# GEOLOGY 2405
# MINERALOGY (CRYSTALLOGRAPHY AND OPTICAL MINERALOGY)

FALL 2023

Geology Program, Natural Sciences Dept, ALPS College
Sul Ross State University

**MWF 11:00-11:50 Lab Tue 2-5**


## Dr. E Measures

**office WSB 315**
**432-837-8117**
**measures@sulross.edu**

Program office WSB 216
837-8112


## Office hours:

| | |
|---|---|
| **Mon** | **2 pm to 3:30 pm** |
| **Tue Thrs** | **9 am to 10 am** |
| **Thrs** | **2:30 pm to 4 pm** |

**or by appointment; call or email to arrange**
**weekly schedule is posted on office door**

## Course Description

*Introduction to crystallography, crystal chemistry, and optical mineralogy. Identification of minerals by physical, optical, and x-ray diffraction techniques.* (as written in catalog)

Mineralogy is a fundamental class required for a degree in Geology. It provides a content foundation that is prerequisite for other, more advanced topics such as lithology, petrology, petrography, and geochemistry.

This class will:

1) provide students with the skills needed to identify minerals in hand specimen, rock hand sample and thin section using simple physical tests, optical behavior, and other analytical techniques.
2) provide students with a background in the vocabulary and notation used in crystallography, optical mineralogy and geochemistry in order to understand technical literature.

## Prerequisites/Co-requisites

GEOL 1303/1103 Physical Geology; CHEM 1311/1111 General Chemistry I

## Method(s) of Instruction

One-day field trip(s) could be offered during the semester. At least one may be required.

## Required Texts

**Mineralogy text is on Reserve in the Library**
any picture book of minerals in **thin section**

## Reference Books/Texts

Other books to be used for reference will be available in the lab.

## Materials

| | | | |
|---|---|---|---|
| notebook/paper | pencils | hand lens | small stapler |
| tracing paper | pasteboard (8½ by 11) | flat-headed tack | |

## Attendance Policy and Conduct- Expectations and Requirements

- Be on time to lecture and lab, attend all lectures and labs, and stay throughout the entire designated period.
- Be engaged, awake, and on task.
- Do not work on another class during this class.
- For every hour spent in lecture, at least 2 to 3 hours should be spent outside class studying.
- Keep instructor informed either before anticipated absence or after unplanned absence.
- Where possible, schedule routine medical/dental appointments around lecture/lab times.
- If you are going to miss a lecture, or have missed a lecture, written notification (email) and documentation must be provided as soon as possible. Be sure to get the notes from another student in the class.
- Legitimate reasons for tardiness, leaving and returning during class, or leaving class early are, but are not limited to, illness, appointment with specialist, family emergency, caregiver duties, and emergency responder calls.
- Inform instructor prior to class if conditions exist that may cause you to leave periodically during class or leave before the end of class.
- Arrangements for missed assignments and exams must be made, and the make-up done, within one week of the scheduled due date. Points will be deducted for late work on assignments other than exams.
- Late assignments will not be accepted once graded papers are returned.
- You are expected to check your SR email 3 times a day; morning, noon, and evening,
- You are expected to observe the University's Code of Student Conduct (see the Student Handbook).

## Electronics Policy

- Texting, checking email, playing games, surfing the internet, working on another class during lectures is not acceptable.
- Smart phones, cell phones, i-pods, laptops, earbuds (etc.) are to be turned OFF during lectures.
- If taking notes on an electronic device is your preferred method, please discuss this with the instructor.
- If electronics are to be used for recording audio or for taking images of material written on the board, please discuss this with the instructor. DO NOT post any class recordings on any social media/web site.
- If you need access to your electronics during lectures (e.g., caregiver, emergency responder), for purposes other than note taking, audio recording, or obtaining images of material written on the board, discuss this with the instructor.
- Points will be deducted from exams for violation of the electronic policy during lectures.
- Electronics may be used during lab and for purposes of lab.
- Multitasking is not a good idea.
- If electronics are accessed during an exam, then the exam will receive a grade of zero.
- If an electronic device makes an audible noise during an exam, then the exam will receive a grade of zero.
- Use of any AI on any assignment will result in a grade of zero on the assignment.

## Disabilities Accommodation **ADA (Americans with Disabilities Act)**

Sul Ross State University (SRSU) is committed to equal access in compliance with the Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class for accessibility services. Students seeking accessibility/accommodation services must contact Mrs. Mary Schwartze Grisham, LPC, SRSU's Accessibility Services Director at 432-837-8203 (leave a message and they will get back to you as soon as possible during working hours), or email mschwartze@sulross.edu. The office is located on the first floor of Ferguson Hall, room 112. The mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas, 79832.

You will be provided with an accommodation letter which must be given to the instructor as early as possible in the semester.

## Grading and Assignments

Requirements:

| | |
|---|---|
| Exams (3) ..... | 57% |
| Lab ..... | 30% |
| Other ..... | 13% |
| quizzes & hwork | |
| partic & behavior | |
| attend & other | |
| field trip(s) | |

Standard grading scheme:

| | |
|---|---|
| A ..... | ≥90% |
| B ..... | 80-89% |
| C ..... | 70-79% |

(D and lower does not count for majors)

| | |
|---|---|
| D ..... | 60-69% |
| F ..... | ≤59% |

Exams - Cover the previous 4 to 4.5 weeks of material; vocabulary, symbology, notation and theory of crystallography and optical mineralogy. Some material carries through so exams are comprehensive to an extent. Types of questions variable: true-false, matching, fill-in-the-blank, multiple choice, short answer, sketching, labeling, and discussion.

Lab - Hands-on study of minerals and their properties in hand samples, in rocks, and in thin sections. See lab syllabus for detailed description of grading assignments and criteria.

Quizzes - Short questions over class periods material. Notes may be used on some quizzes. Purpose is to evaluate comprehension and alert students to areas of weakness.

Homework - Questions over text and lecture material. Problem solving and practice problems in using and applying crystallography notation and symbology. Problem solving and practice in using and applying optical properties.

Field trip(s) - At least one trip offered toward end of the semester. Trip(s) probably day-long but may be overnight. Applies identification of minerals and minerals as seen in the field.

**The following schedule is approximate and subject to change:**

| Monday | | Tuesday - LAB | | Wednesday | | Friday | |
|---|---|---|---|---|---|---|---|
| Aug 28 | ✦Intro | Aug 29 | ✦Review of basic Phys Props of Minerals | Aug 30 | ✦Physical Properties of Minerals | Sept 1 | ✦Physical Properties of Minerals |
| **Sept 4** | **LABOR DAY Holiday no class** | Sept 5 | ✦hand samples 1- Physical Prop | Sept 6 | ✦Chemistry basics<br>✦Crystal Systems | Sept 8 | ✦Sulfide & related mins |
| Sept 11 | ✦Crystal Systems<br>✦Crystallography | Sept 12 | ✦hand samples 2- Physical Prop<br>✦h. samp 1 - ID | Sept 13 | ✦ Symmmetry | Sept 15 | ✦Ox, Hydrox, Hal etc mins |
| Sept 18 | ✦Symmetry<br>✦Miller Indices | Sept 19 | ✦hand samples 3- Physical Prop<br>✦h. samp 2 - ID | Sept 20 | Miller Indices | Sept 22 | ✦Silicate mins I |
| Sept 25 | ✦Notation & Symbology | Sept 26 | ✦hand samples 4- Phys Prop & ID<br>✦h. samp 3 - ID | Sept 27 | ✦Stereonets | Sept 29 | ✦Silicate mins II<br>✦Silicate mins III |
| **Oct 2** | **EXAM 1** | Oct 3 | ✦hand samples 5- Phys Prop & ID | Oct 4 | ✦Light | Oct 6 | ✦Light<br>✦Relief |
| Oct 9 | ✦Relief<br>✦Refractive Index | **Oct 10** | **Lab Practical 1 Hand samples** | Oct 11 | ✦Refractive Index | Oct 13 | ✦Optical Properties |
| Oct 16 | ✦Optical Properties | Oct 17 | ✦Scope Intro<br>✦Thin Sections 1 | Oct 18 | ✦Optical Properties | Oct 20 | ✦Isotropic & An-isotropic Behavior |
| Oct 23 | ✦Anisotropic Behavior | Oct 24 | ✦Thin Sections 2 | Oct 25 | ✦Anisotropic Behavior | Oct 27 | ✦Uniaxial Indicatrix |
| Oct 30 | ✦Uniaxial Minerals | Oct 31 | ✦Thin Sections 3 | Nov 1 | ✦Uniaxial Interference Figures | **Nov 3** | **EXAM 2** |
| Nov 6 | ✦Biaxial Indicatrix | Nov 7 | ✦Thin Sections 4 | Nov 8 | ✦Biaxial Minerals | Nov 10 | ✦Biaxial Interference Figures |
| Nov 13 | ✦Biaxial Interference Figures | Nov 14 | ✦Thin Sections 5 | Nov 15 | ✦Atomic Structure | Nov 17 | ✦Atomic Structure |
| Nov 20 | ✦Pauling's Rules | Nov 21 | ✦Thin Sections 6 | **Nov 22** | **Thanksgiving Holiday No Class** | **Nov 24** | **Thanksgiving Holiday No Class** |
| Nov 27 | ✦Pauling's Rules | Nov 28 | ✦Thin Sections 7 | Nov 29 | ✦Lattices & Unit Cells | Dec 1 | ✦Lattices & Unit Cells & Phase Diagrams |
| Dec 4 | ✦Phase Diagrams | **Dec 5** | **Lab Practical 2 Thin sections** | Dec 6 | ✦Phase Diagrams | | |
| | | **DEC 12** | **EXAM 3 10:15 to 12:15** | | | | |

## BS Geology Student Learning Outcomes (SLO's):

1. The student will be able to apply a diverse body of Geologic information in the area of Earth history.
2. The student will be able to apply a diverse body of Geologic information in the area of mineralogy and petrology.
3. The student will be able to apply a diverse body of Geologic information in the area of structural geology and tectonics.
4. The student will be able to apply a diverse body of Geologic information in the area of stratigraphy.
5. The student will be able to apply a diverse body of Geologic information in the area of field techniques.

## Expected Course Learning Objectives:

At the end of the semester, the successful student will be able to:

- identify rock-forming minerals, accessory minerals and ore minerals both in hand sample and in thin section; *SLO # 2 … to apply a diverse body of Geologic information in the area of mineralogy and petrology; SLO # 5 … to apply a diverse body of Geologic information in the area of field techniques.*
- identify, interpret and explain the optical behavior of a mineral; *SLO # 2 … to apply a diverse body of Geologic information in the area of mineralogy and petrology.*
- demonstrate application of physical and optical properties to minerals in rock samples and thin section; *SLO # 2 … to apply a diverse body of Geologic information in the area of mineralogy and petrology; SLO # 5 … to apply a diverse body of Geologic information in the area of field techniques.*
- interpret and apply common notation and symbology used in mineralogy; *SLO # 2 … to apply a diverse body of Geologic information in the area of mineralogy and petrology.*
- integrate crystallography and mineralogy to explain physical and optical properties of minerals; *SLO # 2 … to apply a diverse body of Geologic information in the area of mineralogy and petrology.*

## Geology Undergraduate (BS) Student Marketable Skills:

- The student will be able to conduct field work.
- The student will be able to use field equipment.
- The student will be able to use lab equipment.
- The student will be able to use library resources.
- The student will be able to communicate in written and oral format.

## Library

The Bryan Wildenthal Memorial Library offers FREE resources and services to the entire community. The library's website, library.sulross.edu, has information on how to borrow or electronically access books, articles, and more. Off-campus access requires logging in with your LoboID and password. Librarians are a tremendous resource for coursework and can be reached by email (srsulibrary@sulross.edu) or phone (432-837-8123).

## Academic Integrity

Students are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. Students should submit work that is their own. A scholar is expected to be punctual, prepared, and focused; meaningful and pertinent participation contributes to learning.

Examples of academic dishonesty include, but are not limited to:

- Turning in work as original that was used in whole or in part for another course and/or professor;
- Turning in another's person's work as one's own;
- Copying from professional works or internet sites without citation;
- Collaborating on a course assignment, exam, or quiz when collaboration is forbidden;
- Using AI for an assignment.

Violations of academic integrity can result in failing an assignment, failing the class, and/or more serious university consequences. These behaviors also erode the value of college degrees and higher education overall.

## Classroom Climate Of Respect

This class fosters free expression, critical investigation, and open discussion of ideas. Everyone in the class must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, all people in the class must learn how to probe, oppose, and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Discourse will not be silenced by the difficulty of fruitfully discussing politically sensitive issues.

## Diversity Statement

This course is a learning environment for students that supports diversity of thoughts, perspectives and experiences, and honors identities (including race, gender, class, sexuality, religion, ability, socioeconomic class, age, nationality, etc.). Conditions necessary for students to succeed, could be impacted by pandemics, economics, health concerns, or unexpected life events. The student will be given assistance to meet the course's learning objectives. This demonstrates commitment to the student and Sul Ross State University's mission to create an inclusive environment and the whole student. Experiences outside of class may impact class performance and resources are available to the student for dealing with them.