GEOL2140 Fall 2019 – Geology of New Mexico

Instructor: Dr. Kevin Hobbs **Email:** khobbs84@unm.edu **Office:** A-132A **Phone:** 925-8876
Office hours: T 10:30-12:00; W 8:00-10:15; W 12:45-1:30; Th 10:30-12:00
Class time and location: Tuesday and Thursday 9:00-10:45 in VAHS 108
Supplies needed: Notebook or binder with lined paper, pencils; some students prefer different colors of pens/pencils for note-taking and diagrams

SCHEDULE (subject to adjustment; stay tuned for changes)

Week	Date	Topic
1	20-Aug	Introduction; review of fundamental concepts of geology; relating concepts to NM
2	27-Aug	Review of fundamentals; geography; geologic time; New Mexico in the Proterozoic Eon
3	3-Sep	New Mexico in the Proterozoic: orogenies that built the North American continent
4	10-Sep	Exploring Proterozoic rocks in the Manzano Mountains
5	17-Sep	NM in the Paleozoic; continental shifts recorded in NM rocks
6	24-Sep	Mississippian, Pennsylvanian, and earliest Permian in New Mexico
7	1-Oct	Permianland: What NM tells us about the Permian Period
8	8-Oct	The Jurassic Period in NM and surroundings
9	15-Oct	The Cretaceous Period in NM and surroundings: rising and falling oceans and mountains
10	22-Oct	The Cenozoic in New Mexico
11	29-Oct	The Laramide Orogeny: causes; effects; where it is and where it isn't in NM
12	5-Nov	OIL! or, Hydrocarbon geology in New Mexico (northwest and southeast NM)
13	12-Nov	The Rio Grande Rift: Introduction; geography, major geological features
14	19-Nov	The Rio Grande Rift in central NM, including Valencia County and the Manzano Mountains
15	26-Nov	Volcanoes of NM: introduction and relation to underlying geological processes
16	3-Dec	Local volcanoes: Tome Hill, Los Lunas Volcano, Isleta Volcano
17	10-Dec	Final exam 9:00 A.M.

A note on class schedule: The schedule included above will serve as a general outline for the semester. Dates and topics might change as needs arise. If there are specific topics or time periods on which students would like to spend more time, then the course will accommodate those wants. Changes will be posted ASAP.

COURSE DESCRIPTION

Course Description: This course is a tour of the geologic history and natural places of New Mexico. Students will explore the materials (rocks and minerals) that make up New Mexico and the processes that created and continue to shape our state. Students will learn about mountains, rivers and seas that have come and gone, and New Mexico's rich fossil heritage. Students will discover where and why volcanoes erupted, and where natural resources are found and extracted.

COURSE OBJECTIVES

Student Learning Outcomes:
1. Identify or describe New Mexico's physiographic provinces.
2. Reconstruct and interpret New Mexico's geologic history using geologic maps.
3. Identify and describe New Mexico's orogenic provinces and explain the state's orogenic history.
4. List, describe, or explain major periods of igneous activity in New Mexico's history.
5. Describe how magma types relate to rock types, plutonic bodies, volcanic landforms, and eruptive processes.
6. Describe when, where, and why ancient seas covered portions of New Mexico and explain what the sedimentary rock record tells us about these seas and their inhabitants.
7. Identify or interpret unconformities and their significance.
8. Explain the changes in New Mexico's flora and fauna over time as revealed in the fossil record.

9. Recognize or describe the geologic processes involved in the formation and concentration of our natural resources.

COURSE POLICIES

GRADING

Quizzes:	15%
Homework:	15%
Map exercises:	25%
Exams:	45%
Total:	100%

GRADE SCALE:

98+ = A+	92-97 = A	90-91 = A-
88-89 = B+	82-87 = B	80-81 = B-
78-79 = C+	72-77 = C	70-71 = C-
68-69 = D+	62-67 = D	60-61 = D-

EXAMS:

Three exams will be given during the semester on the following dates: 20 February, 27 March, and 1 May. Each exam will be worth ~15% of the final grade.

QUIZZES:

There will be five in-class quizzes throughout the semester. These quizzes will cover a combination of the two preceding lectures and the reading assignment for the day's class. Each quiz will be worth 3% of the final grade.

MAP EXERCISES:

There will be three geologic map exercises throughout the semester. Each exercise will be worth ~8% of the final grade.

HOMEWORK:

There will be 5 homework exercises throughout the semester. Each exercise will be worth ~3% of the final grade.

ATTENDANCE:

Attendance is required at each class meeting. *Attendance is taken before the start of each class. To be late is to be absent.* Students with 2 consecutive absences or 3 absences overall may be dropped from the course. Students with 2 absences in the first three weeks of class will be dropped from the course. There are no excused absences. If you are forced to miss a class due to an emergency, you are encouraged to get notes and materials you missed from a classmate and read the assignment for that day.

READING:

This course covers a broad range of topics from many fields of Earth science. It would be impossible to give fair treatment to all topics with lectures alone. Therefore, successful students must read from books, journals, and other sources in preparation for class meetings. To encourage you to read *before* class meetings, most online quizzes will be taken from the reading materials that will be discussed in class on the due date of the online quiz. I encourage you to take notes while reading, including writing down questions that arise during reading that you would like to discuss in class. Re-reading after the class meeting has been shown to improve comprehension and success.

LITERATURE:

Do not purchase any of the following books; most are available from UNM Libraries.
Books available in the UNM-Valencia library for in-library use:

- Baldridge, W.S., *Geology of the American Southwest,* ISBN 0-521-01666-5
- Baars, D.L., *The Colorado Plateau: A Geologic History*, ISBN 978-0-8263-2301-9
- Baars, D.L., *Navajo Country: A Geology and Natural History of the Four Corners Region*, ISBN 0-8263-1587-9
- Blakey, R., and Ranney, W., *Ancient Landscapes of the Colorado Plateau*, ISBN 978-1-934656-03-7
- Goff, F. *Valles Caldera: A Geologic History*. ISBN 978-0-8263-4590-5
- Price, L. Greer, 2010, *The Geology of Northern New Mexico's Parks, Monuments, and Public Lands*: New Mexico Bureau of Geology and Mineral Resources. ISBN 978-1883905255
- Albuquerque: A Guide to its Geology and Culture. ISBN 1-883905-14-1

Optional recommended books (available from Hobbs):

- Sprinkel, D.A., Chidsey, Jr., T.C., & Anderson, P.B., *Geology of Utah's Parks and Monuments,* ISBN 0-9702571-0-4
- Chronic, L.H., *Pages of Stone: Geology of the Grand Canyon and Plateau Country,* ISBN 978-0898866803
- Ranney, W., *Carving Grand Canyon: Evidence, Theories, and Mystery (2nd Edition),* ISBN 978-1934656365
- Duffield, W.A., *Volcanoes of Northern Arizona: Sleeping Giants of the Grand Canyon Region*, ISBN 978-0938216582 (cheap used copies available; worth it for the photos alone)
- Fillmore, R., *Geological Evolution of the Colorado Plateau of Eastern Utah and Western Colorado,* ISBN 978-1-60781-9

OFFICE HOURS:
While my "official" office hours are listed at the top of this syllabus, you are welcome to stop by my office at any time. My door is always open, and I am here to help you in any way that I can. If you are having trouble catching me in my office, email or phone me so that we can arrange a meeting.

PLAGIARISM AND CHEATING:
Discussion of ideas is a crucial skill in science, and I encourage you to talk with one another about the topics and assignments in this class. However, all work that you submit must be your own. If you use information from outside resources, such as the textbook, newspapers, the internet, or journals, you must cite it. Plagiarism will result in a "0" on the assignment. If you are concerned about what does or does not constitute plagiarism, I'm happy to help – just ask me after class, via email, or in office hours.

ELECTRONIC DEVICES:
Do not use cell phones during class, even for checking texts. Mute or turn off anything that can provide any distraction before class begins.

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see pg 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see:https://policy.unm.edu/university-policies/2000/2740.html