Universitat de Lleida

DEGREE CURRICULUM

PLANNING, PROGRAMMING AND CONTROL

Academic year 2014-15

Subject's general information

Subject name	PLANNING, PROGRAMMING AND CONTROL
Code	101421
Semester	1st Q Continuous Assessment
Typology	Compulsory
ECTS credits	6
Theoretical credits	0
Practical credits	0
Department	Agricultural and Forest Engineering
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	Catalan
Degree	Degree in Architectural Technology
E-mail addresses	egregorio@eagrof.udl.cat

Eduard Gregorio López

Subject's extra information

The planning, scheduling and control techniques presented in this course are closely related, therefore it is essential a continuous work for a correct learning. This subject combines the theoretical and practial approaches. It is essential make the exercices that will be proposed in class. This work can be supplemented by recommended bibliography.

Subject of the 3rd degree course. It belongs to the module "Specific Training", specifically to the subject "Managing of the process".

Learning objectives

- Construct the PERT chart for a probabilistic planning of the building and to calculate the probability of achieving the specified deadlines.
- Scheduling a building with minimum cost using MCE.
- Resource allocation and leveling in the program of a building.
- Track and correct the deviations in the planning using review and control techniques.
- Making a temporal scheduling of the building using the critical path method (CPM).
- Apply the Roy technique to planning a building with overlaps and shifts between activities.
- Making and interpret Gantt charts applied to the planning of construction.
- Use informatic tools to apply programming techniques.

Competences

University of Lleida strategic competences

- UdL3 Mastering ICT's.

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.

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.

Subject contents

1. Introduction to planning and scheduling in construction.

    1.1 General concepts about planning, scheduling and control.

    1.2 Classification of planning and scheduling techniques.

    1.3 Methods based on graph theory.

        1.3.1. Activities and events.

        1.3.2. *Dependence relationship between activities*.

        1.3.3. C*onstruction and representation of graphs*.

2. CPM: Critical Path Method.

    2.1 Duration of activities in CPM.

    2.2 Early and last times.

    2.3 Slack time.

    2.4 Critial activites and critical path.

    2.5 Construction of the CPM network.

3 PERT: Program Evaluation and Review Technique.

    3.1 Probabilistic calculation of time in PERT: β distribution.

    3.2 Probabilistic calculation of deadline in PERT: normal distribution.

    3.3 Construction of the PERT network.

4.Roy Method.

    4.1 Bakground and comparison with CPM and PERT methods.

    4.2 Basic principles of representation.

    4.3 Construction of the network in Roy.

4.4 Calculation of minimum time, maximum time and slack time.

4.5 Overlap and displacement of activities.

4.6 Equivalence between networks: conversion from PERT to Roy.

5. The Gantt chart.

5.1 Background and main features..

5.2 Construction of the Gantt chart.

5.3 Advantages and limitations.

5.4 Representation of a network with the Gantt chart.

6. MCE: Minimum Cost Expediting Method.

6.1 Relationship between the cost and the duration of an activity.

6.2 Methodology for the reduction of a project.

6.3 Optimization of the duration with heuristic algorithms: Ackoff and Sasieni.

7. Project scheduling with limited resources.

7.1 Types of resources.

7.2 The problem of limited resources.

7.3 Resource leveling.

7.4 Resource assignment.

8. Tracking the program.

8.1.Progress of the activities.

8.2 Tracking of the program with Gantt charts.

8.3 Tracking of the program with S curves.

8.4 Measurement of the proctect activity.

9. Program control and review.

9.1 Main techniques for control and review.

9.2 Procedure for controll of a program.

Methodology

See Development plan.

Development plan

Week	Themes
1	Unit 1. Introdution
2	Unit 2. CPM: Critical Path Method.
3	Unit 3. PERT: Program Evaluation and Review Technique.
4	Unit 3. PERT: Program Evaluation and Review Technique.
5	Unit 4. Roy Method.
6	Unit 5. The Gantt chart.
7	Unit 6. MCE: Minimum Cost Expediting Method.
8	Unit 6. MCE: Minimum Cost Expediting Method.
9	First evaluation.
10	Unit 7. Project scheduling with limited resources.
11	Unit 7.Project scheduling with limited resources.
12	Unit 8. Tracking the program / MS Project
13	MS Project
14	Unit 9. Program control and review / MS Project
15	Exam review.
16	Second evaluation.
17	Second evaluation.
18	Tutorial
19	Recovery exams.

Evaluation

Week	%	Dates
PA 1. Written exam.	30	Weet 9
PA 2. Examen escrit.	50	Weeks 16 i 17
Exercicies in class and home	20	Along the course
Recovery exam.	80	Week 19

Exercises

- During the course, exercises will be proposed in class. The resolution of some of thes exercicies will be asked by the professor.
- On the other hand, the student will complete exercices at home. The student will give the resolution of those proposed exercises at the stablished deadline.
- The note of exercises represents the 20% of the final note. It is calculated as the average of the corresponding notes of all the exercises proposed along the course.

- The realisation of all the exercises is compulsory.The student has to submit the resolution of the exercises in paper. The no presentation of an exercise or his delivery out of term involves a note of 0. This note can not be modified by the delivery of another exercise.

Examns

- Written exame will be carried out in weeks 9 and 16/17. Each of these exams has a weight of 30% and 50%, respectively, over the final note.
- To take into account the note of the exercises (20%), it is necessary to have at least a 4 over 10 **of the written exams**.
- The recovery exam will take place the 19th week. The recovery will include all the contents of the subject. It represents the 80% over the final note. To take into account the note of exercises (20%), it is necessary to have at least a 4 over 10 of this recovery exam.

Bibliography

BASIC BIBLIOGRAPHY

- Capuz Rizo, S. et al., Cuadernos de Ingeniería de Proyectos III: Dirección, Gestión y Organización de Proyectos. Servicio de Publicaciones Universidad Politecnica de Valencia, 2000.
- Pomares Martinez, J., Planificación Gráfica de Obras. Ed. Gustavo Gili, Barcelona, 1977.
- Romero Lopez, C., Técnicas de Programación y Control de Proyectos. Ed. Piramide, Madrid, 1997.

COMPLEMENTARY BIBLIOGRAPHY

- Mateos Perera, J., La Programación en la Construcción: el PERT en versión completa. Ed. Bellisco, Madrid, 2003.
- Lopez Valera, P., Iglesias Baniela, S., Planificación, Programación y Control de Proyectos mediante Técnicas de Camino Crítico. Ed. Torculo, Santiago de Compostela, 2007.
- Ponz Tienda, J.L., Project Management con redes PERT. Universidad Politecnica de Valencia, 2008.