SUBJECT TEACHING GUIDE

G863 - Materials, Elasticity and Strength of Materials

Degree in Electrical Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Electrical Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Materials, Elasticity and Strength of Materials Module in Common with the Industrial Branch				
Course unit title and code	G863 - Materials, Elasticity and Strength of Materials				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ESTRUCTURAL Y MECANICA
Name of lecturer	ALBERTO DIEZ IBARBIA
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Other lecturers	JOSE CARLOS GOMEZ SAL

3.1 LEARNING OUTCOMES
- To recognize the strengths and weaknesses of the different methodologies studied
- To be able to select materials for a certain application taking into account the materials' electrical and magnetic properties.

4. OBJECTIVES
To be familiar with the procedures used to determine the stress, strain and deformation in structural elements.
To be able to design structural elements
To know the structure, properties and applications of electrical and magnetic materials commonly used in the industry.

6. COURSE ORGANIZATION

CONTENTS	
1	Materials in electrical and electronic engineering. Introduction: Structure of materials. Atomic structure. Ionic bond. Covalent bond.
1.1	Electrical properties - Electrical conductivity. Conductors. Semiconductors (intrinsic and extrinsic). Dielectrics. Thermoelectric properties. Piezoelectricity. Ferroelectricity. Superconductivity.
1.2	Magnetic properties - Origin of magnetism. Diamagnetism and paramagnetism. Ferromagnetism. Magnetic domains. Hysteresis loops. Other magnetic behavior. Materials for industrial use. Magnetic glasses.
2	Elasticity and Strength of Materials. Introduction. Elasticity - loads and stresses. Stress state. Plane stress state. Variation of stresses on inclined planes. Principal stresses. Variation of shear stress on inclined planes. Mechanical properties of sections (centers of mass and moments of inertia)
2.1	TENSILE STRESS- Yield point. Hooke's law. Shear modulus. Poisson's ratio. Relationship between the elastic constants. Calculation of stresses and strains.
2.2	SHEAR, TORSION. Shear strength equation. Calculation and design of joints under shear. Simple torsion. Torsional stresses. Proportionality of stresses. Torsion strength equation.
2.3	BENDING - Strenght formula. Navier formula. Modulus. Shear stress. Radius of curvature. Mohr theorems. Calculation of stresses and strains.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
First Part Test	Written exam	No	Yes	50,00
Second Part Test	Written exam	Yes	Yes	50,00
TOTAL				100,00

Observations

The final grade of the course will be the result of the weighting of the different grades obtained in each of the blocks . When the result is less than 5.00 points or in any of the course blocks the student does not reach the minimum qualification, the remedial examn will consist of an examination of the corresponding blocks in the extraordinary call. No mark will be saved for successive courses

Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

C. Hoppe Atienza – A. M. De Juan de Luna. Esfuerzos Axiles Teoría y problema. U.C.

C. Hoppe Atienza – A. M. De Juan de Luna. Torsión Teoría y problemas. U.C.

Timoshenko. Resistencia de Materiales. Thomson España

W.D.Callister - Introducción a la ciencia e ingeniería de materiales . Limusa Wiley .

J.F. Shackelford - Introducción a la ciencia de materiales para ingenieros . Pearson Education.

D.Askeland,P.Phulé . Ciencia e ingeniería de materiales. CENGAGE learning.

W.Smith,J.Hashemi. Fundamentos de la ciencia e ingeniería de materiales. McGraw-Hill Interamericana