

MONTANA TECH
Department of Metallurgical & Materials Engineering

EMET 595 – Special Topics: Advanced Separations

Instructor: Dr. A. Das

Office Hours: ELC 213, MWF 10:00-11:00 or by appointment, Fall Semester

Lecture: MGB 104; MW 12.00 -12:50

Prerequisites: EMET 232 (or equivalent) or Consent of Instructor

Co-Requisite: None

Designation: Elective in M&ME

Catalog Description:

Advanced separation processes relevant to metallurgical and materials processing are detailed. Separation of solids from other solids, liquids and gases are discussed. Liquid-liquid and gas-liquid separations relevant metallurgical processing are covered. Separation of gaseous species in metallurgical processing from gas mixtures are dealt with.

Credits: 2 Credit-Hours (Lecture)

Textbook: No required text book

References: Books and journal article references will be given in the class for each topic

Outcomes: Graduates of this course will or will be able to:

1. Understand and apply advanced separation techniques to metallurgical and materials processing
2. Accomplish effective separation of solids from other solids, liquids and gases as applicable to M&ME
3. Gain knowledge for liquid-liquid, gas-liquid and gas-gas separation systems in metallurgy
4. Develop metallurgical and materials processing schemes requiring any type of separation

Topics: The course will cover the topics as listed below.

1. Introduction and review of separation systems in M&ME
2. Solid-solid separation: advanced gravity, magnetic and electrostatic separation systems
3. Solid-liquid separation: thickening, filtration, evaporation, elutriation, centrifuging, desliming, drying
4. Solid-gas separation: air cyclone, electrostatic precipitators, baghouse filters, venturi cleaners
5. Liquid-liquid separation: solvent extraction, ion exchange, fractional distillation
6. Liquid-gas separation: vacuum degassing, stirring, displacement purging in M&ME systems
7. Gas-Gas separation: selective adsorption and sequestration

Examinations: This course has one mid-term test and one term project with no final exam;

Grading Policy: The final grade will be weighted from the above course elements approximately as follows:

Homework Assignments	20%
Class Participation	20%
Project	40%
Midterm	20%

Professional Component: Engineering Topics (two credits)

ABET Outcomes Covered: 1, 3, 7, 9 and 10

1. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
3. communicate effectively with a range of audiences
7. acquire and apply new knowledge as needed, using appropriate learning strategies
9. integrate the understanding of the scientific and engineering principles underlying the four major elements of the field: structure, properties, processing and performance related to metallurgical and materials systems appropriate to the field, and
10. apply and integrate knowledge from each of the above four elements of the field using experimental, computational and statistical methods to solve materials problems including selection and design consistent with the program educational objectives.

Prepared by: Avimanyu Das

Date: November 12, 2018