

COURSE OUTLINE

Materials and Process 146 Materials and Process

Catalog Statement

Material and Processes- 3 units

MAT P 146 is a study of the manufacture properties of ferrous and non-ferrous alloys, ceramic products, wood, cements, plastics, fuels, glass, concrete, rubber, etc. Their uses, adaptability, and limitations in industry are studied. Current methods of manufacture and technique are covered. The course covers testing of materials by the destructive and nondestructive methods and the physical properties of materials.

Lecture 3 hours

Prerequisite: None.

Recommended Preparation: Technical Education 145 or Physics 110 or physical science 131 or equivalent, and eligibility for English 120 or ESL 165

Note: Materials and process 146 is a mandatory requirement for the engineering major certificate. This course may not be taken for credit by students who have completed Technical Education 146.

Course Objectives

Given lecture, demonstrations, films, simulations, written and other assignments, students will demonstrate their knowledge by:

- completing two comparative tests on give materials and prepare a written evaluation and oral report on the test results;
- developing two test procedures on materials used within electro-mechanical packaging.
- obtaining a knowledge of the various terms used within the manufacturing industries;
- obtaining a knowledge of the various manufacturing methods used in industry.

Textbooks

Introduction to Material Science, B.R. Schlenker, John Wiley and Sons 1974

Manufacturing Processes, B.H. Amstead, P.E. Ostwald, John Wiley and Sons 1977

Course Outline

Structure of Materials

Periodic table of elements

Atomic structure, atomic bonds

Physical properties

Methods of testing

Properties of Materials

- Chemical properties, mechanical properties
- Fractures in brittle and ductile materials
- Rockwell, brinell tests
- Selection of materials

Wood and its product

- Structure of wood
- From tree to board, seasoning of wood
- Selecting lumber, costs
- Prolonging the useful life of wood
- Plywood and improved wood, paper, forestry

Fuels

- Calorimeter and heating value
- Solid fuels, gaseous fuel, liquid fuels
- Crude oil, refining of petroleum
- Distillate and residual fuels
- Rocket propellents
- Energy from nuclear fuels
- Coal, coke fuels
- Synthetic fuels, L-P gases

Ceramics

- Structural clay products
- Bonding materials, cements
- Abrasives, natural and synthetics
- Glass, paints
- High temperature ceramics
- Ceramics to metal

Metals

- Metals from A to Z their chemical symbols, melting points, specific gravity, occurrences, Characteristics
- Ferrous metals and non-ferrous metals and alloys
- Alloys steel and cast iron
- Casting techniques
- Working of metals, hot and cold
- Joining of metals, removing metals
- Iron and steel, pig iron, cast iron
- Mechanical shaping
- Heat treatment of metals
- Foundry practices
- Protecting metals against corrosion
- Refractory metals
- Gases used in the handling of metals
- Gold welding, cold forming, plating of metals
- Surface hardening, case hardening

Plastics

- Plastics, types A through Z
- Laminates and adhesives

Organic plastic
Plastic materials and their uses
Properties and methods of forming
Amorphous materials
Polymerization
Thermosetting and thermoplastic resins
Rubber, natural and synthetic

Examination/Evaluation procedures

Nine regularly scheduled one-hour quizzes and one two-and one half-hour final examination.
(Both written and objective).

Special Features

Field trips, guest speakers