Met/MSE 341 Syllabus: Particulate and Materials Processing
Fall Semester

Course Information:

Course title: Particulate and Materials Processing
Course number: Met 341/ MSE 341, Fall semester
Credit hours: 4 credits
Prerequisites by topic: Chem 111 Principles of Chemistry I
Chem 112 Principles of Chemistry II
Math 310 Ordinary differential Equations
Classroom: McClure 214a (Tuesday, Thursday; 12:30 am – 1:50 am)

Instructor Information:

Instructor: Keith Prisbrey, Professor of Metallurgy
Office: McClure 407c
Office tel: 885-6743
Office hours: M-F 9:30-11:30 or by appointment

Textbook: 1) www.ets.uidaho.edu/met341; 2) www.me.pdx.edu/~gerry/mmm/course; 3) Mindstorm Robots by Lego

Supplementary reading:
Published articles from journals, TMS/SME/ASM

Course Objectives:

This course is designed to introduce junior students in metallurgical engineering and materials science and engineering with the concepts of thermodynamics applied to engineering materials.

Learning Objectives:

1. Formulate ordinary differential equations (ODE) and define "the control question" for material processes and flow sheets
2. Perform block diagram algebra (using the concept of convolution) in Matlab and Simulink
3. Apply block diagram algebra to lead, zinc, silver, copper, gold, iron, phosphate, and other mills
4. Define rise time, overshoot, settling time, natural frequency, damping ration, eigen values, poles, and zeros for particulate materials processes
5. Define state space models for flotation, magnetic separation, electrostatic separation, gravity separation, crushing, grinding,

screening, cyclone separating, thickening, filtering, drying, and solid state powder processing

Grading System: There will be almost daily quizzes, three take home midterms exams, written lab reports, oral project presentations, and a final take home exam. All quizzes and exams will make up 60% of the total grade. The other activities make up 40% of the total grade.

Course Calendar:

Lesson	Topic
1	Introduction and overview
2	Matlab computing language
3	ODE systems and particulate material processing
4	
5	Characteristics and identification of powder processing cause/effect relationships (next 9 classes), plus.....
6	
7	Crushing, grinding, screening
8	Metal powders
9	
10	Exam
11	Compaction
12	Sintering
13	Hip'ing and other powder metallurgy techniques
14	Characteristic and identification of state variables (3 lec), of manipulated variables (4 lec), of controlled variables (3 lec), and of disturbance variables (2 lec), plus....
15	
16	Froth flotation, gravity separation
17	
18	Magnetic separation, electrostatic separation
19	Exam
20	Testing and engineering classification of materials processing flow sheets
21	
22	
23	Basic linear quadratic gaussian estimators and controllers
24	
25	Flow sheet design, plus
26	
27	Exam
28	Optimization, design and control summary
29	Cyclone separating

30	Thickening
31	Filtering
32	Drying
33	Final Examination

Elements of Proper Behavior:

Improve on the high standards of honesty and fair play expected of professional engineers and our code of ethics. Have fun with and thrill in the intense competition that underpins our learning activities. Come to class on time and prepared, having read books, chapters, and articles, and be mentally available to come to the board and explain equations and concepts to other class members on a minute's notice. Explaining to others is a powerful learning aid. Snacks and drinks are allowed and welcome (because of our lunch time class time). We use a lot of peer review—you will grade others' written reports and oral presentations; scores are totaled and the winning paper or presentation is chosen for many assignments; therefore, be positive and helpful in your comments, become "thick skinned" and don't take offense, and notice what is the most persuasive and effective for you (as a future boss, and for your future boss).

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>**