

Code	INI383L	Prerequisites	CBQ208 ING217
Name	Laboratory Materials Science and Engineering.	Co-requisites	INI383

Credits	Contact Hours
01	22
Categorization of credits	
Math and basic science	
Engineering topic	X
Other	

Coordinator's name	Laura Ramírez
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Text book
Askeland, D., and Wright, W. (2017). Materials science and engineering. (7th Ed.) Mexico City : Cengage Learning Editors. Shackelford, James F. (2014). Introduction to materials science for engineers. (7th Ed.). Madrid: Pearson Prentice Hall. Callister, W., Rethwisch, D., Molera Solski, P. y Salá Ballesteros, N. (2016) Materials science and engineering. (2nd Ed.). Barcelona: Reverté. Ashby, M.F., Shercliff, H., & Cebon, D. (2014). Materials: engineering, science, processing and design. (3rd Ed.), Elsevier, Butterworth-Heinemann (BH). Lasheras, J. & Carrasquilla, J. (2005). Materials science for engineering. (1st Ed.) San Sebastián: Donostiarra. Kalpajian, S., Schmid, S., Murrieta Murrieta, J., Sandoval Palafox, F. and Figueroa López, U. (2014). Manufacturing, engineering and technology. Naucalpan de Juárez (Spain). State of Mexico: Pearson Education of Mexico. CES Edupack Granta. (2017). Cambridge, United Kingdom: Granta Design Limited.
Other supplemental materials
Askeland, D. and Phule, P. (2011). Materials science and engineering, Thomson. Mangonon P. (1999). Materials science: selection and design, Prentice Hall. Ashby, M. (2011). Materials Selection in Mechanical Design, Elsevier. Giménez, C., Amigo, V. y Moya, M. (2009). Fundamentals of Materials Science, Volume I and II, Spain UPV. Van Vlack, L. (1980). Engineering Materials. (2nd Ed.). Mexico: CECOSA.

Description
The Materials Science and Engineering Laboratory is a basic course for understanding the relationship between the structure, properties, and processing and testing techniques of engineering materials. Various tests (tension, compression, bending, hardness,

metallography, impact) are carried out on different materials following international standards, techniques or procedures. Students are expected to analyze the mechanical behavior of materials with the evaluation of faults (fracture mechanics), as well as determine the effect of composition and phases of structure on alloys with phase diagrams.

Type of course	Required ☒ Elective ☐
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Specific goals for the course	
Outcomes of instruction	1. Summarizes the characteristics of the most important materials and their manufacturing processes by identifying the effects of manufacturing processes on design. 2. It describes the microstructure of materials and the latest advances in the technological development of materials processing to incorporate design improvements. 3. Interprets the test requirements and/or specifications of a product or material appropriately to assess its conformity or determine its characteristics and properties. 4. It shows willingness and collaboration to team work during the development of laboratory practice tests. 5. It organizes the data of the practices in a coherent and structured way, detailing and describing the procedure carried out to calculate design requirements or properties of the materials relating it to the theoretical foundation that supports it. 6. Appropriately uses the primary concepts of materials science and engineering for troubleshooting product materials and/or their manufacturing processes.
Student outcomes	SO1. Identifies, formulates and solves complex Engineering problems through the application of Engineering, Science and Mathematics principles. SO5. Function effectively in a team whose members together provide leadership, create a collaborative and inclusive environment, set goals, plan tasks, and meet objectives. 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 to materials science and engineering. Unit II. Mechanics of the fracture. Unit III. Metallography. Unit IV. Hardness. Unit V. Voltage. Unit VI. Compression. Unit VII. Flexion. Unit VIII. Impact. Unit IX. Binary isomorphous phase diagrams. Unit X. Iron-Carbon Diagram.