

Course Syllabi

1. INDU-00027 SCIENCE AND ENGINEERING OF MATERIALS

2. Instructor:

- Maria Eulalia Vanegas Peña

3. Bibliography

- Materials Science and Engineering An Introduction, Callister W., Rethwisch D., 2010
- Fundamentos de la ciencia e ingeniería de materiales, Smith W., Hashemi J., 2006
- Engineering materials: an introduction to properties, applications, and design, Ashby M., Jones D. , 2012

4. Specific Course Information

- a. Theoretical and practical subject is based on the study of materials focused on the relation structure - processing properties - use, gives the future Chemical Engineer a series of skills and knowledge to have a global view of the different materials, how to characterize them through different trials and their possible final applications. Likewise it reinforces the use of knowledge in mathematics, physics and chemistry to plan possible solutions to problems in the field of Ing. The subject contributes to the items: Applying knowledge and skills in mathematics, physics and chemistry, effectively, as basic tools for solving problems in the field of Chemical Engineering. Communicating effectively in oral and written form using the appropriate technical language, whether working individually or in the field of chemical engineering. n interdisciplinary and/or multi-ethnic teams. Apply the basic foundations of training research, at the exploratory and diagnostic levels, in an appropriate way, for the development of experiments, for the search, selection and evaluation of information, preparation of bibliographical essays and academic articles and for the communication of findings.

b. Prerequisites:

- EDUC-00024 Scientist's book and met. inve.
- INGE-00033 Thermodynamics

5. Learning Objectives of the Course

- a. Identify and analyze the relationship between structure and properties of materials, and how transformation processes can affect the final characteristics depending on the intended use of the material - Analyze the direct relationship structure of the material - properties - uses - Identify crystalline structures and how they affect imperfections in the properties of materials - Develop the ability in the handling of instruments to characterize materials, especially the related to mechanical properties

b. Learning Outcomes

1. Interpret the phase diagram in a material system and understand the evolution of microstructures in the various regions of the diagram
2. Knowing and understanding the different types of material tests to determine their properties and how different processes can modify these properties
3. Understanding atomic structure, atomic bonds, crystalline structures and identifying the types of defects causing imperfections and knowing the phenomena that cause the diffusion of atoms
4. Understand the importance of materials and differences between metallic, ceramic, polymeric and composite materials (on a different scale)
5. Understanding atomic structure, atomic bonds, crystalline structures and identifying the types of

defects causing imperfections and knowing the phenomena that cause the diffusion of atoms

6. Understanding atomic structure, atomic bonds, crystalline structures and identifying the types of defects causing imperfections and knowing the phenomena that cause the diffusion of atoms

7. Knowing and understanding the different types of material tests to determine their properties and how different processes can modify these properties

6. Course Topics

1. Introduction to science and engineering materials

2. Links and atomic arrangement

3. Imperfections in atomic arrangements and movement of atoms

4. Mechanical properties

5. Phase and alloy diagrams

6. Introduction to nanomaterials