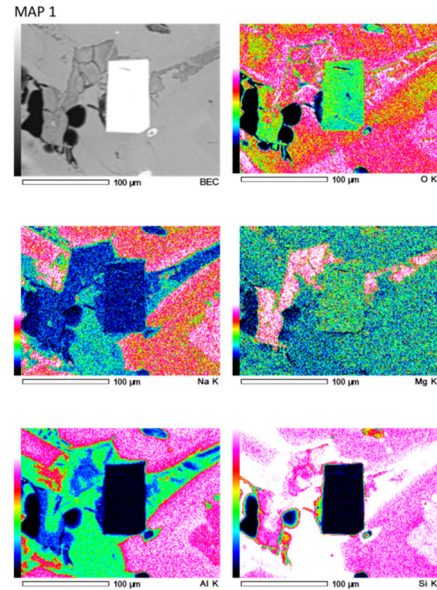


GEOLOGY 4403

IGNEOUS AND METAMORPHIC PETROLOGY

SPRING 2023

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.



1 X-Ray map of a granodiorite xenolith

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.

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 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.

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

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 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:

SRSU Disability Services. Sul Ross State University (SRSU) is committed to equal access in compliance with 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. Alpine students seeking accessibility/accommodations services must contact Mary Schwartz Grisham, M.Ed., LPC, SRSU's Accessibility Services Coordinator at 432-837-8203, or email mschwartz@sulross.edu Our office is located on the first floor of Ferguson Hall – room 112, and our mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas, 79832.

Distance Education Statement:

Students enrolled in distance education courses have equal access to the university's academic support services, such as library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login. 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. Directions for filing a student complaint are located in the student handbook.

week	date	Topic	Lab
1	1/18/2023	Introduction	
	1/20/2023	Introduction	
2.0	1/23/2023	Introduction	
	1/25/2023	Basalts and related rocks	L1 Optical Mineralogy review
	1/27/2023	Basalts and related rocks	
3	1/30/2023	Basalts and related rocks	
	2/1/2023	Basalts and related rocks	L2 Igneous minerals and textures
	2/3/2023	Magma Differentiation	
4	2/6/2023	Magma Differentiation	
	2/8/2023	Magma Differentiation	L3 M&M lab / magmatic differentiation
	2/10/2023	Magma Differentiation / Exam 1	
5	2/13/2023	Gabbroic rocks	
	2/15/2023	Gabbroic rocks	L4 Mafic igneous rocks
	2/17/2023	Gabbroic rocks	
6	2/20/2023	Gabbroic rocks	
	2/22/2023	Ultramafic and Ultrabasic rocks	L5 SEM/EDXRF and processing of geochemical data
	2/24/2023	Ultramafic and Ultrabasic rocks	
7	2/27/2023	Ultramafic and Ultrabasic rocks	
	3/1/2023	Ultramafic and Ultrabasic rocks	L6 Quantitative petrology - spreadsheets, modeling magmatic evolution
	3/3/2023	Andesite, dacite and rhyolite	
8	3/6/2023	Andesite, dacite and rhyolite	
	3/8/2023	Andesite, dacite and rhyolite	L7 Midterm
	3/10/2023	Andesite, dacite and rhyolite	
SB		Spring Break	Spring Break
9	3/20/2023	Andesite, dacite and rhyolite	
	3/22/2023	Pyroclastic rocks	L8 Intermediate and felsic rocks
	3/24/2023	Pyroclastic rocks	
10	3/27/2023	Pyroclastic Rocks / Exam 2	
	3/29/2023	Pyroclastic rocks	L9 Plutonic rocks
	3/31/2023	Granitic rocks	
11	4/3/2023	Granitic rocks; Draft Term Paper Due	
	4/5/2023	Granitic rocks	L10 Pyroclastic rocks
	4/7/2023	Good Friday - No Class	
12	4/10/2023	Granitic rocks	
	4/12/2023	Alkali rocks no class	L11 DMSP field trip
	4/14/2023	Alkali rocks	
13	4/17/2023	Alkali rocks Draft Term Paper Due	
	4/19/2023	Alkali rocks	L12 Metamorphic rocks part 1
	4/21/2023	Alkali rocks	
14	4/24/2023	Metamorphic rocks	
	4/26/2023	Metamorphic rocks	L13 Metamorphic rocks part 2
	4/28/2023	Metamorphic rocks	
16	5/1/2023	Metamorphic rocks	
	5/3/2023	Metamorphic rocks	L14. Lab Final
	5/5/2023	Metamorphic rocks	
17	5/8/2023	Presentations	
	5/10/2023	Presentations	
		Final Exam	???