

APPLIED PHYSICAL GEOLOGY

Geology 210

Spring Semester, 2020

Syllabus

Instructor: Dr. L. Scott Eaton
Office: Engineering/Geosciences 3220
E-mail: eatonls@jmu.edu
Office Hours: M, W: 11:00-13:15, F: 12:15-13:15, or by arrangement
Class Time: M W F: 13:25-14:15
Room: Engineering/Geosciences Building, Room 3009
Course Web Site: <http://csmgeo.csm.jmu.edu/geollab/eaton/web/eaton.htm>

Textbook: Geology Applied to Engineering (1st or 2nd edition), by T.R. West

Test Dates (tentative) Test 1: **Friday, February 21**
Test 2: **Friday, April 3**
Final Exam* **Wednesday, May 6, 1-3 p.m.**

***The Final Exam is Cumulative**

Grading:

Quizzes and Assignments:	10%
Test 1:	30%
Test 2:	30%
Final Exam:	30%

Expectations:

You are expected to abide by the JMU Honor Code for all graded material. This Honor Code belongs to you, the James Madison University Student. Respect it!

You are expected to attend class, pay attention, take notes, and complete reading assignments in a timely manner, and to take exams at the scheduled time.

Mannerly behavior is required. Being attentive and respectful of our colleagues is the least we will expect of each other.

You are expected to pay attention and participate in class discussions, questions, and answers. Sleeping, randomly wandering in and out of the classroom during lecture, and talking incessantly with the people seated around you is not conducive to your education or the people around you, and will not be tolerated.

“Texting” or general use of cell phones is prohibited in class. You will be given one warning for the first violation; repeated violations will result in removal from class.

You are expected to learn the material, and decide for yourself what is important and what is not. This is a college class, and I will not tell you what to study or provide review sheets for tests.

Suggestions:

1. Read the text BEFORE coming to class. This textbook was chosen primarily because it is "student friendly". You will be amazed in how much easier you will absorb the material during the lecture.

2. Sit in the front rows of the classroom.

3. Review the material within 24 hours after the lecture. Studies have shown an “exponential decay” in what your brain retains if you don’t review immediately. (Shown below are the final grades from the GEOL 210 Fall semester)

	%
A	9.3
B	14
C	35
D	23
F	19

4. Form a study group with the other members of your class. Try explaining the information to other members of your group. There is no better way to learn the material than to teach someone else.

5. Keep up with the readings and homework assignments.

6. Ask questions. You (or someone you know well) are paying good money to be here. Make the most of it!

7. Keep a positive attitude. Believe it or not, science can be fun and interesting.

LECTURE TOPICS AND READINGS
Spring, 2020

TEXTBOOK: *Geology Applied to Engineering (2nd edition)*, by Terry West and Abdul Shakoor

TOPIC

READING IN TEXT

Origin and Development of Earth

Chapter 1

Geologic Time

Chapter 10

Plate Tectonics

Chapter 1, p. 10-13;

Interior of the Earth & and Earthquakes

Chapter 18

Structural Geology

Chapter 11

Soil and Rock Mechanics

Chapters 7 & 8

Minerals

Chapter 2

Igneous Rocks and Volcanism

Chapter 3

Weathering and Soils

Chapter 4

Sedimentary Rocks

Chapter 5

Metamorphic Rocks

Chapter 6

Geology of Virginia

Chapter 20

River Systems

Chapter 12

Ground Water & Water Quality

Chapter 13

Glaciers

Chapter 14

Slope Stability and Ground Subsidence

Chapter 15

Shorelines & Shoreline Processes

Chapter 16

Energy Resources

TBA

COURSE GOALS AND OBJECTIVES

The course provides a rigorous introduction to the discipline of Physical Geology, coupled with a strong emphasis on the *application* of this natural science to the 'real world'. The course is specifically designed for engineering and natural science majors seeking to fulfill part of their core course requirements; as well as fulfilling GenEd Cluster Three (The Natural World) requirements for non-science majors. The course also serves as the first course towards a degree in geology. A summary of the goals and objectives for the course are shown below:

GOAL 1: Introduce students to the "scientific method" and how "science" is conducted.

Objective 1: Interweave the methods of science into the fabric of the various topics covered during the course.

Objective 2: Develop the concept that there are no absolute truths in science. Science is constantly striving toward better explanations, greater truth.

Objective 3: Promote the importance of quantitative methods (math and statistics) in scientific experimentation and interpretation.

Objective 4: Strive to have the students understand that a strict code of ethics and ethical conduct are absolutely essential in all aspects of science.

GOAL 2: Provide a solid foundation in earth materials (minerals, igneous rocks, metamorphic rocks, and sedimentary rocks) that can be built on in later courses.

Objective 1: Fully discuss the nature of minerals and rocks, their important properties, the major environments where they occur, and the major processes that produce them.

Objective 2: Introduce students to classification systems that are commonly used for rocks and minerals.

Objective 3: Provide students with practical experience in recognizing and learning to test for major physical properties that are used for identifying rocks and minerals in hand specimen.

Objective 4: Relate the different categories of rocks to the rock cycle and the plate tectonic cycle.

GOAL 3: Help students understand the various internal earth processes that are important in deforming rocks, producing mountains, and causing continental drift.

Objective 1: Introduce students to results obtained from stress-strain experiments and how these results help geologists understand joints, faults, and folds.

Objective 2: Discuss the most essential nomenclature used to describe faults and folds and the most important types of faults and folds.

Objective 3: Provide the students with practical experience in the basics of interpreting geologic maps, drawing structural cross sections, and using geologic maps to determine important information concerning deformed rocks.

Objective 4: Cover the development of plate tectonic theory including its immediate predecessors, continental drift and sea floor spreading, and show that geomagnetic, gravitational, and heat flow data were important pieces of the puzzle leading to plate theory.

Objective 5: Discuss in detail the most important basic tenants of plate tectonics including the various types of mountains, associated basins, suites of sedimentary rock, subduction, rifting and earthquakes.

GOAL 4: Introduce students to the fact that the earth has a history that is extremely rich and varied, almost infinitely long compared to the span of human history, and that this history can be determined from the rocks by discovering and applying appropriate geological principles and techniques.

Objective 1: Study the most important basic principles of geology and stratigraphy which geologists use to determine earth history.

Objective 2: Introduce students to the vastness of geologic time and how determining time in a relative sense differs from an absolute determination.

Objective 3: Show students that absolute dating using natural radioactivity is successful because there is a sound scientific basis for accepting the assumptions inherent in radiometric dating. The same assumptions utilized in earlier age dating techniques have been found to contain serious flaws.

GOAL 5: Introduce students to important earth processes operating at or near the surface which shape the landscape, decompose rocks, produce soil, affect climate, and in the end, make life on the earth possible.

Objective 1: Explore the difference between weathering and erosion and how each relates to the rock cycle and the production of soil and landforms.

Objective 2: Study some of the dynamics of stream flow and the importance of streams in shaping the landscape and transporting sediment.

Objective 3: Investigate the role glaciers and ice ages have played in producing landforms. Help students understand that climate has changed in the past and is likely to change in the future.

Objective 4: Explore the importance of ground water, both as a source of water and as an agent of erosion in shaping the landscape.

Objective 5: Develop skills in classifying soil, and comprehending their uses and limitations in natural and engineering environments.