

**Department:** Mining Engineering

**Division:** Mineral Processing

**Level and Major:** MSc, Mineral Processing

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**Course Title:** Analytical Methods in Mineral Science

**Number of Credits:** 1

**Lecturer:** Dr. Amir Reza Azadmehr

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### **Course Goals and Objectives**

Fundamental of quantitative and qualitative of chemical analysis - Introduction to analytical chemistry methods in minerals.

### **Course Topics**

- Equilibrium, parameters of chemical equilibrium, equilibrium constant, solubility, solubility product
- Mass balance and charge balance in equilibrium, the solubility of metal hydroxide, solubility in chelate agents.
- Fundamental of electrochemistry, reduction and oxidation reactions, galvanic and electrolytic cell, Nernst equation, usage of electrochemical potential for quantitative analysis, the equilibrium constant of oxidation and reduction reactions, electrochemical potential and solubility product.
- Electrochemical titration, Oxidation and reduction titration, the oxidative and reductive compound in electrochemical titration
- Potentiometry methods, electrodes, indicator electrode, ion-selective electrodes, voltammetry method, polarization methods, transformation ion in solution, polarography
- Coulometry and quantitative analysis, coulometry and titration
- Molecular spectroscopy and application Molecular spectroscopy in quantitative analysis, atomic absorption, and application Atomic absorption in quantitative analysis
- Application of XRD, XRF spectroscopy in chemical analysis of minerals.

### **Reading Resources**

- Analytical chemistry
- Douglas Skoog and Donald West, Analytical chemistry, Saunders college publishing, 2005