NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF GEOLOGICAL, MINING AND METALLURGICAL ENGINEERING

METALLURGICAL ENGINEERING PROGRAM

ME413 METALLURGICAL BASICS II

I. GENERAL INFORMATION

CODE	**:**	ME413 Metallurgical Basics II
SEMESTER	**:**	7
CREDITS	**:**	4
HOURS PER WEEK	**:**	6 (Theory, Practice, Laboratory)
PREREQUISITES	**:**	ME320 Metallurgical Basics I
CONDITION	**:**	Compulsory
DEPARTMENT	**:**	Metallurgical Engineering

II. LEARNING UNITS

1. ELECTROCHEMICAL EQUILIBRIUM AND THEIR GRAPHICAL REPRESENTATIONS IN AQUEOUS SYSTEMS

Chemical equilibrium in chemical aqueous. Electro-chemical equilibrium in aqueous systems. Nernst equations and their applications. Ideal and real aqueous solutions at different temperatures. Graphical representations and their applications for analyzing precipitation of heavy metals.

2. SORPTION

Introduction. Isothermal sorption. Sorption kinetical models. Applications.

3. ELECTROCHEMICAL KINETICS

Electrochemical reactions. Faraday laws. Polarization curves. Tafel equations.

4. FUNDAMENTAL RELATIONS: BUTLER VOLMER EQUATION

Electron transfer regimen. Over-tension by activation. Limit laws of over-tension. Mass transfer regimen. Over-tension by diffusion. Diffusion-transference mixed regimen.

5. MULTIPLE ELECTRODES

Mixed potential. Corrosion current or dissolution. Evans diagrams, applications. Electrolytic cells. Cyclic and lineal voltmetry. Semiconductors electrochemistry. Gold in nature.

6. APPLICATION OF KINETIC MODELS IN METALLURGY

Application of unreacted nucleus model. Other empiric and semi-empiric models. Introduction to reactors design.

III. PRACTICE EXPERIENCE

Practice 1. Electrochemistry
Practice 2. Graphical representations of chemical and electro-chemical equilibrium
Practice 3. Predominance and solubility diagrams
Practice 4. Pourbaix diagrams
Practice 5. Sorption isothermals
Practice 6. Calculation of Tafel slope. Polarization resistance.