



## UNSW Course Outline

# MINE8820 Mineral Processing - 2024

Published on the 24 May 2024

## General Course Information

**Course Code :** MINE8820

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**Is a multi-term course? :** No

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Minerals & Energy Resources Engineering

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This course provides basic knowledge in mineral processing and extractive metallurgy and is delivered to students who have no training in this area. After completion, students are expected to be equipped with basic concepts and knowledge to work effectively with metallurgists/

mineral processing engineers in the field.

The course begins with an overview of mineral processing and its associated disciplines, such as mineralogy, and hydrometallurgy, which are required for the production of metals and other products from mineral ores and wastes. Topics covered include comminution, physical separation, flotation, leaching, solvent extraction and electrowinning/refining. These unit operations are also discussed in case studies which cover base metals grinding and flotation circuits, Carbon-In-Pulp for gold processing and copper heap leaching-solvent extraction and electrowinning circuits.

Videos and YouTube sites relevant to the field are collated for the course, and students are advised to go through them to see how mineral processing is performed in mining operations.

## Course Aims

This course is designed to equip students with a comprehensive understanding of mineral processing principles and techniques. Through this course, students will gain knowledge of the fundamental principles underlying concentrate production. Additionally, they will develop a strong grasp of hydrometallurgy unit operations, which are typically employed in the production of copper and gold, two prominent metal and mineral products in Australia. As a result, students will be able to comprehend essential mineral processing terminologies, including grade/recovery curves, and further enhance their understanding of various mineral processing techniques. By the end of the course, students will have a solid foundation in mineral processing, enabling them to apply this knowledge effectively in practical settings.

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : Analyse the fundamental principles of crushing and grinding in mineral processing.
CLO2 : Evaluate the implications of mineralogical characteristics for processing requirements.
CLO3 : Evaluate the fundamental principles governing physical and chemical processes used in selectively separating minerals from ore.
CLO4 : Analyse basic mass balance calculations.
CLO5 : Analyse commonly used mineral and hydrometallurgical processing routes in base metals and precious metals processing.
CLO6 : Evaluate sustainability aspects in mineral processing, encompassing water usage, energy efficiency and the mine-to-mill concept.

Course Learning Outcomes	Assessment Item
CLO1 : Analyse the fundamental principles of crushing and grinding in mineral processing.	• Assignment 2: Lab Report - Grinding
CLO2 : Evaluate the implications of mineralogical characteristics for processing requirements.	• Assignment 4: Major project
CLO3 : Evaluate the fundamental principles governing physical and chemical processes used in selectively separating minerals from ore.	• Assignment 1: Group Presentation • Assignment 3: Lab report - Flotation • Assignment 4: Major project
CLO4 : Analyse basic mass balance calculations.	• Assignment 4: Major project
CLO5 : Analyse commonly used mineral and hydrometallurgical processing routes in base metals and precious metals processing.	• Assignment 1: Group Presentation • Assignment 4: Major project
CLO6 : Evaluate sustainability aspects in mineral processing, encompassing water usage, energy efficiency and the mine-to-mill concept.	• Assignment 4: Major project

## Learning and Teaching Technologies

Moodle - Learning Management System

## Additional Course Information

### Course Completion

Course completion requires submission of all assessment items; failure to submit all assessment items can result in the award of an Unsatisfactory Failure (UF) grade for the Course.

### Assumed Knowledge

This course assumes a student has knowledge of:

- basic knowledge of mineral processing terms and descriptions;
- some basic understanding of mining operations to follow the course effectively.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment 1: Group Presentation Assessment Format: Group	15%	Start Date: 17/06/2024 12:00 AM Due Date: 21/06/2024 12:00 AM
Assignment 2: Lab Report - Grinding Assessment Format: Individual	20%	Start Date: 20/06/2024 12:00 AM Due Date: 12/07/2024 12:00 AM
Assignment 3: Lab report - Flotation Assessment Format: Individual	20%	Start Date: 20/06/2024 12:00 AM Due Date: 12/07/2024 12:00 AM
Assignment 4: Major project Assessment Format: Individual	45%	Start Date: 17/06/2024 12:00 AM Due Date: 26/07/2024 12:00 AM

## Assessment Details

### Assignment 1: Group Presentation

#### Assessment Overview

Each team is tasked with developing a processing route for a specific commodity. In addition to the processing route, the presentation should encompass crucial aspects such as the location of the concentrator, feed characteristics, production rate, and an analysis of current and future market opportunities. To evaluate individual contributions to the team project, peer assessment will be employed. The marking process will utilise a rubric to ensure a fair evaluation. Feedback will be provided following the oral presentation to support learning and improvement.

#### Course Learning Outcomes

- CLO3 : Evaluate the fundamental principles governing physical and chemical processes used in selectively separating minerals from ore.
- CLO5 : Analyse commonly used mineral and hydrometallurgical processing routes in base metals and precious metals processing.

#### Assignment submission Turnitin type

Not Applicable

### Assignment 2: Lab Report - Grinding

#### Assessment Overview

The assignment aims to enhance students' comprehension of size reduction and classification principles by providing a practical, hands-on experience that bridges the gap between theoretical concepts discussed in lectures and their real-world application. The laboratory experiment entails grinding a mineral using two distinct mills, followed by an analysis of the particle size

distribution of the mill products to compare the performance of the mills. This collaborative experiment will be conducted as a team effort, requiring each student to prepare and submit an individual report that adheres to the detailed marking criteria provided in the lab manual and comprehensive learning guidelines. The work will be assessed against specific criteria, and feedback will be provided online and in class during assignment reviews.

#### **Course Learning Outcomes**

- CLO1 : Analyse the fundamental principles of crushing and grinding in mineral processing.

#### **Assignment submission Turnitin type**

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

### **Assignment 3: Lab report - Flotation**

#### **Assessment Overview**

The primary objective of this assignment is to foster a deeper understanding of the froth flotation process among students. By engaging in hands-on batch scale flotation experiments, students will gain valuable insights into how various parameters, such as collector dosage and particle size, influence flotation kinetics and recovery. The experiments will be conducted in teams, and students will be required to prepare and submit individual reports, adhering to the detailed marking criteria provided in the lab manual and comprehensive learning guidelines. Feedback will be provided online and in class during assignment reviews to aid students' learning and improvement.

#### **Course Learning Outcomes**

- CLO3 : Evaluate the fundamental principles governing physical and chemical processes used in selectively separating minerals from ore.

#### **Assignment submission Turnitin type**

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

### **Assignment 4: Major project**

#### **Assessment Overview**

The written report focuses on the processing of the commodity presented in Assignment 1. Students are expected to explore various separation and processing techniques commonly used in the minerals industry for a specific ore. The assessment encourages students to consult external sources beyond the provided notes, enabling them to access the latest information in public domain literature. This assignment is submitted through Turnitin, allowing students to view the Turnitin similarity reports for their submissions. Feedback will be provided online.

## Course Learning Outcomes

- CLO2 : Evaluate the implications of mineralogical characteristics for processing requirements.
- CLO3 : Evaluate the fundamental principles governing physical and chemical processes used in selectively separating minerals from ore.
- CLO4 : Analyse basic mass balance calculations.
- CLO5 : Analyse commonly used mineral and hydrometallurgical processing routes in base metals and precious metals processing.
- CLO6 : Evaluate sustainability aspects in mineral processing, encompassing water usage, energy efficiency and the mine-to-mill concept.

## Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

## **General Assessment Information**

### Grading Basis

Standard

## **Course Schedule**

## **Attendance Requirements**

Students are strongly encouraged to attend all classes and review lecture recordings.

## **Course Resources**

### **Prescribed Resources**

No prescribed resources.

### **Recommended Resources**

Resources will be provided on Moodle.

### **Additional Costs**

No additional cost.

## **Staff Details**

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Seher Ata			478492034		No	Yes

# Other Useful Information

## Academic Information

### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

### II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

### III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

### IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their

streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

## Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: <student.unsw.edu.au/plagiarism>. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## **Submission of Assessment Tasks**

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

### **Faculty-specific Information**

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

### **Phone**

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School-specific Information

### Course completion

Course completion requires submission of all assessment items. Failure to submit all assessment items may result in the award of an Unsatisfactory Failure (UF) grade for the Course unless special consideration has been submitted and approved.

### Submission of Assessment Tasks

We encourage you to retain a copy of every assignment submitted for your own record, either in hardcopy or electronic form. All assessments must have an assessment cover sheet attached (if required).

### Student Resources

The School has [student resources](#) section, containing useful advice and information to ensure you're able to focus on your studies.

### Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the online Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning: [www.covid19studyonline.unsw.edu.au](http://www.covid19studyonline.unsw.edu.au)

Note that some specialist engineering software is not available for Mac computers.

- Mining Engineering Students: OMB G48
- Petroleum Engineering Students: TETB LG34 & LG35

For more information about system requirements is available at [www.student.unsw.edu.au/moodle-system-requirements](http://www.student.unsw.edu.au/moodle-system-requirements)

### Accessing Course Materials Through Moodle

Course outlines, support materials are uploaded to Moodle, the university standard Learning Management System (LMS). In addition, on-line assignment submissions are made using the assignment dropbox facility provided in Moodle. All enrolled students are automatically included in Moodle for each course. To access these documents and other course resources, please visit: [www.moodle.telt.unsw.edu.au](http://www.moodle.telt.unsw.edu.au)

## School Contact Information

School of Minerals and Energy Resources Engineering  
Old Main Building, Level 1, 159 (K15)  
UNSW SYDNEY NSW 2052 AUSTRALIA

For current students, all enquiries and assistance relating to enrolment, class registration, progression checks and other administrative matters, please see [The Nucleus: Student Hub.](#)

### Web & Important Links:

[School of Minerals and Energy Resources](#)

[The Nucleus Student Hub](#)

[Moodle](#)

[UNSW Handbook](#)

[UNSW Timetable](#)

[Student Wellbeing](#)

[Urgent Mental Health & Support](#)

[Equitable Learning Services](#)