

MECHANICS OF THE MATERIALS

Code: 322068

Main Scientific Area: Mechanics and industrial processes

Lecturer: Luís Miguel Moura Frade Vaz Pinto

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 105h

ECTS: 6,0

Objectives

The main goals are:

1. To know the different material classes and its generic properties. For each material class, study the most important materials, specific properties and applications. Understand the different manufacturing processes for each material class
2. Determine stresses and displacements, resulting from simple traction/compression, torsion, flexion loading
3. To dimension and design resisting cross-sections and joints.

Learning Outcomes

Students shall be able to analyze the applied loading in order to obtain the resulting forces applied at each cross-section of the object trying to dimension them. Students shall also conduct a material selection, accounting for the different manufacturing processes that are available and the supporting loads.

Course Contents

Presentation and introduction of the course unit; Reviews; definition of force and introduction to static; stress and strain; mechanical tests; mechanical joints; combined stresses; resistance criterion; evaluation test A; shear moment and shear strength; deformation due to bending; bending; torsion in shafts and springs; evaluation test B; presentation of group work.

Recommended Bibliography

Lucas F.M. da Silva, J.F. Silva Gomes, "Introdução à resistência dos materiais", 2010, PUBLINDÚSTRIA, ISBN: 9789728953553.

Carlos A. G. de Moura Branco, "Mecânica dos materiais", 1998, 3ª edição, Fundação Calouste Gulbenkian, ISBN: 9723108259.

Learning and Teaching Methods

With this curricular unit, the different material classes will be taught and also the manufacturing processes and material selection methodologies. The structural calculus of stresses and displacements is also taught in order to dimension objects.

Assessment Methods

Assessment Methods Evaluation will take into account:

5% - assiduity;

25% - Job Assignment I (Material Mechanics)

35% - mini-test A (Material Mechanics I)

35% - mini-test B (Material Mechanics II)