

GEOLOGY 4403 IGNEOUS AND METAMORPHIC PETROLOGY

SPRING 2022

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OFFICE (T 10-12; W 8-9; R 8-10 and 2-3)

Sul Ross State University

Purpose and Organization of Course: Igneous and metamorphic rocks comprise > 90% of the rocks of the Earth's crust. Knowledge of their nature and origin is, therefore, essential to understanding the geologic processes operating on our planet. The two main objectives of this course are: 1) to teach you how to identify the most common igneous and metamorphic rocks, both in the field and in the lab; and 2) to introduce you to the physical and chemical processes involved in their formation.

Learning Objectives: After completing this course, students will be expected to be able to identify common igneous rocks and minerals, have an understanding of the origins and evolutionary processes that create the diversity seen in igneous and metamorphic rocks on a global scale, and be able to independently analyze petrographic and geochemical data for a suite of rocks and interpret the history of these rocks.

SACS SLO's: The student will be able to apply a diverse body of Geologic information in the area of mineralogy and petrology. The student will be able to apply a diverse body of Geologic information in the area of field techniques.

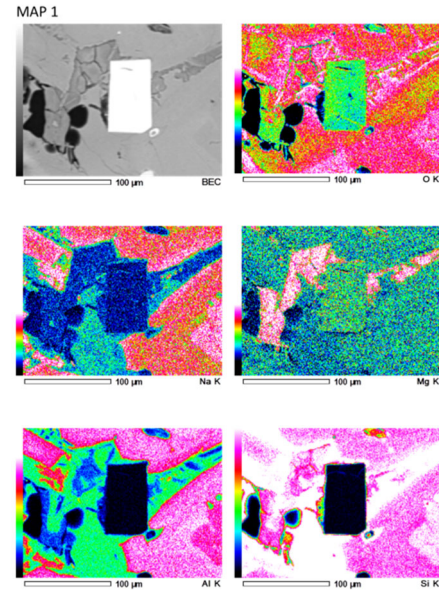
SACS Marketable skills: The student will be able to conduct field work. The student will be able to use field equipment. The student will be able to use lab equipment. The student will be able to use library resources. The student will be able to communicate in written and oral format.

Class meets in WSB321 MWF 12-1 and is taught via remote connection to Midland at the same time.

Labs: Lab meets on Wednesdays, 2-5 in WSB 303 (or in the Midland college lab at time to be determined). Lab will start with a review of optical mineralogy. The rest of the labs will involve examination of a suite of rocks in hand sample and thin section, and/or the analysis of geochemical data.

Problem sets: Homework assignments will be issued. Unless otherwise noted, these will be due exactly one week from the date assigned.

In-class quizzes: In class quizzes will be issued periodically to encourage review of current



1 X-Ray map of a granodiorite xenolith

material.

Field Trip(s): We plan/hope (COVID issues permitting) to have two field trips, one to the Davis Mountains state park, and a weekend trip to Big Bend National Park or Big Bend Ranch State Park.

Semester projects: One term paper (and oral presentation) is required. This will cover a topic of your choice, approved by your instructor. The presentation will be made during the final week of class and attendance is mandatory for these. The term paper must have a minimum of 5

GRADING SCHEME	%
Exam 1	10
Exam 2	10
Final Exam	10
Homework and weekend Field Trip	15
Term paper	15
In-class quizzes	10
Lab	30
Total	100

references from approved peer reviewed journals. The paper must be a minimum of 5 pages in length, double spaced, excluding graphics. A draft version of the paper will be due March 26. This will be graded and the edits will be incorporated into the final version that will be due May 1. Grading will be 33% for draft, 67% for final.

Lecture Text: Gill, Igneous Rocks and Processes, **Lab Text:** Philpotts, Petrography of Igneous and Metamorphic Rocks, **Optional text:** Nesse and Shulze Introduction to Optical Mineralogy.

Classroom Conduct:

The Student handbook states under Student Misconduct, number 21, "Such prohibition includes disorderly classroom conduct that obstructs, interferes with, inhibits and/or disrupts teaching and/or classroom activities." Behavior which is included in this category: 1) persistent talking to ones' neighbors during lecture, 2) coming to class late or leaving early, 3) the use of cellular phones or MP3 devices in the classroom. CELL PHONES MUST BE TURNED OFF IN CLASS. This includes texting, emailing and social networking. (*If you are a member of an EMS/VFD group or have a child in day care and they must be able to reach you, let me know and we will discuss.*) Offenders of this policy will be asked once to stop and 5 points will be taken from their grade. If it occurs a second time, the offender will be instructed to leave the classroom, and there will be a meeting with the Dean of Student Life. If there are further incidents, UDPS will be called and offenders will be physically ejected from the classroom and will likely be expelled from the University.

Students Needing Special Accommodations:

Sul Ross State University is committed to equal access in compliance with the Americans with Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. If you have a disability, find out what your resources are: Students seeking accessibility services must contact Mary Schwartz in Disabilities Services, Ferguson Hall, Room 112. The mailing address is PO Box C-171, Sul Ross State University, Alpine, Texas 79832. Telephone: 432-837-8203.

Distance Education Statement: Students enrolled in distance education courses have equal access to the university's academic support services, library resources, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should submit online assignments through Blackboard or SRSU email, which require secure

login information to verify students' identities and to protect students' information. The procedures for filing a student complaint are included in the student handbook. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website.

week	date	Topic	Lab
1	1/10	Introduction	
	1/13	Introduction	
	1/15	Introduction	
2 MLK	1/17	No Class - MLK day	L1 Optical Mineralogy review
	1/20	Basalts and related rocks	
	1/22	Basalts and related rocks	
3	1/24	Basalts and related rocks	L2 Igneous minerals and textures
	1/27	Basalts and related rocks	
	1/29	Magma Differentiation	
4	1/31	Magma Differentiation	L3 M&M lab / magmatic differentiation
	2/3	Magma Differentiation	
	2/5	Magma Differentiation / Exam 1	
5	2/7	Gabbroic rocks	L4 Mafic igneous rocks
	2/10	Gabbroic rocks	
	2/12	Gabbroic rocks	
6	2/14	Gabbroic rocks	L5 SEM/EDXRF and processing of geochemical data
	2/17	Ultramafic and Ultrabasic rocks	
	2/19	Ultramafic and Ultrabasic rocks	
7	2/21	Ultramafic and Ultrabasic rocks	L6 Quantitative petrology - spreadsheets, modeling magmatic evolution
	2/23	Ultramafic and Ultrabasic rocks	
	2/25	Andesite, dacite and rhyolite	
8	2/28	Andesite, dacite and rhyolite	L7 Midterm
	3/2	Andesite, dacite and rhyolite	
	3/4	Andesite, dacite and rhyolite	
SB	3/7	Spring Break	Spring Break
9	3/14	Pyroclastic rocks	L8 Intermediate and felsic rocks
	3/16	Pyroclastic rocks	
	3/18	Pyroclastic Rocks / Exam 2	
10	3/21	Pyroclastic rocks	L9 Plutonic rocks
	3/23	Granitic rocks	
	3/25	Granitic rocks; Draft Term Paper Due	
11	3/28	Granitic rocks	L10 Pyroclastic rocks
	3/30	Granitic rocks	
	4/1	Alkali rocks no class	
12	4/4	Alkali rocks	L11 DMSP field trip
	4/6	Alkali rocks Draft Term Paper Due	
	4/8	Alkali rocks	
13	4/11	Alkali rocks	L12 Metamorphic rocks part 1
	4/13	Metamorphic rocks	
GF	4/15	Good Friday - No Class	
14	4/18	Metamorphic rocks	L13 Metamorphic rocks part 2
	4/20	Metamorphic rocks	
	4/22	Metamorphic rocks	
16	4/25	Metamorphic rocks	L14. Lab Final
	4/27	Presentations	
	5/3	Final Exam	Tuesday 12:30-2:30