

28727 - Works Planning and Management

Syllabus Information

Academic Year: 2019/20

Subject: 28727 - Works Planning and Management

Faculty / School: 175 -

Degree: 423 - Bachelor's Degree in Civil Engineering

ECTS: 6.0

Year: 3

Semester: Second semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

The subject "Planning and Construction Management" addresses the construction projects from the points of view of the main agents involved in a public procurement work: Contracting Body, Construction Management and Contractor / construction manager, starting from the publication of the tender to temporarily follow its different phases until it reaches its reception and settlement. In this way, the provisions of the Public Sector Contracts Law for construction contracts are followed.

1.2.Context and importance of this course in the degree

The student, at the end of the subject, will know the process of managing a work, being able to plan the different units of work and the resources involved in it, organize them and monitor and control their execution.

1.3.Recommendations to take this course

It is highly recommended to have passed the course 28722 "Procedures and organization" because this study the concepts of calculation of costs of personnel and machinery, as well as building construction processes and their performance.

It is advised to take this subject of "Planning and management of work" previously and the one of "Projects" of 4th year.

2.Learning goals

2.1.Competences

Upon passing the subject, the student will be more competent in a specific way:

? E06 - Ability to apply construction procedures, construction machinery and construction planning techniques.

And in a basic and general way:

? G01 - Organizational and planning capacity

? G02 - Ability to solve problems

? G03 - Ability to make decisions

? G04 - Aptitude for oral and written communication of the native language

? G05 - Ability to analyze and synthesize

? G06 - Information management capacity

? G07 - Ability to work as a team

? G08 - Capacity for critical reasoning

? G09 - Ability to work in an interdisciplinary team

? G10 - Ability to work in an international context

- ? G11 - Capacity for improvisation and adaptation to face new situations
- ? G12 - Leadership skills ? G13 - Positive social attitude towards social and technological innovations
- ? G14 - Ability to reason, discuss and expose ideas
- ? G15 - Ability to communicate through the word and the image
- ? G16 - Ability to search, analyze and select information
- ? G17 - Capacity for autonomous learning
- ? G23 - Understand and understand respect for fundamental rights, equal opportunities for women and men, universal accessibility for people with disabilities, and respect for the values ??of the culture of peace and democratic values
- ? G24 - Encourage entrepreneurship
- ? G25 - Knowledge of information and communication technologies
- ? CB1 - That students have demonstrated to possess and understand knowledge in an area of ??study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the vanguard of its field of study
- ? CB2 - That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of ??study
- ? CB3 - That students have the ability to gather and interpret relevant data (usually within their area of ??study) to make judgments that include a reflection on relevant issues of social, scientific or ethical nature
- ? CB4 - That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public
- ? CB5 - That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The current subject ?Construction work management? is organized into five main groups of activities: two of them run by the teacher (lectures and problems), another carry out by the students and teacher jointly, a fourth one consisting of self-study and finally the assessment written test:

- Lectures: in which the teacher will explain the theoretical concepts of the subject topics.
- Practical sessions: The teacher will explain the practical application on the concepts developed at the theoretical lectures, resolving practical problems. This session will take place at the classroom or at the computer laboratory.
- Tutorship practical sessions: Using technical software at the computer laboratory students will resolve, individually or in groups of two of them, the practical applications of concepts detailed in above paragraphs. Depending on the duration of these practices it can be only initiated at class time and later on finished as a non-class activity bases.
- Assessment written test: Students will demonstrate the knowledge gained through two not mutually exclusive methods. One by continuing assessment throughout the course or, if these midterms tests are not passed successfully, a global written test on two calls.
- Personal study: Non-class activities in which students have to study the topics learnt at the class activities in order to understand and assimilate the theory taught in lectures and train the practical cases solved in the practical classes and prepare the written test.

Besides these activities there will be individual tutorials based on personalized attention by the teacher in order to help and resolve doubts and questions about the specific areas in which students have found more difficulties to be understood.

4.2.Learning tasks

To the activity groups mentioned at the previous section the following workload has been assigned:

- | | | |
|----------------------------------|----------|---------|
| • Lectures / Theoretical classes | 18 hours | (12%) |
| • Practical classes | 7 hours | (4,7%) |
| • Tutorship practical sessions | 26 hours | (17,3%) |
| • Assesment written test | 9 hours | (6%) |
| • Personal study | 90 hours | (60%) |

According this distribution of hours, a total 150 hours workload is reached, corresponding to the 6 credits ECTS that the subject has assigned during the second quarter of the third course of the Civil Engineer Bachellor?s degree.

These 150 hours involve 15 week of class.

Individual tutorials are scheduled in a two hours per week basis.

4.3.Syllabus

To reach the subject aims, this one is structured in 12 topics grouped into 4 educational units.

The detailed contents of these topics is as follows:

EDUCATIONAL UNIT I: PUBLIC CONSTUCTION WORKS TENDERING

TOPIC 1. GENERAL CONSIDERATIONS AT CIVIL ENGINEERING PROJECTS

- 1.1. Civil engineer Project: general concept and definition
- 1.2. Systemic concept of construction projects
- 1.3. Civil engineering projects types
- 1.4. The Project and its environment
- 1.5. Phases and life cycles of a project
- 1.6. Agents and stakeholders
- 1.7. Construction company structure
 - 1.7.1. Construction company organization chart
 - 1.7.2. Department?s roles
 - 1.7.3. Store and warehouses
 - 1.7.4. Safe and safety department
 - 1.7.5. Quality department
- 1.8. Project management: Planning, Organization, Execution and control.

TOPIC 2. WORKS TENDERING ON THE PUBLIC SECTOR

- 2.1. Construction contract
 - 2.1.1. Current legislation on public contracting
 - 2.1.2. Contract types
 - 2.1.3. The construction contract
 - 2.1.4. The public contracting body
 - 2.1.5. Conditions required to get a public contract
 - 2.1.6. Construction Company qualification required
 - 2.1.7. Guarantees
 - 2.1.8. Objet and price of a public contract
 - 2.1.9. Processing of the contracting files
 - 2.1.10. Biding documents (Economical and Technical)
- 2.2. Tendering, biding , offer document, and contracts award
 - 2.2.1. Contract award proceeding types
 - 2.2.2. Physical construction budget / Tendering construction budget
 - 2.2.3. Costs to be consider on bidding

- 2.2.4. Initial planning estimation
- 2.2.5. Execution bid / Technical and economical
- 2.2.6. Coefficient of contract award, recklessness
- 2.2.7. Contract awarding
- 2.2.8. Forms of provide a security right (Guarantee)
- 2.2.9. Software tools to help for drawing up a cost assessment for a bidding (PRESTO, spreadsheet Excel)

EDUCATIONAL UNIT II: PLANNING AND CONSTRUCTION WORKS ORGANIZATION

TOPIC 3. PLANNING TECHNIQUES

- 3.1. Project planning
 - 3.1.1. Work structure breakdown (WSB)
 - 3.1.2. General planning process
- 3.2. Generalities about arrow diagrams
- 3.3. Time-space diagram
- 3.4. Gantt diagram
- 3.5. Critical path method (C.P.M) diagram
- 3.6. Program evaluation review technique (P.E.R.T) diagram
- 3.7. Precedence diagram method (PDM)

TOPIC 4. CONSTRUCTION WORKS ORGANIZATION

- 4.1. Work contract award
- 4.2. Contract completion and sign
- 4.3. The act of topographic survey
- 4.4. Contract resolution before works start
- 4.5. Pre-works
 - 4.5.1. Health and safety plan
 - 4.5.2. Communication of the opening of the work center
 - 4.5.3. The act of verification of topographic survey
 - 4.5.4. Implementation / deployment
 - 4.5.5. Affected services
- 4.6. Construction work general organization chart
- 4.7. Work site manager
- 4.8. Assistant to work site manager
- 4.9. Technical and topographic office
- 4.10. Administrative tasks
- 4.11. Work site organization
- 4.12. Supply and material reception
- 4.13. Works management
- 4.14. Surveillance, control and works supervision

TOPIC 5. CONSTRUCTION WORKS PLANNING

- 5.1. Technical planning
 - 5.1.1. Resources allocation to a project
 - 5.1.2. Resources allocation methods
 - 5.1.3. Resources allocation
 - 5.1.4. Resource leveling
 - 5.1.5. Resources histogram
- 5.2. Economical planning
 - 5.2.1. Minimum cost programming method
 - 5.2.2. Time-cost relationship

- 5.2.3. Cost curve
- 5.2.4. Time optimization
- 5.2.5. Ackoff - Sasieni mathematic algorithm
- TOPIC 6. PLANNING SOFTWARE TOOLS
 - 6.1. MS Project
 - 6.2. Excel worksheet
 - 6.3. PRESTO

EDUCATIONAL UNIT III: CONSTRUCTION WORKS EXECUTION AND CONTROL

- TOPIC 7. CONSTRUCTION WORKS EXECUTION MONITORING
 - 7.1. Purchasing management
 - 7.2. Executed tasks control
 - 7.3. Payment certifications
 - 7.4. Price review formulas and reference indices.
 - 7.5. Quality control
 - 7.5.1. Quality concept
 - 7.5.2. Standard ISO 9000
 - 7.5.3. Quality management
 - 7.5.4. Quality assurance plan
 - 7.5.5. Inspection and control points programme
 - 7.6. Documentation on work site
 - 7.6.1. Orders and assistance log book
 - 7.6.2. Safe & Safety log book
 - 7.6.3. Subcontracting log book
 - 7.6.4. Daily operations diary
 - 7.6.5. Task report
 - 7.6.6. Storehouse and warehouse reports
- TOPIC 8. COST CONTROL
 - 8.1. Concept of cost and relativity of it
 - 8.2. Difference between spending, cost and payment
 - 8.3. Classification of costs
 - 8.4. Payment certifications planning
 - 8.5. Costs planning
 - 8.6. Cash flow study
 - 8.7. Comparative study: initial bid / Price target / real execution
- TOPIC 9. CONTROL SOFTWARE TOOLS
 - 9.1. Spreadsheet : Payment certifications / Prices review
 - 9.2. PRESTO: Payment certifications / Price comparative studies/real execution cost /target cost
 - 9.3. MS Project: Work execution monitoring
- TOPIC 10. INCIDENCIES DURING WORK EXECUTION
 - 10.1. Indemnification in case of force majeure
 - 10.2. Missed deadlines
 - 10.3. Legal modifications in construction works contracts
 - 10.4. Works suspension
 - 10.5. Time frame modifications and readjustment of annuities
 - 10.6. Contract assignment to another contractor and subcontracting
 - 10.7. Contract resolution
- TOPIC 11. LIQUIDATION OF THE CONSTRUCTION WORK
 - 11.1. Completion of the work
 - 11.2. Reception of the work
 - 11.3. Final payment certification

- 11.4. Contract liquidation
- 11.5. Guarantee period
- 11.6. Processing and return of guarantees

EDUCATIONAL UNIT IV: PROJECT MANAGEMENT

1. 12. PROJECT MANAGEMENT

- 1. 1. Project management
- 2. 2. Main international standards: PMI, IPMA.
- 3. 3. Standard UNE-ISO 21500 ?Guidance on project management?
 - 1. 3.1. Aim and field of application
 - 2. 3.2. Terms and definitions
 - 3. 3.3. Project management concepts
 - 4. 3.4. Processes considered

4.4.Course planning and calendar

Planning

The theoretical and practical workload of the different topics is distributed according the table below:

Nº	TOPIC	S	P	PT	E	TI	TOTAL
1	GENERAL CONSIDERATIONS AT CIVIL ENGINEERING PROJECTS	3				3	6
2	WORKS TENDERING ON THE PUBLIC SECTOR	3		6		12	21
EV I	Written assesment test				2		2
3	PLANNING TECHNIQUES	4	4	6		20	36
4	CONSTRUCTION WORKS ORGANIZATION	2				1	2
5	CONSTRUCTION WORKS PLANNING	1	2	2		10	15
6	PLANNING SOFTWARE TOOLS			4		12	14
EV II	Evaluación				2		2
7	CONSTRUCTION WORKS EXECUTION MONITORING	1	1	3		9	12
8	COSTS CONTROL			2		6	8
9	CONTROL SOFTWARE TOOLS			3		12	17
10	INCIDENCIAS DURING WORK EXECUTION	2				3	4
11	LIQUIDATION OF THE CONSTRUCTION WORK	1				2	3
12	PROJECT MANAGEMENT	1				2	3
EV III	Written assesment test				2		2
EV-F	Final written assesment test				3		3
	TOTAL	18	7	26	9	90	150

- S.- Theoretical sesions / lectures
- P.- Practical sesions /Problems
- PT.- Computer lab workshop

- E.- Written assesment test
 TI.- Personal study

DESIGNATION OF SESSIONS ACCORDING TO THE WORKLOAD

TU	Nº	TEMA	T	P	PT	E
	0	SUBJECT INTRODUCTION AND LEARNING AIMS	S-011			
I	1	GENERAL CONSIDERATIONS AT CIVIL ENGINEERING PROJECTS	S-112 S-122			
	2	WORKS TENDERING ON THE PUBLIC SECTOR	S-213 S-223 S-233		PT-216 PT-226 PT-236 PT-246 PT-256 PT-266	
		Written assesment test				EV-I-12 EV-I-22
	3	PLANNING TECHNIQUES	S-315 S-325 S-335 S-355	P-315 P-325 P-335 P-355	PT-315 PT-325-1 PT-325-2 PT-335 PT-355-1 PT-355-2	
II	4	CONSTRUCTION WORKS ORGANIZATION	S-412 S-422			
	5	CONSTRUCTION WORKS PLANNING	S-511	P-512 P-522	PT-512 PT-522	
	6	PLANNING SOFTWARE TOOLS			PT-614 PT-624 PT-634 PT-644	
		Written assesment test				EV-II-12 EV-II-22
III	7	CONSTRUCTION WORKS EXECUTION MONITORING	S-711	P-711	PT-713 PT-723 PT-733	
	8	COSTS CONTROL			PT-812 PT-822	
	9	CONTROL SOFTWARE TOOLS			PT-914 PT-924 PT-934-944	
	10	INCIDENCIES DURING WORK EXECUTION	S-1012 S-1022			
	11	LIQUIDATION OF THE CONSTRUCTION WORK	S-1111			
IV	12	PROJECT MANAGEMENT	S-1211			
		Written assesment test				EV-III-12 EV-III-22
	-	Final written assesment test				EF-13 EF-23

TOTAL OF SESSIONS	18	7	26	EF-33 9
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(Eg. Designation meaning: PT-723.- Tutorial practice corresponding to the topic 7, session 2 of 3)

4.5. Bibliography and recommended resources

<http://psfunizar7.unizar.es/br13/egAsignaturas.php?codigo=28727&Identificador=14285>