

Course Unit	Mechanical Technology II	Field of study	Mechanical Constructions
Bachelor in	Mechanical Engineering	School	School of Technology and Management
Academic Year	2023/2024	Year of study	3
Type	Semestral	Semester	1
Level	1-3	ECTS credits	6.0
Code	9123-759-3104-00-23		
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) João Eduardo Pinto Castro Ribeiro

### Learning outcomes and competences

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

1. Have basic knowledge of the manufacturing processes and machining technology, sheet metal cutting and sheet metal forming.
2. Ability to design and manufacturing mechanical elements by machining processes and the use of cutting processes and sheet metal forming.
3. Have basic knowledge about the metals join processes: welding, soldering and structural adhesives.

### Prerequisites

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

1. Basic knowledge of materials science, metallography.
2. Knowledge of English.

### Course contents

Machining processes: turning, milling, planing, drilling, rectification and electric spark machining. Technology of cutting and sheet metal forming: sheet metal cutting, cutting tools, technical design, study of practical cases of progressive cutting. Technology of cutting and sheet metal forming: Presses, metal forming machines, guillotines, tools materials and sheet materials. Procedures for metals connection: welding, soldering and adhesive joints.

### Course contents (extended version)

1. Technology of cutting sheet metal:
  - Sheet metal cutting.
  - Cutting tools.
  - Rational use of sheet.
  - Technical design.
  - Study of practical cases of progressive cutting.
  - Punching
  - guillotines.
2. Machining processes:
  - turning.
  - milling.
  - planing.
  - drilling.
  - rectification.
  - electric spark machining.
3. Procedures for metals connection:
  - welding.
  - soldering.
  - adhesive joints.
4. Welding:
  - main features of welded joints.
  - problems and methods to prevent welding defects.
  - shielded arc welding (SMAW).
  - TIG.
  - MIG / MAG.
  - submerged arc welding.
5. Adhesive Joints:
  - advantages and disadvantages.
  - characterization of stress fields in adhesive joints.

### Recommended reading

1. Ribeiro, J. , "Apontamento de Tecnologia Mecânica II", IPB-ESTIG, 2008.
2. Gerling "Alrededor de las máquinas-herramientas", Editorial Reverté, S. A.
3. Ferraresi, Dino "Fundamentos da usinagem dos metais", Editora Edgard Bócher.
4. Rocha, A. B. e Duarte, J. F. "Tecnologia da Embutidura", APTCP, 1995.
5. Messler, R. , Principles of welding: processes, physics, chemistry, and metallurgy; New York: John Wiley, cop. 1999.

### Teaching and learning methods

Theoretical-practices classes are used with an expository component of the theoretical subjects and a practical component of problems resolution and practical cases analysis. It is also used the interrogative method, questioning the students systematically about the most important elements of the course. In non-presence environment is proposed the resolution of problems and accomplishment works.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Practical Work - 30%
  - Intermediate Written Test - 60% (Minimum grade requirement of 6 values.)
  - Presentations - 10%
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

**Language of instruction**

Portuguese, with additional English support for foreign students.

**Electronic validation**

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