and practical course that aims to provide the knowledge needed to plan and organize the construction process and be able to execute the work, so that it can ensure the fulfillment of commitments owner and builder, guaranteeing the fundamental conditions of quality, cost, time, health and safety and waste management.

2. Objectives

- To know who are the agents involved in the construction process, how the construction company is structured, and what is the role of Technical Architect.
- To get the necessary documentation in the construction process, both technical and administrative.
- To have the resources of materials, labor, machinery and auxiliary means in order to execute the terms of quality, cost, time, health and safety and waste management required.
- Understanding the determinants of the organization's work depending on the type of building, building systems and technical and human resources available.
- To analyze the activity of the construction process in order to allocate resources more appropriate in quality and quantity and establish their timing.
- Planning processes in time of execution of the work by applying its planning and programming tools.
- To implant the site machinery and installations work for each phase of the construction process.
- To coordinate the various construction trades in implementing the work plan determining planning work.
- Managing construction and demolition waste generated during the construction process.
- Visiting buildings under construction in order to know the reality of the construction process firsthand.

Competences

University of Lleida strategic competences

- UdL3 Mastering ICT's.

Degree specific competences

- GEE25. Capacity to schedule and manage the building process, the work teams, and the technical and human means for maintenance and execution.
- GEE26. Knowledge of building legislation, contractual relationships in the different phases of a building process. Furthermore, knowledge of the legislation and other specific rules regarding security and occupation healthcare issues in buildings.
- GEE27. Aptitude to write studies, basic studies and security and labour health plans, and coordinate the security in a project and executive phases of a construction work.
- GEE28. Capacity for the quality management in construction works, the writing, application, implantation and update of manuals and quality plans, to perform quality management audits in companies and to edit the book of the building.
- GEE29. Aptitude to analyse, design and execute solutions that allow the universal access to buildings and surroundings.
- GEE30. Knowledge of professional work organization and studies organization, offices and professional societies, the regulation and the legislation related with the functions that develop a Building Engineer and the legal framework of responsibility associated to the activity.

Degree cross-disciplinary competences

- EPS2. Capacity to gather and interpret relevant data, within the area of study, to judge and think about relevant subjects of social, scientific and ethical nature.
- EPS7. Capacity to work in situations with a lack of information and/or under pressure.
- EPS8. Capacity of planning and organizing the personal work.
- EPS13. Capacity to consider the socioeconomic context as well as the sustainability criteria in engineering solutions.

Subject contents

The contents of the course have been set based on the skills and goals that are detailed above. Each issue aims to answer one of the aspects of the organization of the building process. Prior to the exposure of content issues, the subject is introduced explaining the context of the responsibilities and objectives for the course and how it is related to other subjects.

The first chapter presents the agents involved in the construction process and the necessary documentation. Therefore, this chapter is about who is involved in the organization of the work.

The second chapter presents theoretical concepts to analyze each activity of the construction process in order to allocate resources and perform timing. Therefore, this chapter is about what processes are discussed in the organization of the works in the building process.

The third chapter will expose the general principles of organization of technical workshops and facilities in the area of work for each phase of the construction process. Therefore, this chapter is to answer how building processes are organized on construction site.

The fourth theme will present the process of preparing the plan of activities in time to plan the implementation of the various activities of work. Therefore, this chapter is about when the processes that make possible the execution of the work are starting and finishing.

In the fifth chapter will be introduced the management of the building process with practical examples of real cases. Therefore, this issue is in response to how runs the organization's work.

Finally, the sixth chapter will deal with concepts of environmental management in the work, emphasizing the drafting of waste management plan. Therefore, this subject is to respond to whisch the environmental impact of the construction process is and how to mitigate it.

The contents for each topic are:

CHAPTER I. The organizational process in the construction sector

1. Agents involved in the construction process
2. The construction company
3. The project executive building
4. Documentation, licenses and permits before
5. Contracting of the work and guidance
6. The head of work
7. Human resources and construction trades

CHAPTER II. Analysis of activity of the construction process

1. Production
2. Assets and operational resources
3. Duration
4. Amount of work
5. Rhythm and cycle
6. Performance and Productivity
7. Decomposition of an activity in elementary
8. Reference values for the amount of work and productivity
9. Amount and duration of work
10. Productivity and rhythm
11. Pace and resource allocation

CHAPTER III. Implementation of the work

1. The project organization
2. The general plan of implementation of the work
3. Elements conditions
4. Requirements
5. General principles of organization

    5.1. Facilities
    5.2. Storage areas for materials and machinery and acopio
    5.3. Temporary facilities services
    5.4. Circulation interior
    5.5. Location of premises

CHAPTER IV. Planning temporary work

1. Needs Planning
2. Requirements Planning
3. Planning the work
4. Process of business plan

    4.1. Definition of work activities
    4.2. Ordering activities
    4.3. Resource allocation
    4.4. Estimated time
    4.5. Calculating the deadline
    4.6. Review planning
    4.7. Graphical representation of planning. PERT network diagram and Gantt chart
    4.8. Monitoring and control planning

CHAPTER V. The operation of the work.

- Real Cases.

CHAPTER VI. Environmental management in the organization of work

1. Objectives of environmental management
2. Influence of the building process on the environment

2.1. Resource consumption
2.3. Production Waste
2.3 Emissions to air, water and soil

3. Environmental measures in the implementation phase of the work
4. Deconstruction
5. Waste generated in construction
6. Waste Management Plan

Methodology

The subject will be taught four hours weekly over 2 hours of lecture and two hours of practical class in half group. The lectures will be considered a theretical lecture with active student participation, where the contents of the subject will be exposed. During the same week, in practice class they will arise and solve problems related to the contents exposed during the previous theoretical session. During the course the student will be indicated in the literature and regulations that have to be based for a proper study of the issues. Given the importance of the active participation of student, the assistance is essential in both lectures and practices.

1. Lectures
In the classroom, teachers will present the contents helping classroom resources such as slideshows with computer and projector, and whiteboard. Despite being a character class lecture, student participation will be encouraged through questions that lead to thinking upon the issue raised with short-term activities in the classroom. This participation is essential for the student, who is not a mere spectator and becomes a participant in the lecture, as part of a theoretical class and also participatory.

2. Practical classes
The practical classes have a participatory nature by the student so they must fully participate. In practical classes, real case studies are exhibited, so that knowledge from being materialized in circumstances as similar to the professional world. In these case studies, intensive analysis of the problem or incident raised will help us to analyze and interpret the case, making a critical thinking and the conclusions of the solutions adopted. Generally, the exercises will start at the beginning of the class, leaving a space of time for analysis, thinking and resolution of it, and then resolving them in the same class or in the immediate week later.

3. Practice visit work
A major evaluation activities is the practice of monitoring the work. This practice aims to put students in direct contact with the professional activity on the organization of the works in the building process. It arises at the beginning of the semester and lasts for almost the entire semester in order to regularly visit the construction of the building under study. It is essential that students acquire previously their own and use at any time the individual protection (helmet, safety boots, and reflective vest reinforced) to comply with health and safety measures at work.

Development plan

1. Preliminary considerations

The EPS system considers semiannual pure subjects for first and second year, is the most appropriate for their specific qualifications.

- 1 ECTS = 25 hours (40% attendance is 10h and 60% are independent work of the student són15h).
- Half are 20 weeks.
- 10% of classroom hours are devoted to evaluation activities.
- 90% of classroom hours are devoted to training activities (not evaluative)

2. Academic Calendar

- 15 weeks of training activities: These weeks will be conducted no assessment contact hours (90% of the contact hours). Due to rounding performed by calculating the weekly hours of instruction in classes, total hours of classes conducted during 15 weeks training exceeds the actual hours that each teacher must perform. This means that, for 15 weeks, every teacher has to regain some margin session had been canceled or delayed the start of sessions / problems, in order to advance the theory.
- Weeks of evaluation activities: In these weeks will distribute evaluation activities (10% of the contact hours)
- 1 week of activities revision / correction.
- The delivery practices are recommended to be done during the weeks training.
- In the weeks where evaluation activities, the management of the EPS made the corresponding calendar evaluation tests. The teacher can use this schedule depending on the need for evaluation of their subject.
- The delivery of events will be held according to the schedule set by the Department for Education.

According to the description of the subject in the curriculum, it consists of 6 credits, which corresponds to:

6 x 25 hours = 150
60% autonomous work = 90 hours
40% work with teacher = 60 hours (54 hours of learning activities).

This course runs for 19 weeks of the second semester. Of these 19 weeks, four are for evaluation, leaving only 15 teaching weeks. Each week features 4 hours of class for students.

The following table presents the various activities carried out during the 19 weeks of the course. Moreover, it shows a scheduling of each activity divided into hours of theory and problems / practices.

Development plan:

Week	Description	Activity at class	HTP (1) (Hours)	Activity autonomous work	HTNP (2) (Hours)
1	Subject presentation Introduction to the building visting practice Chapter 1: theory and exercices	Lecture Exercices at class	4	Exercices and study	3
2	Chapter 1: theory and exercices	Lecture Exercices at class Workshop	4	Exercices and study Preparation of the practice Visiting building	3
3	Chapter 2: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
4	Chapter 2: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
5	Chapter 3: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
6	Chapter 3: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
7	Chapter 4: theory Correction practice building visiting	Lecture Exercices at class Workshop	4	Exercices and study Preparation of the practice Visiting building	
8	Chapter 4: theory and exercices	Lecture Exercices at class Workshop	4	Exercices and study Preparation of the practice Visiting building	6
9	TEST 1st EVALUATION	Evaluation	2	Exercices and study	6
10	Visiting building under construction Practice building visiting	Practice out of class	4	Exercices and study Visiting building	6
11	Chapter 5: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
12	Chapter 5: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
13	Chapter 5: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6
14	Chapter 6: theory and exercices	Lecture Exercices at class	4	Exercices and study Visiting building	6

Week	Description	Activity at class	HTP (1) (Hours)	Activity autonomous work	HTNP (2) (Hours)
15	Presentation practice building visiting	Practice evaluation	4	Preparation of presentation	6
16-17	TEST 2nd EVALUATION	Evaluation	2	Exercices and study	6
18	Tutoring				
19	RECOVERY ACTIVITIES	Evaluation	2	Exercices and study	3
TOTAL			60		90

(1) HTP = Hours of Classroom Work
(2) HTNP = No Face Working Hours

Evaluation

Evaluation Criteria:

The evaluation of the course consists of a theoretical part which evaluated the theoretical concepts, part of exercises during practical classes and a part of the practice of monitoring work in a building under construction. The theoretical part correspond to two individual written tests exam type, weighing 20% and 30%. Tests are cumulative, so in the 2nd test will evaluate all the agenda items. Generally, the first test (T1) consist of theoretical concepts exposed to issues 1, 2, 3 and 4 and the second test (T2) of items 1 to 6. These tests will take place during the weeks set for assessing the calendar school. It is essential to overcome these trials with more than 4 out of 10 in order to be considered in the evaluation. The practical part of the evaluation consists of a band of exercises (PR1) in lectures with a total value of 20%, and on the other side of the practice of monitoring the work (PR2) 30%. Thus, the evaluation system is distributed as follows:

Mark = 0,20·T1+0,30·T2+0,35·PR1+0,15·PR2

To call recovery, the corresponding note on the practices and exercises in class preserved. Just be recovered theoretical tests (which represents 50%). The following table presents the evaluation criteria specific to the subject.

Assessment of the subject:

Evaluation activity	Criteria	%	Date	I/G
Test 1	>= 4	20	Week 8	Individual
Test 2	>= 4	30	Week 17-18	Individual
Work practice	-	35	Weeks 1-15	Group
Exercices at class	-	15	Weeks 1-15	Individual/Group

Bibliography

1. Basic bibliography

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- “Organización de obra y control de personal”. Salvador López Álvarez i Jaime Llames Viesca. Ed. Ribera de Arriba Lex Nova 2005
- “Organización y gestión de proyectos y obras”. Germán Martínez Montes, Eugenio Pellicer Armiñana. Madrid. Ed. McGraw-Hill / Interamericana de España 2007
- “El Oficio de jefe de obra. Las bases de su correcto ejercicio”. Agustí Portales i Pons. Barcelona. Edicions UPC 2007
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- “Manual para la dirección de obras”. Faustino Merchán Gabaldón. Ed. CIE Dossat 2000.
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- “Manuals d'ecogestió 7. Construcció. Aspectes ambientals. Gestió ambiental en l'execució d'obres”. Construccions Rubau. S.A. Bordó Colomer, Joaquim. Departament de Medi Ambient de la Generalitat de Catalunya.
- “Organización y control de obras de edificación”.Tema V. Conceptos básicos asociados a su ejecución. José Antonio Comas. Ed. Entinema, 1995.
- “Planes de obra”. Fco. Javier Zaragoza Martínez. Editorial Club Universitario. 4ª edición. San Vicente (Alicante), 2008.

2. Complementary Bibliography

- REIAL DECRET 314/2006, de 17 de març, pel qual s’aprova el Codi tècnic de l’edificació.
- Institut de Tecnologia de la Construcció de Catalunya. Banc BEDEC. www.itec.cat
- “Les claus per a construir l’arquitectura. Tom 9: principis”. Josep-Lluís González, Albert Casals, Alejandro Falcones. Generalitat de Catalunya DPTOP, Ed. Gustavo Gili. Barcelona 1997. Temes 13 i 14 (pàg. 153-182).
- “Curso de técnico en construcción”. Tema 9. Gestión de obra. Grupo CEAC, 2000.
- “Construction management. Manual de gestión de proyecto y dirección de obra”.Sección primera. Técnicas de planificación.Frank Harris i Ronald Mc Caffer. Ed. Gustavo Gili, 1999.
- “Manual de dirección y organización de obras”.CAPÍTULO 13. Gestión medioambiental en el proceso edificatorio. A. García, A. Sánchez-Ostíz, P. González, E. Conradi, J.A. López. Ed. CIE Dossat 2000. 2004
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- “Arquitectura i sostenibilitat”. Albert Cuchí Burgos. Edicions UPC, 2005.
- Rincón, Lídia. (2011) Material Flow Analysis of the building sector in Lleida. Ph.D. Thesis. Universitat de Lleida.

3. Webs of interest

- Código Técnico de la Edificación. www.codigotecnico.org
- Col.legi d’Aparelladors i Arquitectes Tècnics de Lleida. www.caatlleida.cat
- Col.legi d’Aparelladors i Arquitectes Tècnics de Barcelona. www.apabcn.es
- Institut de Tecnologia de la Construcció de Catalunya. www.itec.cat
- Gencat. Departament de Medi Ambient i Habitatge. http://www.gencat.net/mediamb/sosten/construccio/
- Agenda de la construcció sostenible. www.csostenible.net
- Agència Catalana de Residus. http://www.arc-cat.net/ca/aplicatius/municipal/cgr_consulta_municipal.asp?Tresidu=RUN