

FACULTY OF **ENGINEERING**

DEGREE COURSE: **INDUSTRIAL ENGINEERING BS**

SUBJECT: MATERIALS TECHNOLOGY

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OBJECTIVES

The course is aimed at:

- 1) Providing basic knowledge for the study of the different treated materials: metals, polymers and ceramics.
- 2) Providing basic knowledge of the main processes.
- 3) Providing basic knowledge to integrate the characteristics of materials and their applications in engineering.
- 4) Providing preliminary basic knowledge to choose the most suitable material for a specific application.

CONTENTS

INTRODUCTION: The role of materials technology. Classification of materials. Competition between the materials. Modern materials' needs.

STRUCTURE OF MATERIALS: Atomic structure and interatomic bonding. The structure of crystalline solids. Imperfections in solids. Phase diagrams.

METAL ALLOYS: Mechanical properties of metals. Elastic and plastic deformations. Tensile test. Compression test. Fatigue. Hardness. Toughness. Fundamentals of fracture. Applications and processing of metal alloys.

POLYMERS: Polymer structures. Characteristics, applications, and processing of polymers. Polymer types.

CERAMICS: Structures and properties of ceramics. Applications and processing of ceramics. Glasses.

LEARNING OUTCOMES

At the end of the course, students:

- will be able to solve basic technological problems related to materials production and properties and choose the right materials for given applications.
- will understand how material production and properties are connected to chemical properties and atomic structure and how materials structure is affected by thermal and mechanical treatments.

ASSESSMENT

Written exam: multiple choice and open questions

RECOMMENDED TEXTBOOKS

- W. D. Callister: "Materials Science and Engineering - An Introduction", John Wiley & Sons (Seventh Edition).
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