

Course Unit	Drawing and CAD		Field of study	Biomaterials and Biomechanics	
Bachelor in	Biomedical Technology		School	School of Technology and Management	
Academic Year	2022/2023	Year of study	2	Level	1-2
Type	Semestral	Semester	1	ECTS credits	6.0
Code	9600-752-2103-00-22				
Workload (hours)	162	Contact hours	T -	TP 60	PL -
			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) Luís Miguel Cavaleiro Queijo

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Recognize the need to learn technical drawing as a tool communication in engineering and explain the need for the rules of technical drawing.
2. Distinguish the various types of existing projections, decide on the number of views necessary and sufficient for proper representation of a piece and choose the best view elevation to principal.
3. Make graphical representations using orthogonal projections, with the use of dimensions.
4. Know to whether or not apply cuts or sections to completely represent one part through orthogonal projections.
5. Know how to use CAD tools in 2D and 3D and apply these tools to equipment part drawing.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Non-applicable.

### Course contents

Standardization of design. Concept of projection. Axonometric projection systems. Parts representation. Views representation. Projections reading. Curves, surfaces and solids and its parametric representation. Introduction to geometric modelling using CAD software. Basic geometric modelling. Mechanical components definition drawing. Introduction to complex surfaces modelling. Two-dimensional representation of mechanical components. Exploded views.

### Course contents (extended version)

1. Drawing standards.
  - Sizes. Labels.
  - Drawing lines: Sizes and types.
  - Views representations: Cuts and sections.
2. Projections.
  - Projections introduction.
  - Axonometric projections system: Orthogonal and Oblique.
3. Parts representation (European method).
  - Basic rules of hand-free drawing.
  - Views representation (selection, partial, local and auxiliary views).
  - Projections reading.
4. Drawing and modelling.
  - Curves, surfaces and solids: parametric representation of surfaces and curves.
  - Elementary solids computational implementation.
  - Geometric modeling introduction using Solidworks® CAD software.
  - Geometric modeling basic functions: drawing commands; features functions.
  - Mechanical parts modeling.
5. Definition drawing.
  - Definition drawing of mechanical parts.
  - Bidimensional representation of mechanical parts and assemblies from geometric modeling. Dimensions.
  - Assemblies drawing.

### Recommended reading

1. Normas Portuguesas, I. P. Q;
2. L. Veiga da Cunha, "Desenho Técnico" - Fundação Calouste Gulbenkian, 1994;
3. Simões Morais, "Desenho Técnico Básico - 3, Porto Editora, 2006;
4. Arlindo Silva/ João Dias/Luís Sousa, Desenho Técnico Moderno, LIDEL, 2004.
5. Apontamentos fornecidos.

### Teaching and learning methods

The classes are based in students participation in theoretical contents explanation as in his application to the drawings in exercises solved in class. In non-class times, some works and exercises are done to increase their independency and creativity.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Intermediate Written Test - 50% (Mandatory. Evaluation of contents taught to date.)
  - Final Written Exam - 50% (Mandatory. Evaluation of contents taught to date.)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

### Language of instruction

Portuguese

## Electronic validation

Luís Miguel Cavaleiro Queijo	João Eduardo Pinto Castro Ribeiro	Joana Andrea Soares Amaral	Paulo Alexandre Vara Alves
18-10-2022	18-10-2022	31-10-2022	01-11-2022