

Met/MSE 344 Syllabus: Hydroprocessing of Materials Spring Semester

Course Information:

Course title: Hydroprocessing of Materials

Course number: Met 344/ MSE 344, Spring semester

Credit hours: 4 credits

Prerequisites by topic: Met/MSE 308 Thermodynamics of Materials

Classroom: McClure 415 (Tuesday, Thursday; 11:00am – 12:15am)

Laboratory: Mines 210 (Thursday 1:30pm – 3:20pm)

Instructor Information:

Instructor: Batric Pesic, Professor of Metallurgy

Office: McClure 407b

Office tel: 885-6569

Office hours: Open. If not in McClure 407B, check the lab, Mines 210.

Textbook: Fathi Habashi, A Textbook of Hydrometallurgy. Publisher: Metallurgie
Extractive Quebec, 1993

*Textbook is available in the University of Idaho Bookstore

Supplementary reading: Xeroxed notes. Class handouts

Course Objectives:

This course is designed to give junior and senior students in metallurgical engineering the ability to select and develop flowsheets for processing of metals, minerals and materials by hydrometallurgical methods.

Learning Objectives:

1. To introduce the principles of hydrometallurgy.
2. To know how to use thermodynamics to study and evaluate hydrometallurgical reaction systems.
3. To know how to use kinetics to study and evaluate hydrometallurgical reaction systems.
4. To know chemical reaction kinetics modeling principles.
5. To know how to distinguish chemical reactions according to their controlling mechanisms.
6. To know how to construct Eh-pH phase diagrams.
7. To know basic unit operations of importance to hydrometallurgy: comminution, leaching, solid/liquid separation, metal recovery.

8. To know metal recovery methods based on electrowinning, electrorefining, solvent extraction, reduction and precipitation.
9. To know how to design a metal recovery and processing flowsheet.
10. To know how to conduct metallurgical laboratory experiments.

Grading System:

Exams: 70% of overall grade

Homework: No credit (homework is mandatory)

Lab Reports: 30% of overall grade. Lab reports are due one week after the lab was performed. For the lab reports turned in late, 5 points will be taken off per week for each individual lab report turned late.

Course calendar:

Lesson	Topic
1.	History of hydrometallurgy
2.	Theory of decomposition chemistry and thermodynamics
3.	
4.	Hydrometallurgical fluid-particle reaction
5.	
6.	
7.	
8.	Dissolution of metals, minerals, materials
9.	
10.	
11.	
12.	Hydroprocessing of metals from solutions - Preparation
13.	Hydroprocessing of metals from solutions – Ion exchange
14.	
15.	Hydroprocessing of metals from solutions – Solvent extraction
16.	
17.	TEST
18.	Spring Break
19.	Hydroprocessing of metals from solutions – Electrometallurgy: electrowinning and electrorefining
20.	
21.	
22.	Hydroprocessing of metals from solutions – Hydrogen reduction thermodynamics and theory
23.	
24.	Pressure processing of materials
25.	Bioprocessing of materials
26.	Hydroprocessing of ceramic materials
27.	TEST
28.	Flowsheet design and analysis

29.	
30.	
31.	Reaction path synthesis. Production consumption analysis
32.	Mass balance techniques. Tie components techniques
33.	Final Examination

Disability Support Services Reasonable Accommodations Statement:

Reasonable accommodations are available for students who have a documented disability. Please notify the instructor during the first week of class of any accommodation(s) needed for the course. Late notification may mean that requested accommodations might not be available. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 333.

- 885-7200
- email at <dss@uidaho.edu>
- website at <www.access.uidaho.edu> or <www.webs.uidaho.edu/aap>

Laboratory Projects:

1. Analytical methods of analyzing metals in solutions. (1 week)
2. Dissolution of ores. (2 weeks)
3. Dissolution of metals. (2 weeks)
4. Adsorption from aqueous solutions. (1 week)
5. Determination of standard potentials in electrometallurgy (1 week)
6. Electrowinning. (2 weeks)
7. Solvent extraction. (1 week)
8. Cyanidation of gold ores (2 weeks)

Laboratory Safety

Discipline in the lab is mandatory. Come prepared for the lab by at least reading the lab handout. Leave all your bags in a corner for safety reasons (no tripping). Goggles must be used. No horsing around, neither applying bad or good jokes while handling the chemicals. In the lab, the safety is number one priority.

Elements of Proper Behavior:

Come to class on time.

No snacks, drinks and chewing gums.

For the students, please address me as Dr. Pesic or Professor Pesic, you choose. This is an institution of higher learning, therefore it calls for proper communications too.