

# MINERAL PROCESSING (MNPR)

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MNPR 301: Elements of Mineral Processing

3 Credits

Introduction to mineral process engineering. Sampling, sizing, comminution, physical and chemical processes, applications to industrial practice. Pollution control.

**Enforced Prerequisite at Enrollment:** (CHEM 110 or CHEM 106) and MATH 141

MNPR 401: Mineral Process Engineering

3 Credits

Unit operations for processing particulate materials: comminution, screening, classification, slurry pumping, thickening, filtration, etc.; application to mineral processing plant design.

**Enforced Prerequisite at Enrollment:** MNPR 301 and (MATH 250 or MATH 251)

MNPR 401H: Mineral Process Engineering

3 Credits

Unit operations for processing particulate materials: comminution, screening, classification, slurry pumping, thickening, filtration, etc.; application to mineral processing plant design.

Honors

MNPR 413: Mineral Processing Laboratory

1 Credits

A laboratory study of the chemical and physical principles involved in practical mineral processing operations.

**Enforced Prerequisite or Concurrent at Enrollment:** MNPR 301

MNPR 426: Aqueous Processing

3 Credits

A study of the chemical and engineering principles pertinent to metal processing in aqueous systems: hydrometallurgical extraction, plating, materials preparation. MATSE (MN PR) 426 Aqueous Processing (3) This 3-credit course deals with the chemical and engineering principles underlying the aqueous processing of metals: metal extraction from primary and secondary sources, electroplating, and metal finishing, powder synthesis, energy storage and conversion, and treatment of recycling of metal-containing toxic wastes.1. Physico-Chemical Principles - Thermodynamic, chemical kinetic and transport factors which control hydrochemical processes (leaching; precipitation; adsorption; solvent extraction; ion exchange; electrowinning, electrorefining and electroplating; membrane processes; energy storage and conversion); graphical representation of homogeneous and solid/solution equilibria; chemical reagents.2. Engineering Principles - Reactor design and staged operations; ideal batch, continuous stirred-tank and plug-flow reactors; fluidized bed reactors; electrochemical reactors; multistage separation processes (solid-liquid, liquid-liquid, and gas-liquid systems).3.

Process Synthesis - Design of metal separation (extraction, refining, waste treatment) materials synthesis, metal finishing, and energy storage/conversion processes and system-integration of unit operations, industrial practice. Emphasis on closing circuits to minimize or eliminate waste effluents.

**Enforced Prerequisite at Enrollment:** EME 301 or MATSE 401

Cross-listed with: MATSE 426

MNPR 496: Independent Studies

1-18 Credits/Maximum of 18

Creative projects, including research and design, which are supervised on an individual basis and which fall outside the scope of formal courses.