Course Unit	Technical Drawing and Construction Graphics			Field of study	Planning and Urbanism		
Bachelor in	Civil Engineering			School	School of Technology and Management		
Academic Year	2021/2022	Year of study	1	Level	1-1	ECTS credits	6.0
Type	Semestral	Semester	2	Code	9089-322-1202-00-21		

Workload (hours)	162	Contact hours	T	-	TP	52	PL	8	TC	-	S	-	E	-	OT	-	O	-

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): António Jorge Ferreira Vaz, Sílvia Maria Afonso Fernandes

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Draw and understand two-dimensional and three-dimensional space;
2. Resolve applied problems to the dual orthografic projection system, as well as the listed projections method;
3. Understand and apply the system of orthografic multiview projections or views of solids, particularly the use of European and American methods and axonometric perspectives system;
4. Interpret and perform written and drawn elements of construction projects;
5. Work with 2D CAD software (and have brief notions of the 3D system) and make the ordering, printing and storage of drawings.

Prerequisites

Before the course unit the learner is expected to be able to:
1. Informatic knowledge from user point of view;
2. Aplly basic concepts of technical drawing and grafic representation;
3. Recognize english words associated with drawing tools in CAD software.

Course contents

Graphic concepts; Dual Orthografic projection system; System of Orthographic Multiview projections: European and American Methods; Axonometric System perspective; Architectural Design: analysis and interpretation of Architecture projects; Computer Aided Design (CAD).

Course contents (extended version)

1. Graphic concepts:
   - Introduction to Technical drawing;
   - Standardization in Technical drawing;
   - Technical Design tools for Computer Aided Design.
2. Dual Orthografic Projection System:
   - Point alphabet and coordinates;
   - Line alphabet: horizontal and frontal projections; line intersection with primary projection plans;
   - Alphabet's Plan;
   - Intersections of plans; Line and Plan intersections;
   - Two-dimension Geometric Shapes on Orthographic Plans and determination of its true dimensions;
   - Two-dimension Geometric Shapes and Solids based on Normal plans;
   - Geometric Solids;
   - Sections in Solids produced by plans and sections; real dimension determination;
   - Intersection of straight Lines with Solids.
3. Orthographic Multiview projections or Multiview drawing:
   - European Method;
   - American Method.
4. Axonometric Perspective Systems:
   - Orthogonal perspectives; geometric determination of reduction coefficients;
   - Notions of conic perspective;
   - Free-hand Design - design principles.
5. Architectural Design:
   - Analysis and interpretation of architecture drawing projects;
   - Written documents: descriptions and other written elements;
   - Architectural drawing - plans, elevations and sections;
   - The detailed drawings of various components of construction; dimensions in drawings;
   - Windows and doors details; materials listing;
   - Concrete, wood and metal structures;
   - Water supply networks, drainage and waste, electricity and others;
   - Toppings - closing the roof, inclinations, details;
   - Curves and Lines Concordances.
6. Computer Aided Design - CAD software:
   - Concepts and commands;
   - Introduction to the 2D and 3D design systems;
   - Printing and archiving.

Recommended reading

1. Santa-Rita, José Fernando, GD-A, Desenho e Geometria Descritiva - A 11º ano, Texto Editora;
2. Carvalho, Luís Filipe de e Soares, Óscar, Desenho e Geometria Descritiva B 12º ano, Texto Editora, Lisboa, 2001;
3. Neufert, Ernest, Arte de Projectar em Arquitectura. Editorial Gustavo Gili, S. A.
4. Cunha, Luís Veiga da; Desenho Técnico - 9ª Edição. Fundação C. Gulbenkian, Lisboa, 1994
5. Silva, Arlindo, Dias, João, Sousa, Luís e Tavares Ribeiro, Carlos; Desenho Técnico Moderno (11ª edição). Lidel, Lisboa, 2004

Teaching and learning methods

Lectures based on theoretical explanation using interrogative, expositive and demonstrative methods and resolution of drawing practical exercises for knowledge consolidation.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 40%
   - Practical Work - 60% (3 practical works: TP1 (20%), TP2 (20%), TP3 (20%).)
2. Alternative 2 - (Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

António Jorge Ferreira Vaz, Sílvia Maria Afonso Fernandes	Rui Alexandre Figueiredo de Oliveira	António Miguel Verdelho Paula	Paulo Alexandre Vara Alves
08-03-2022	08-03-2022	14-03-2022	14-03-2022