

MINE 3544: Mineral Processing Lab

Instructor: Scott Koermer

Spring 2021

Last Updated: Sunday 14th February, 2021

E-mail: skoermer@vt.edu

Office: [Zoom Link](#)

Office Hours: [Scheduled Here](#)

Discord: <https://discord.gg/XYBChESWH5>

Lab: [740 Plantation Road](#)

Class Sections: M 2:30PM-5:15PM

T 2:00PM-4:45PM

W 2:30PM-5:15PM

Writing Coordinator: Angelo Biviano

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Catalog Description:

Laboratory investigations of the unit operations and principles of mineral processing including ore preparation (size reduction, mineral liberation, and classification) and mineral recovery (froth flotation, electrostatic separation, magnetic separation, and solid-liquid separation). CLE Area AR1W - Writing Intensive. Pre: 3534; Co: 3554. (3L, 1C)

Expected Learning Outcomes:

The purpose of this class is to give an overview of laboratory techniques and operations common to the field of mineral processing. After completion of this course, the student will be able to:

- Obtain a representative sample of slurry or dry ore.
- Measure the size distribution of a particulate material.
- Design and evaluate basic comminution circuits.
- Analyze an unknown mineral sample and determine the assay.
- Design clarification and dewatering systems.
- Conduct separation tests (floatation/electrostatic) to evaluate experimental parameters.
- Interpret recovery-grade relationships and identify optimum conditions.
- Design and conduct a mineral processing experimental program to meet a desired objective.

Grading:

Final grades will be based upon the successful completion of laboratory exercises and a final project. Both the final project and final project proposal are writing intensive activities and will be evaluated for technical accuracy and written quality. Any late submissions will incur a 10 point per day penalty.

Category	Weight
Laboratory Exercises	60%
Project Proposal	10%
Final Project Report	30%

Letter grades will be assigned on a standard 10 point scale with rounding occurring on the first decimal place (90.0-100 = A; 80.0-89.9 = B; 70-79.9 = C; 60-69.9 = D; < 59.9 = F). Provisions for pluses and minuses will be made at the instructor's discretion.

Assignments are to be submitted electronically on Canvas, with the first word of the submission file name as the student's last name (Ex: "Doe_John_Lab_4.pdf"). If named improperly, the student will

be asked to resubmit the file. If the student does not resubmit within 48 hours, the assignment will be counted as late. For repeated offenses (>3 instances), the assignment will immediately be counted as late, and the student will be asked to resubmit.

Course Schedule:

Laboratory exercises are typically due one week after completion of the activity. However, the spring break can change the due date of a lab assignment in the following ways:

1. A spring break day lands on the due date. The assignment is due one week later.
2. A spring break day is the day before an assignment is due. The assignment is due one week later.

In these cases, a lab exercise is due two weeks after completion. Assignments where this is the case are marked with an asterisk.

Week No.	Week of	Section Lab Day		
		Monday	Tuesday	Wednesday
1	01/17/2021	Martin Luther King Day	L1: Introduction	L1: Introduction
2	01/24/2021	L1: Introduction	L2: Sampling and Splitting	L2: Sampling and Splitting
3	01/31/2021	L2: Sampling and Splitting*	L3: Particle Size Analysis	L3: Particle Size Analysis
4	02/07/2021	L3: Particle Size Analysis	L4: Grinding Assessment	L4: Grinding Assessment
5	02/14/2021	L4: Grinding Assessment	L5a: Flotation 1	L5a: Flotation 1
6	02/21/2021	L5a: Flotation 1	L5b: Flotation 2 [†]	L5b: Flotation 2 [†]
7	02/28/2021	L5b: Flotation 2 [†]	L6: Crushing Plant Simulation [†]	L6: Crushing Plant Simulation [†]
8	03/07/2021	L6: Crushing Plant Simulation [†]	L7: Thickening [†]	L7: Thickening ^{†*}
9	03/14/2021	L7: Thickening [†]	No Meeting	Spring Break
10	03/21/2021	L8: Assay and Analysis [†]	L8: Assay and Analysis [†]	L8: Assay and Analysis [†]
11	03/28/2021	L9: Electrostatic Separation [†]	L9: Electrostatic Separation ^{†*}	L9: Electrostatic Separation ^{†*}
12	04/04/2021	No Meeting	Spring Break	No Meeting
13	04/11/2021	No Meeting	No Meeting	No Meeting
14	04/18/2021	No Meeting	No Meeting	No Meeting
15	04/25/2021	Spring Break	No Meeting	No Meeting
16	05/02/2021	Class Wrapup [†]	Class Wrapup [†]	Class Wrapup [†]

* An extra week is given to complete this assignment due to spring break schedule.

[†] Virtual lab.

Other Important Dates:

Item	Section Lab Day		
	Monday	Tuesday	Wednesday
Final Project Assigned	02/22/2021	02/23/2021	02/24/2021
Writing Workshop	03/08/2021	03/09/2021	03/10/2021
Experimental Proposal Due	03/29/2021	03/30/2021	03/31/2021
Proposal Feedback Returned	04/12/2021	04/13/2021	04/14/2021
Final Project Due	05/07/2021	05/07/2021	05/07/2021

Writing Lab Reports Conferences: Weeks 12-14. Presentation on writing the final report to individual lab groups during period of their final project.

Individual Writing Conferences: Students are encouraged to work with the writing coordinator one-on-one for questions or help on any of the report assignments.

Final Project Technical Content Conference: Weeks 14-16. Students will be selected for a conference related to the technical content of the final project using a [clustering algorithm](#). Students not selected, have the option of scheduling a conference.

Course Guidelines:

Recommended Text:

Mineral Processing Technology by Willis and Finch is recommended. Material from this course will come from this textbook, as well as other sources.

Course Website:

Canvas will be kept up to date with all required course materials. Completed assignments must be submitted on Canvas.

The same materials will be available on my personal website skoermer.github.io. The purpose of this website is to make course materials easy to access, increase interactivity, and provide help for lab assignments. Students are encouraged to comment questions on assignment pages. For some questions, I will upload a tutorial page showing some steps for completing the lab assignment.

Laboratory Safety:

COVID-19

By participating in this class, all students agree to abide by the Virginia Tech Wellness principles: <https://ready.vt.edu/well.html>.

If you answer yes to any questions in the Hokie Health survey (questions can be posted in the syllabus), you must not attend class in person. Notify me by email and contact Schiffert Health Center for testing and quarantine protocol.

The following safety requirements have been added to this laboratory class to adapt to the COVID-19 outbreak:

1. Do not come to class if you are sick or have been exposed. Typically, a live stream over zoom will be set up so you will be able to watch as your lab group members complete the exercise. If all group members are unable to attend, the group will make the lab up at a later date. It is expected each group member will participate in each lab exercise, however an alternative virtual assignment will be given at the instructor's discretion.
2. Anyone entering the Plantation Road lab is required to check in using the QR code posted on the entry, as well as bring and wear a face mask. It is expected students bring their own mask.
3. Gloves will be provided by the instructor and must be worn while working on the lab exercise.
4. Everyone must be greater than 6 ft apart while performing the laboratory exercise. Standing spaces will be marked on the floor.
5. Supplies for sanitizing equipment will be provided after completion of the lab exercise.

Additionally, some labs have been converted to a virtual format. Details for each virtual lab will be sent out about one week before the scheduled class.

Lastly, if you have any concerns related to COVID-19 please contact me.

General

Safety is our number one priority. Typical hazards in this class include dust, noise, dilute acids and bases, other mild reagents, and moving equipment. Besides COVID-19 related PPE, students must wear long pants and closed toed shoes to participate in laboratory exercises. Other PPE, including safety glasses, and gloves will be provided by the laboratory instructor during the first in person class. Any questions concerning health and safety should be directed to the laboratory instructor. Prior to the first class session, students must complete the **Personal Protective Equipment Awareness** online module provided by the Virginia Tech Safety Management System. Details will be provided to students via email.

Ethics and Academic Integrity:

The Undergraduate Honor Code pledge, that each member of the university community agrees to abide by, states: *“As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”* Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the university community from the requirements and expectations of the Honor Code. For additional information about the Honor Code, please consult the honor code [website](#).

Furthermore, as a future engineering professional, you are also encouraged to abide by the [NSPE](#) Code of Ethics which prohibits “deceptive acts” and encourages engineers to conduct themselves in a manner so as to enhance the “honor, reputation, and usefulness of the profession.” For this class, collaboration on the laboratory assignments and data analysis is accepted and encouraged; however, each student should submit an original copy of their final work for the assignments.

Attendance:

Participation is required for all lab exercises to receive credit. Greater than or equal to 2 face-to-face labs are required to be completed in person. If only one face-to-face lab is completed in person, an additional virtual make up assignment will be required to receive credit. If no face-to-face labs are completed in person, the student will be required to reschedule a make up time for a lab of the instructors choosing as well as complete the extra virtual assignment. See the Safety section for more detailed participation requirements related to COVID-19. Students should consult with the course instructor to make arrangements prior to any expected absences. Principles of Community & Accommodations: This course instructor affirms and adheres to Virginia Tech’s Principles of Community. If you have any questions, please ask or consult the Principles of Community [online](#).

If you are a student with special needs or circumstance, if you have emergency medical information to share, if you must miss class to participate in a day of special concern, or if you need special arrangements in case the building must be evacuated, please make an appointment with the course instructor as soon as possible during office hours.

Data Integrity:

A computer is required for many of the assignments of this class. While computer crashes and malfunctions do happen, students should take every initiative to ensure that such misfortune does not supersede the responsibility to complete and submit assignments in a timely manner. All critical documents should be stored on at least two media. This instructor **STRONGLY** recommends real-time online backup and/or cloud storage. The GoogleDrive associated with your @vt.edu account is a good option, since it can be set up to back up files from your computer [automatically](#), and is free. Any

sensitive data or information should be encrypted on physical drives. Should a computer crash occur, inform the instructor immediately to ensure that the appropriate provisions can be made.