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|------------------|------------------------|----------------|---|
| Course Unit      | Technical drawing      | Field of study | Mechanical Constructions                  |
| Bachelor in      | Mechanical Engineering | School         | School of Technology and Management       |
| Academic Year    | 2023/2024              | Year of study  | 1   |
| Type             | Semestral              | Semester       | 1   |
| Workload (hours) | 162                    | Contact hours  | T - 60 TP - 60 PL - TC - S - E - OT - O - |
|                  |                        | Level          | 1-1 ECTS credits 6.0                      |
|                  |                        | Code           | 9123-759-1103-00-23                       |

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) Carlos Alberto Rodrigues Andrade

### Learning outcomes and competences

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

1. Application of the methods used to communicate ideas through free hand drawing techniques with drafts and CAD tools, also must know engineering principles for mechanical design application.
2. The students make use on the development of mechanical engineering design through the computer added drawing tools.
3. Representation and interpretation of objects through their projections.
4. Developing the ability of spatial visualization of objects.
5. Application of computer graphics for drawing and representation in two and three dimension of parts.
6. Piping representation in 2D and isometric.

### Prerequisites

Before the course unit the learner is expected to be able to:

1. Descriptive geometry basic knowledges.
2. Technical English basic knowledges.

### Course contents

Drawing rules and standardization; Basic rules in free hand representation; Projections; Representation of orthogonal object views; Cuts and sections; Perspectives; Dimensioning; Piping.

### Course contents (extended version)

1. Drawing rules and standards:
  - Paper size and shape; Drawing sheet scheme; Title and sub-title; Writing; Line type and shape (2h).
2. Free hand orthographic representation basic rules:
  - Projections: Idea of projection; Projection systems: conic; parallel; Axonometric (4h).
3. Orthographic model view representation:
  - Model view selection; local view; particular view; auxiliary view (primary and secondary) (6h).
  - Make use of 2D software for model view representation (14h).
4. Dimensioning:
  - Nominal dimension; dimension elements; Nominal dimension of objects (4h).
5. Cuts and sections: Interpretation; Representation; Patterns. Cut types:
  - Total; half; cut; By parallel plane; By cross plane; By several plane; Auxiliary, partial cuts (4h).
  - Sections; (2 hours);
6. Perspectives:
  - Make use of isometric drawing sheets for sketches (12h).
  - Interpretation of section cuts (2 hours).
7. Isometric piping drawings.
  - Orthogonal views; 3D normalized views (4h).
8. Short introduction to assembly drawings.

### Recommended reading

1. Simões Morais, "Desenho Técnico Básico - 3", 23ª edição, Porto Editora (texto de apoio principal)
2. Arlindo Silva/ João Dias/Luís Sousa, Desenho Técnico Moderno, LIDEL.
3. ISO Standards Handbook - Technical drawings, Vol. 1 e 2. Switzerland ; ISO, 4ª ed. 2002
4. French, Thomas, E. ; Engineering drawing and graphic technology. ISBN: 0. 07-113302-X

### Teaching and learning methods

The curricular unit is developed in lectures making use of expository multimedia methods of theory and practice. To the students are given several exercises related with the subject to maintain and develop the knowledge acquired. Are useful computers adapted and prepared for evolved 2D and 3D modeling with CAD software.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Final Written Exam - 100%
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

### Language of instruction

1. Portuguese
2. Portuguese, with additional English support for foreign students.

### Electronic validation

|                                  |                                   |                       |                          |
|----------------------------------|-----------------------------------|-----------------------|--------------------------|
| Carlos Alberto Rodrigues Andrade | João Eduardo Pinto Castro Ribeiro | João da Rocha e Silva | José Carlos Rufino Amaro |
| 29-09-2023                       | 29-09-2023                        | 02-10-2023            | 07-10-2023               |