

## 28727 - Works Planning and Management

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	175 - Escuela Universitaria Politécnica de La Almunia
Degree	423 - Bachelor's Degree in Civil Engineering
ECTS	6.0
Year	
Semester	Second semester
Subject Type	Compulsory
Module	---

### **1.General information**

#### **1.1.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

#### **4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.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

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- 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.

### 5.2.Learning tasks

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

- Lectures / Theoretical classes 18 hours
- Practical classes 7 hours
- Tutorship practical sessions 26 hours
- Assessment written test 9 hours
- Personal study 90 hours

According this hours distribution 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 Bachelor's degree.

These 150 hours involve 15 week of class.

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

### 5.3.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 CONSTRUCTION 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

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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

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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 biding (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

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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

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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

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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



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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**

**TOPIC 12. PROJECT MANAGEMENT**

12.1. Project management

12.2. Main international standards: PMI, IPMA.

12.3. Standard UNE-ISO 21500 "Guidance on project management"

12.3.1. Aim and field of application

12.3.2. Terms and definitions

12.3.3. Project management concepts

12.3.4. Processes considered

**5.4. 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'S PROJECTS					3	6

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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					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	2				3	4

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	EXECUTION						
11	LIQUIDATION OF THE CONSTRUCTION WORK	1				2	3
12	PROJECT MANAGEMENT	1				2	3
EV III-IV	Written assesment test				2		2
-	Final written assesment test				3		3
	<b>TOTAL</b>	<b>18</b>	<b>7</b>	<b>26</b>	<b>9</b>	<b>90</b>	<b>150</b>

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			



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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

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II	3	PLANNING TECHNIQUES	S-315	P-315	PT-315		
			S-325	P-325	PT-325-1		
			S-335	P-335	PT-325-2		
			S-355	P-355	PT-335		
	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

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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	INCIDENCES DURING WORK EXECUTION	ESS-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 EF-33
TOTAL OF SESSIONS			18	7	26	9

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(Eg. Designation meaning: PT-723.- Tutorial practice corresponding to the topic 7, sesion 2 of 3)

### 5.5.Bibliography and recommended resources

#### Basic Bibliography

- Organización y gestión de proyectos y obras de los autores Germán Martínez Montes y Eugenio Pellicer Almiñana (Editorial Mc Graw Hill).
- Procedimientos generales de construcción y organización de obras de Antonio Lara Galera (Editorial Cuadernos ES ICCP Madrid).
- Planificación Técnica (CICCP; Carlos Tutor Larrosa)

#### Normativa de consulta

- Real decreto legislativo Texto refundido de la Ley de contratos del sector público TRLCSP 3/2011 (BOE núm 276 ; 16nov2011).
- Reglamento general de la Ley de contratos de las Administraciones Públicas (RD 1098/2001 ; B.O.E. 257 de 26-oct-01)

#### Complementary Bibliography

- Presto . Tercera Edición. (Mc Graw Hill; R. de Benito Arango y A.J. Sánchez Granda)
- Planificación gráfica de obras (Editorial Gustavo Gili ; Juan Pomares Martínez)
- Organización y control de obras (Universidad de Cantabria; Carlos Fresno; Aja Setién)

#### Normativa de consulta

- Ley 32/2006 de subcontratación del sector de la construcción