

LANDMARK UNIVERSITY

COLLEGE: COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT: MECHANICAL ENGINEERING

PROGRAMME: MECHANICAL ENGINEERING

COURSE CODE: MCE 419

UNITS: 2

COURSE TITLE: ENGINEERING METALLURGY

SEMESTER: ALPHA

COURSE DURATION: Two hours per week for 15 weeks

Lecturer Data

Makanjuola Oki

Qualifications obtained: PhD, MSc, BSc

Department: Department of Mechanical Engineering

Faculty: Engineering

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Office Location: Room C 117 New College Building.

Consultation Hours: Monday to Friday 2-5p.m

A. BRIEF OVERVIEW OF COURSE

The various topics to be treated include Chemical Metallurgy, Physical metallurgy, Mechanical metallurgy, and Powder metallurgy.

B. COURSE JUSTIFICATION

Engineering materials constitute foundation of technology. Hence all engineers should have a basic knowledge of materials, their chemical and physical characteristics as well as areas of applications. Modification of metals and alloys by heat treatment are essential to application of engineering materials in diverse environments. Thus engineers should be knowledgeable about the various transformations that alter the properties of alloys during processing and those deliberately performed in order to make them suitable for predetermined environments/applications.

C. COURSE OBJECTIVES

- Understanding the meta-stable structure of steels.
- To know the effect of alloying element in steels.
- To know the plastic working technique suitable for product finishing.
- Acquiring basic skills and competencies for selecting appropriate manufacturing tools.

D. COURSE REQUIREMENT

In order to maximize the benefits of this course, the student is required to have knowledge of Materials and Raw material studies especially materials related to metals and alloys.

E. METHOD OF LECTURE DELIVERY / TEACHING AIDS

- Provision of detailed explanation in class on the topic.

- Provision of adequate illustration on the board.
- Making lecturing periods interactive.
- Giving the students class work during the lecture period.
- Giving take-home assignments at the end of each lecture.

COURSE OUTLINES

Module 1

Week 1: Chemical metallurgy – Introduction and chemical properties of alloy steels.

Week 2: Alloy steels; classification, general description and effect of alloying elements.

Week 3: Heat treatment.

Module 2

Week 4: Physical metallurgy – Introduction and physical properties of metals.

Week 5: Iron-cementite diagram.

Week 6: Transformation in steel.

Module 3

Week 7: Heat treatment of steels.

Week 8: Tempering and Hardenability.

Week 9: Mechanical metallurgy – Introduction to mechanical properties of metals.

Module 4

Week 10: Plastic working techniques – Hot-working and cold-working; Forge operation.

Week 11: Rolling operation.

Week 12: Drawing operations – wire, rods and tubes.

Module 5

Week 13: Deep drawing.

Week 14: Metallurgical factors influencing corrosion

Week 15: Revision.

Tutorials: Questions will be given to students at the end of each lecture.

STRUCTURE OF PROGRAMME/METHOD OF GRADING: Regular assignment constitutes a part of the continuous assessment (10%), mid semester examination (10%), test (10%) and semester examination (70%).

RECOMMENDED BOOKS

Principle of Materials Science and Engineering (Third Edition) By William F. Smith

Engineering Materials Properties and Selection By Kenneth G. Budinski

Engineering Metallurgy By R. A. Higgins