

Course guides

250204 - EXPGRAF - Graphic Expression

Last modified: 01/10/2021

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2021 **ECTS Credits:** 7.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: JORDI POBLET PUIG

Others: MARIO FERNANDEZ GONZALEZ, ÀXEL LEGARES SIERRA, SERGIO LOPEZ LAZARO, JORDI POBLET PUIG

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

3101. Adequate knowledge of the concept of companies and their institutional and legal framework. Company organisation and management

Transversal:

592. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.

595. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

599. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

602. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

584. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

The subject consists of 5 hours per week of face-to-face classes in the assigned drawing classroom. They are devoted to theoretical classes 2 hours, in which the teacher exposes the concepts and basic materials of the subject, presents examples and realizes exercises and 1 hour of realization of practical works in class. Finally, it is dedicated to 2 hour lab classes also in a small group, in which they will be taught CAD classes. Support material is used in the format of a detailed teaching plan through the virtual campus ATENEA: contents (notes in pdf format), programming of assessment activities and directed learning (practices and exams of previous years) and bibliography.



LEARNING OBJECTIVES OF THE SUBJECT

Students will develop their capacity for spatial vision, learn to use traditional graphical representation techniques and acquire an understanding of metric geometry.

On completion of the course, students will have acquired the ability to:

1. Solve problems requiring the use of plane and spatial geometry;
2. Produce the floor plans of a specific engineering structure;
3. Use basic computer-assisted design software and use the conic system to represent a specific engineering structure.

Basic tools in metric geometry: Ruler-and-compass constructions and demonstrations; Floor plans; Technical drawing; The conic system

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	24.00
Guided activities	7,5	4.00
Hours small group	15,0	8.00
Self study	105,0	56.00
Hours medium group	15,0	8.00

Total learning time: 187.5 h



CONTENTS

01. ORTHOGONAL PROJECTION

Description:

Introduction. Scales. Fundamental tracings in the plane
Representation systems.
Point representation.
Representation of the line.
Representation of the plane.
Representation normalized of objects
Exercises resolution.
Exercises resolution.

Specific objectives:

- 1) Acquire skills when drawing two-dimensional geometric figures.
 - 2) Become familiar with using drawing tools like a technical drawing compass or curved templates (and similar).
 - 3) Learn to solve simple geometric problems
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- 1) Understand the concept of projection onto a plane.
 - 2) Know various ways to make these projections.
 - 3) Know the dihedral projection system.
 - 4) Become familiar with the concepts of plan, elevation, profile.
 - 5) Know correctly locate each of the views and projections of the American and European system.
 - 6) Differentiate between edge, face and hidden side.
 - 7) Learning how to make the pieces projections in the dihedral system.
 - 8) Being able to visualize a piece that moves in space (when imagining the piece in the final position, known the position and movement).
 - 9) become familiar with various types of parts, including those with curved faces, and which therefore is necessary to determine its contour apparent.
 - 10) Being able to visualize a piece cut off.

Full-or-part-time: 31h 12m

Theory classes: 6h

Practical classes: 2h

Laboratory classes: 5h

Self study : 18h 12m



02. AXONOMETRIC PROJECTION

Description:

Fundamentals of the system.
Axonometric scales.
Real magnitudes.
Representation of shapes.
Intersection with lines and planes.
Sections.
Applications and perspectives.
Projection of shadows.
Resolution exercises.
Resolution exercises.

Specific objectives:

- 1) Become familiar with concepts such as angle of flight or reduction coefficient. 2) Grading scales applying the coordinate axes.
- 3) Abatement coordinate planes.
- 4) Learning to represent points, lines and planes.
- 5) Become familiar with the concept of perspective projection of an item 'on the coordinate planes.
- 6) Know how geometric operations such as intersections of a line with a plane, intersections of planes, etc. orthogonal axonometric perspective. Able to solve using skills learned, problems and works intersection of planes with figures.

Full-or-part-time: 31h 12m

Theory classes: 6h
Practical classes: 2h
Laboratory classes: 5h
Self study : 18h 12m



04. CENTRAL PROJECTION

Description:

Introduction.

Fundamentals of conical perspective.

Determined conical perspective.

Elements involved in the conical perspective

Representation of lines and surfaces.

Methods of perspective. Projection of shadows.

Exercise resolution

Exercise resolution

Specific objectives:

- 1) Understanding the mechanism that allows us to represent on paper operations (central projection) that really happen in three dimensional space.
- 2) To assimilate in the working paper will represent both the plane while geometral as the picture plane.
- 3) understand and learn to use the method of extensions.
- 4) Assume that point perspective is not immediately find the prospect of a point in space and a good way to do this is by horizontal lines.
- 5) By proposing very simple examples, learn and practice the method of extensions.
- 6) Acquire tools to overcome the fact that a vanishing point can be out of paper. Learning to work with visual plans.
- 7) Understand the meaning of a conical perspective drawing of a figure at a given scale.
- 8) Become familiar with the two methods of application of scales to be used.
- 9) Acquire criteria for choosing a suitable set of stairs.
- 10) Know how to recognize when a figure is on a visual level. and be able to draw the conical perspective in these cases.
- 11) Become familiar with the technique of abatement plans conical, or acquire sufficient spatial vision to solve problems where necessary, through an auxiliary construction.
- 12) Learning to prospect conical circles, whatever their position in space.

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Full-or-part-time: 31h 12m

Theory classes: 6h

Practical classes: 2h

Laboratory classes: 5h

Self study : 18h 12m



03. CONTOUR MAPS

Description:

Basics, points, lines and planes.

Intersection, parallelism, perpendicularity, and dejection.

Geometric and topographic surfaces

Roofing.

Works lineal and platforms.

Resolution exercises

Resolution exercises.

Specific objectives:

1) Learn the basics of Bounded Plans.

2) Know how to represent points and lines.

3) To acquire the most basic skills for small operations on points and lines (eg, locate a point on a line, determine the distance between two points)

3) Know how to represent a plane

4) Become familiar with concepts such as ' maximum slope line ', ' trace level ' ; ... 5) Learn to perform operations that include geometric planes (intersection of two planes, draw a line contained in a plane, ...)

6) Learn to draw planes and straight lines are parallel and perpendicular.

7) Being able to do other three-dimensional geometric operations such as intersect a line with a flat, folded flat, flat and straight draw at an angle so as to another level.

8) Understand the basic geometric representation of surfaces (spheres, cones, cylinders) with dimensioned drawings.

Full-or-part-time: 28h 47m

Theory classes: 5h

Practical classes: 2h

Laboratory classes: 5h

Self study : 16h 47m

05. CAD LABORATORY

Description:

01.01 Basic tools

01.02 Basic tools

01.03 Basic tools

2.1 Three-dimensional space 2.2 Three-dimensional display 2.3 Solid modeling 2.3.1 Creating solids 2.3.2 Combining solids 2.3.3 Editing edges of a solid 2.3.4 Editing solids 2.4 EXERCISE ITEM 2 (modeled figure)

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03.01 Presentations in paper space

03.02 Presentations in paper space

03.03 Presentations in paper space

4.1 Three-dimensional display CAD 4.2 Export models 4.3 FINAL EXERCISE _ APPLIANCE SUBJECTS 1 + 2 + 3

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Specific objectives:

The final objectives of the CAD laboratory are:

- Preparation of students for the use of infromatic instruments as a tool for solving geometric problems.
- Identify and represent through the system of multiple views the characteristics of the point, line, planes and objects, according to their location in space.
- Know, identify and use solid volumes known in geometry.
- Introduction of the student to the rational use of computing as a work base, under the "interface" of the operating systems, and the application of the specific software as a 2D drawing tool. Always under the conceptual guidelines of the geometric structure of the projects to be represented and the help of computing in the field of descriptive geometry and technical drawing.

Specific:

- Introduction to the interface of Autocad software
- Drawing tools
- Editing tools
- Drawing aids
- Management of layers
- Blogs, generation, editing and management
- Drawing aids
- Space space configuration
- Management of external references (images, CAD files)
- Reduction and labeling
- Line value
- Drawing scale
- Printing of documents

Full-or-part-time: 57h 35m

Theory classes: 8h

Practical classes: 8h

Laboratory classes: 8h

Self study : 33h 35m

GRADING SYSTEM

The final qualification is the sum of the following partial qualifications:

Npr: practical qualification (4 practices - 10 sheets) Npac: qualification continuous evaluation (4 continuous assessment practices)

Ncad: practical qualification CAD (4 practices) Npf: qualification of final tests (2 tests)

$$N_{\text{final}} = 0.1 * N_{\text{pr}} + 0.2 * N_{\text{pac}} + 0.2 * N_{\text{cad}} + 0.5 * N_{\text{pf}} + [0,1 * N_{\text{final}}]$$

(In the final note a 10% of the -Nfinals will be added, if the student has followed the course correctly, taking as a reference an assistance > 85% of the classes).

The continuous assessment consists of doing different individual activities, of an additive and formative nature, carried out during the course (within the classroom).

01. PRACTICES: During the course, documentation will be provided with 4 practical exercises (10 sheets), and that will be carried out in class hours, with the possibility of finalizing them autonomously. The average of the 4 practices will result in the qualification of the practices (Npr). All the practices of this section have the same value.

02. CONTINUOUS EVALUATION PRACTICES: At the end of each subject, there will be an exercise in class, which will be presented at the end of the course, with a duration of approximately 1 hour. The average of the 4 exercises will result in the evaluation of continuous assessment practices (Npac). All the practices in this section have the same value.

03. CAD PRACTICES: During the course, ATENEA documentation will be presented for the 4 practical exercises in CAD and PDF format, and will be carried out during the class practice hours, with the possibility of finalizing them autonomously. The average of the 4 practices will result in the qualification of the CAD (Ncad) practices. All the practices of this section have the same value.

04. FINAL TESTS: The final tests consist of a part with questions about concepts associated with the learning objectives of the subject in terms of knowledge or understanding, and a set of application exercises.

There will be two during the course, the first one on topics 1 (dihedral) and 2 (axonometric), and the second on subjects 3 (bounded plans) and 4 (conical).

The two tests in this section have the same value.

The final test note will result in final qualification (NPF) Qualification and admission criteria for reassessment: Students suspended for regular evaluation that have been submitted regularly to the evaluation tests of the suspended subject will have the option to carry out a reassessment test in the period set in the academic calendar.

Students who have already passed the qualification as not yet submitted may not be submitted to the re-evaluation test of a subject. The maximum grade in the case of submitting to the re-assessment exam will be five (5.0).

The non-attendance of a student summoned to the test of re-evaluation, celebrated in the fixed period will not be able to give rise to the accomplishment of another test with later date.

EXAMINATION RULES.

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

BIBLIOGRAPHY

Basic:

- Palencia Rodríguez, J.; Fernández González, F.; Carreras Cabello, R. Dibujo técnico: introducción a los sistemas de representación. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos - Servicio de publicaciones, 1981. ISBN 84-7493-011-1.

- Izquierdo Asensi, F. Geometría descriptiva: vol. 1: sistemas y perspectivas. 26a ed. ampl. y rev. Madrid: Fernando Izquierdo Asensi, 2008. ISBN 9788493366872 (V. 1).