

POLI ESCOLA SUPERIOR TECNOLOGIA GESTÃO TÉCNICO GUARDA	SUBJECT DESCRIPTION	MODELO PED.013.03
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Course	Equipment Design					
Subject	Production Technologies					
Academic year	2023-24	Curricular year	2nd	Study period	2nd semester	
Type of subject	Compulsory	Student workload (H)	Total: 140	Contact: 60	ECTS	5
Professor(s)	Mestre Pedro Alexandre Nogueira Cardão					
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	(select)	Professor Doutor José Reinas dos Santos André				

PLANNED SUBJECT DESCRIPTION

1. LEARNING OBJECTIVES

Acquiring knowledge about the processing of thermoplastics and thermosets. Study and Identifying the commercial forms, properties and applications of metallic and nonmetallic materials;

Analyzing manufacturing and bonding processes; Planning the manufacture of parts/products involving both cutting with and without (forming and bonding), chipping processes;

Thermal treatments, surface mechanical and thermomechanical treatments.

2. PROGRAMME

2.1. Processing of Thermoplastics. Introduction to thermoplastics. Extrusion of thermoplastics. Blow molding based on extrusion. Injection molding. Thermoforming.

2.2. Processing of thermosets. Molding of liquid resin and fiber composites; Compression molding and transfer molding of powders or granules; Injection molding of polymers derived from HCHO; Molding with RIM reaction of polyurethane resins.

2.3. Commercial forms of metallic and non-metallic materials (wood and derivatives, stone, ceramics, glass).

2.4. Introduction to manufacturing and bonding processes, in particular manufacturing processes without chipping, for mechanical forming of metal sheets (Extrusion, Stamping, Calendaring, Bending, Drawing), foundry processes and non-conventional processes (Electroerosion).

2.5. Adhesive bonds.

2.6. Cutting processes (Mechanical, Oxyfuel, Laser and Plasma) and welding (Coated electrode, MIG-MAG, TIG and submerged arc).

2.7. Machining processes (Turning, Milling and Drilling).

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2.8. *Thermal treatments. Isothermal treatments - time-temperature-transformation diagram. TTT curves for various types of steels. Annealing. Normalization. Tempering. Tempered. Thermochemical treatments. Cementation. nitriding. Cyanidation. Sulfonation.*

2.9. *Surface mechanical and thermomechanical treatments.*

2.10. *Planning and practical manufacture of parts/products.*

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The syllabus was defined taking into account the objectives to be attained and competences to be acquired.

The objectives of obtaining knowledge about polymer processing, will be achieved with the 1st, 2nd chapters of the syllabus; while the objectives of providing the student with knowledge in the fields of adhesive bonds, cutting processes, welding, machining and surface mechanical and thermomechanical treatments will be achieved with the material taught from the 4th to the 7th and 10th chapters. Thermal and surface treatments will be achieved in chapters 8 to 9.

4. MAIN BIBLIOGRAPHY

- *Notes from Professor Pedro Cardão, 2024;*
- *Notes from Professor Reinas André; 2019;*
- *Notes from IST, 2016;*
- *Smith W. F., "Princípios de Ciência e Engenharia de Materiais", 3ªed., McGraw-Hill International Editions, 1998;*
- *Ferreira J.M.C.G.;"Tecnologia da Pulverometalurgia"; Fundação Calouste Gulbenkian, Lisboa, 2002;*
- *Chiaverini V.; "Tecnologia Mecânica"; McGrawHill; Brasil, 1986;*

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

The program contents privilege the interconnection between the theoretical and practical components. The theoretical aspects presented by the expository, demonstrative and interrogative methods supported by the board or the use of projection will be, whenever possible, explored in a workshop environment.

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During the semester students should carry out project group work and laboratory work. The aim is to encourage practical aspects so that learning develops towards future professional activities with group work and demonstrations. These practical works will always be presented in reports that will be evaluated.

The evaluation can be continuous or by exam, in normal or recourse period.

The evaluation of the curricular unit will be carried out through practical application works (35%), examination (60%) and class questions (5%).

The examination and the appeal examination will be on a date set by the school. The student obtains approval if the final mark, resulting from the weighting of the practical work, class questions and the exam is equal or greater than 10/20 values. The presence in classes will have a maximum bonus of one value in the final mark.

Practical work is mandatory, but is only counted for continuous assessment by frequency.

Students who do not perform the practical work will have to obtain a grade equal or higher than 10/20 in the exam or in the appeal exam.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

Lectures, problem solving and lab classes will provide students with the necessary knowledge as to polymer processing, heat treatment, cutting, welding and machining processes, and surface mechanical and thermos mechanical treatments in general. The debate and experiment observation, as well as tutorial guidance will allow for a better knowledge consolidation.

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7. ATTENDANCE

Lectures attendance is not compulsory.

8. CONTACTS AND OFFICE HOURS

E-mail: pcardao@ipg.pt;

Cabinet No: 15

Service hours: Wednesday:14:00 to 16:00

DATE

19 de fevereiro de 2024

SIGNATURES

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

Professor

(signature)

Area/Group Coordinator

(signature)