

Code	INI389	Prerequisites	INI383
Name	Materials selection	Co- requisites	None

Credits	Contact hours
04	44
Categorization of credits	
Math and basic science	
Engineering topic	X
Other	

Coordinator's name	Laura Ramirez
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Text book
Ashby, M.; Shercliff, H. & Cebon , D. (2018). Materials: engineering, science, processing and design. (4th Ed.) Elsevier, Butterworth-Heinemann (BH). Ashby, M. (2013) Materials and the Environment. Eco-Informed Material Choice. (2nd Ed.) Elsevier, Butterworth-Heinemann (BH). Askeland, D., & Wright, W. (2017). Materials science and engineering. Mexico, DF: Cengage Learning Publishers. Kalpajian, S. & Schmid, S. (2014). Manufacturing, engineering and technology (7th Ed.) Naucalpan de Juárez (State of Mexico): Pearson Educación de México. Ashby, M. and Johnson K. (2014) Materials and Design: The Art and science of Material Selection in Product Design (3rd Ed.) Elsevier, Butterworth-Heinemann (BH).
Other supplementary materials
CES Edupack Great. (2018). Cambridge, UK: Granta Design Limited. grantadesign.com. (2019). great Design: Education. [online] Available at: http://www.grantadesign.com/education/ [Accessed April 22, 2019]. Ports Rafales, J., Rios Jordana, R. & Castro Corella, M. (2016). Materials Technology in Engineering . Madrid: Synthesis The Institute of Materials, Minerals and Mining. (2019). IOM3 The Institute of Materials, Minerals and Mining. [online] Available at: https://www.iom3.org/ [Accessed April 23, 2019].

Description	
Materials selection is a subject that trains the student in a theoretical and practical way in the selection of materials according to the design requirements of a product and the designer's objectives (improvement of environmental impact, reduction of production costs, better performance, etc.). This is a basic course to understand the relationship between the properties of materials and the design requirements to ensure their proper functioning. The different approaches to design are exposed (strength, stiffness, flexibility, weight, elasticity, plasticity, yield, ductility, crushing, wobble, fatigue, limited fracture, fracture toughness, optical quality, wear, slip, conductors, insulators, dielectrics). , magnetism, durability) and the properties of the materials with which these approaches are associated.	
Type of course	☒ Required

	☐ Elective _
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Specific goals for the course	
Outcomes of instruction	1. Identify, formulate and solve product performance problems related to materials and/or their manufacture. 2. Design components or manufacturing processes of a product to respond to demands or needs taking into account realistic limitations, as well as economic, environmental, social, political, ethical, health and safety, manufacturing and sustainability. 3. Communicate effectively by discussing the general aspects of the properties and characteristics of materials, as well as their manufacturing processes. 4. Design and conduct experiments, applying data analysis and interpretation to evaluate use and extreme conditions following scientific methodologies and rigorous criteria.
Student outcomes	SO1. Identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics. SO2. Apply the engineering design process to produce solutions that meet specific needs taking into account public health, safety and welfare, as well as global, cultural, social, environmental and economic factors. SO3. Communicate effectively with a variety of audiences. SO6: Develops and conducts appropriate experimentation, in which they analyze and interpret data, as well as use engineering criteria to draw conclusions.

Topics
Unit I. Introduction: materials, history and characteristics. family trees Unit III. Strategic thinking: adapt the material to the initial design Unit IV. Stiffness and weight: density and modulus of elasticity Unit V. Flexing, buckling and wobbling - limited stiffness design Unit VI. Beyond Elasticity: Plasticity, Yield, and Ductility Unit VII. Bend and Crush: limited strength design Unit VIII. Fracture and fracture toughness Unit IX. Shaking, Rattle, and Wobble: Cyclic Loading, Damage, and Failure Unit XI. Friction slide and grip: friction and wear Unit XII. materials and heat. The use of materials in high temperature conditions Unit XIV. Conductors, insulators and dielectrics. magnetic materials