

POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA	SUBJECT DESCRIPTION	MODELO PED.013.03
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Course	Equipment Design					
Subject	Technical Drawing and CAD					
Academic year	2023/2024	Curricular year	1st	Study period	1st semester	
Type of subject	Compulsory	Student workload (H)	Total: 140	Contact: 60	ECTS	5
Professor(s)	Professora Elisa Caetano					
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	(select)	Professor Doutor José Reinas André				

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

It is intended that students acquire skills and knowledge about orthographic and perspective design methodologies in the area of Equipment Design. The practical component of the course consists of making orthographic drawings (representation of views, cuts, sections and dimensioning) of functional and perspective parts of teaching objects. The latter aim to develop the ability to abstractly visualize three-dimensional shapes. It also consists of the execution of drawn parts of an architectural project (representation of plans, sections, elevations) whose purpose is to develop the abilities to use and interpret the specific graphic conventions of architectural drawings. Special emphasis is placed on the use of computer-aided design (Auto CAD software) to carry out technical drawings and two-dimensional architectural drawings. Skills to be developed: correctly use graphic conventions, materials and rigorous drawing tools; know the theoretical basis of the various projection systems; recognize the particular function and vocation of each of these representation systems; use knowledge of the systems studied in the development of ideas and their communication; Know the specific characteristics of architectural drawing; Know the constituent parts of an architectural project; use Auto CAD software as a work tool to create parts designed in two dimensions.

2. PROGRAMME

PART 1 - TECHNICAL DRAWING

INTRODUCTION

- Standardization in Technical Drawing;
- Sheet formatting;
- Subtitling of drawings;
- Types of lines and groups of strokes used in technical drawing;
- Line thickness and nature of strokes;
- Application of different types of lines.

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SCALES

- *Notion of scale;*
- *Numerical scale and graphic scale;*
- *Enlargement and reduction scales;*
- *Scale conversion.*

TYPES OF QUICK PERSPECTIVES / AXONOMETRIES

- *Isometrics;*
- *Dimetry;*
- *Trimetry;*
- *Military;*
- *Using different types of perspective,*
- *Choosing the perspective position,*
- *Methods for constructing perspectives.*

CONICAL OR CENTRAL PROJECTION SYSTEM

- *Frame plan;*
- *Observer and observer positions;*
- *Main point and vanishing points;*
- *Horizon line and land line;*
- *Construction of perspectives with one, two, three, or more vanishing points.*

ORTHOGONAL PROJECTIONS IN 6 PLANES

- *European Method and American Method;*
- *Projection of the faces of an object taking its perspective as reference;*
- *Defining the perspective of an object taking as reference the projections of the object's faces.*

CUTS AND SECTIONS

- *Definitions;*
- *Types of cuts and sections;*
- *Conventional representations;*
- *Drawing and referencing cuts and sections;*
- *Section lines and sight lines;*
- *Representation of cut surfaces;*
- *Representation of hidden lines in cuts.*

QUOTATION

- *Dimensioning elements;*
- *Quote types;*
- *Dimensioning of drawings (plans, sections, elevations, and others) - Roughness, Tolerances and Adjustments.*

ARCHITECTURAL DRAWING

- *General considerations;*
- *Location, overall and detail drawings;*
- *Rules for preparing plans, sections and elevations;*
- *Representation of fixed equipment and furniture;*
- *Design and dimensioning of stairs and ramps;*
- *Roof design.*

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CONSTITUENT PARTS OF A PROJECT

- Written pieces;
- Designed pieces;
- How to organize a project.

PART 2 - INTRODUCTION TO COMPUTER AIDED DESIGN (CAD)

- Introduction;
- Main differences between manual drafting and computer-aided drafting;
- CAD environment;
- Toolbars;
- Working with files [New, Open, Close, Save, Save As, Quit];
- Drawing of 2D entities [Units, Limits, Line, Polyline, Point, Circle, Arc, Rectang, Ellipse, Polygon, Undo, Redo, Erase, Offset, Trim, Extend, Fillet];
- Rigor drawing [Snap, Ortho, Dist, ID,];
- Working with entities [Copy, Paste, Zoom, Cut, Move, Rotate, Mirror, Scale, Stretch, Align];
- Drawing organization [Properties, Layer];
- Plots and area calculation ;
- Add text to drawing;
- Dimensioning and dimensioning Styles.
- Composition space management [Layout]
- Print

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The proposed syllabus aims to transmit to the student theoretical knowledge essential to the correct understanding and interpretation of the various projection systems provided for in the technical drawing, as well as their specific applications. They also aim to transmit to the student the theoretical foundations associated with architectural design. They also aim to ensure that the student correctly uses graphic conventions, both in traditional technical drawing and in computer-aided design (CAD), preparing them to apply the knowledge acquired in the design, execution and interpretation of designed pieces.

4. MAIN BIBLIOGRAPHY

Teacher's notes available on the MOODLE platform.

Bielefeld, Bert and Skiba, Isabella (2010). Dibujo Técnico. Editorial Gustavo Gili, SL, Barcelona.

Costa, Ricardo (2018). Desenho Técnico para Arquitetura, Engenharia e Construção (AEC). Quântica Editora- Conteúdos Especializados, Lda., Porto.

Cunha, Luís Veiga da, (1991). Desenho Técnico. Fundação Calouste Gulbenkian, Lisboa.

Morais, Simões de, (1993). Desenho Técnico Básico. Porto Editora, Porto.

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Neufert, Ernest. A Arte de projectar em Arquitectura

Santos, João, (2009). AutoCAD2010 Curso Completo. FCA - Editora de Informática. Lisboa.

Silva, Arlindo; Ribeiro, Carlos Tavares; Dias, João; Sousa, Luís (2004). Desenho Técnico Moderno, Lidel – Edições Técnicas, Lda, Lisboa.

Tirone, Livia (2007). Construção Sustentável. Edição Tirone Nunes SA, Sintra.

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The expository and demonstrative method will be adopted in theoretical-practical classes using the whiteboard and video projector. In all classes, worksheets will be made up of practical exercises to apply the syllabus provided for in the curricular unit. The support material for the curricular unit will be made available using, preferably, the Moodle platform. Two types of assessment are planned for the course: Continuous Assessment and Assessment by Exam.

Calculation of the final classification (FC) by continuous assessment:

$$FC (00 - 20) = API + FEC + PF + F$$

API - student attendance, participation and interaction in classes – 10% (2 val)

FEC - individual exercises in class – 25% (5 val)

PF – Final Project - 25% (5 val) E (or Normal Exam) - Mandatory attendance (DT+ CAD) - 40% (8 val)

DT - Traditional Technical Drawing - 25% (5 val)

CAD - Computer Aided Design -15% (3 val)

Calculation of the final classification (FC) by Final Exam:

$$FC (00 - 20) = DT + CAD$$

DT - Traditional Technical Drawing - 60% (12 val) CAD - Computer Aided Design - 40% (8 val)

To pass the curricular unit, the student must obtain a final grade equal to or greater than 9.5, on a scale of 0 to 20 values.

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6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The teaching methodology adopted for the curricular unit program, on the one way, that theoretical contents are presented in theoretical-practical classes, using the board, video projector and computer, and on the other way, composed of practical exercises to apply the contents, which will be prepared using traditional technical drawing and computer-aided design. The student will also have to carry out a final project work. It is therefore considered that the adopted methodology ensures the necessary theoretical knowledge component and provides the student with the ability to apply this acquired knowledge and knowledge to the concrete activities of their respective professional profile.

7. ATTENDANCE

If the student chooses the continuous assessment regime, attendance is mandatory and will be assessed in accordance with the provisions of this assessment regime

8. CONTACTS AND OFFICE HOURS

Professor: Elisa Caetano

Email: elisacaetano@ipg.pt

Cab. Nº 6

Assistance hours : Friday from 1pm-3pm

OTHERS

DATE

15 October 2023

SIGNATURES

Professor(s), Area/Group Coordinator or Head of Department signatures

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