

*Introduction to Geology* - Dr. C. E. Heinzl  
Learning Guide #1

**Learning suggestions** –

1. There are two knowledge levels – Concepts/Big Ideas AND the details that make them up.
2. Read and think through the figures and tables to understand the lectures and text.
3. If you listen in lecture I will often give you many ‘tips’ on what will be on the test
4. Use the Take-Home Message boxes (they are good summaries to the text)

Quiz 1 – Tuesday Sept. 17– short 10-point quiz to give you an idea of test format. Quiz will only be 5 questions worth 10 points, this quiz will only go over Earth History.

Quiz 2 will be over the Rock Cycle from your syllabus, it will occur during lab before TEST 1.

Test 1 – Tuesday Oct. 8 (Test: written and identification) written test will be approximately 20 questions for 80 points, identification of Minerals and Rocks will be approximately 22 samples and worth 45 points.

**Content sections** Text source

1. Geology is... (Prelude)
2. Earth History (Ch. 12 and 13)
3. Minerals (Chap. 5)
4. Igneous and Metamorphic rock (Ch. 6 and 8)
5. Sedimentary rock and Fossils (Ch. 7 and Interlude E)

**Important concepts and review questions** –

Section 1: Scientific method and The Big ideas (in your syllabus)

Section 2:

- A. Compare and contrast relative and numerical age dating.
- B. How do you use the relative age dating principles to determine the approximate age of geologic strata?
- C. How does an unconformity develop? What does it represent? What are the three primary types?
- D. What is stratigraphy, what are the different types, how is it used, and why is it important?
- E. How do geologists obtain an isotopic date? What are some of the pitfalls in obtaining a reliable one? Should these pitfalls stop geologist from using this dating method?
- F. What is the age of the oldest rocks on Earth? What is the age of the oldest rocks known? Why is there a difference?
- G. How did the Cambrian explosion change life on Earth?
- H. What life forms appeared in the Mesozoic? How do we know?
- I. How many mass extinctions has the Earth witnessed? How do we know?
- J. What major climatic and biologic events happened during the Pleistocene?

### Section 3 – Minerals (Ch. 5)

- A. How are minerals geologically defined?
- B. How do minerals form; How is energy related to their development gained? lost?
- D. What are the physical properties of a mineral? And how are they used to identify a mineral?
- E. What are the basic mineral groups and what are their properties?
- C. Why are minerals important? Why is it important to understand the physical properties of minerals?
- D. What is an ore? Why are they economically significant?

### Section 4 – Igneous rock (Ch. 6)

- A. Intrusive vs. extrusive rock – How are they defined, characterized?
- B. What is Bowen's reaction series, why is it important to understanding how igneous rocks form?
- C. How do igneous rock compositions (mineralogy) and textures help tell the Earth's story?
- D. Be able to draw a dike vs. sill, pluton vs. batholith, and xenoliths... And understand how to use these features for relative dating.
- E. What are the primary minerals found in igneous rocks?
- G. Be able to name the chemical/extrusive equivalents of granite, diorite and gabbro.
- H. Why study igneous rocks?

### Metamorphic rock (Ch. 8)

- A. What is the primary difference between metamorphic and igneous rock?
- B. What is metamorphism?
- C. What is a protolith? Be able to give examples.
- D. Why could Chuck Norris be considered an agent of metamorphic change? E.g. What are the different types of stress? What is the difference between stress and strain?
- E. How do we classify metamorphic rocks?
- F. Differences and importance of Regional vs. Contact metamorphism

### Section 5 Sedimentary rock and Fossils (Ch. 7 and interludes B and E)

- A. Know the difference between clastic vs. chemical sedimentary rocks
- B. Why are sedimentary rocks important?
- C. What are depositional environments and how are they characterized?
- D. Be able to describe how sediments change into sedimentary rock.
- E. What is porosity and permeability in sedimentary rocks? Why is it important?
- F. What is stratigraphy, how does this relate to the principle of superposition?
- I. How do fossils form and why are they useful?
- J. What environments are more likely to produce fossils?

## Test 1 – Explained

### Part 1

Identification of minerals and rocks using their physical properties. There is a potential of 30 minerals and/or 30 rocks for a total of 60 possibilities. \*The samples will be in numbered boxes AND will be mixed (minerals and rocks will not be grouped together)

Format:

- A. You will get 1 minute and 30 seconds to identify/name each hand sample.
- B. You will be able to use any physical property test to identify the hand sample.
- C. You may develop an identification help sheet. Help sheet rules include:
  - 1. One sheet of paper 8 ½ by 11 inches.
  - 2. The help sheet must NOT include photographs
  - 3. You must hand write your help sheet, do not print it out with a computer.
  - 4. It is ok to use drawings, color pencils to color code your information
  - 5. You could add a word bank, parts of the identification tables, or other aspects that may help you identify the mineral or rock.
  - 6. You will turn this help sheet in with part I.
- D. There will be approx. 22 samples, 2 pts per sample, I may also ask about how a mineral is used OR its formula, you can add this information to your help sheet.
- E. Samples will be passed around the room in order, you will not move during Part I.

### Tips for doing well on this exam.

- A. Learn as much as you can each week, do NOT try 'cram' learning mineral and rock identification into a week or two...
- B. Develop a set of flash cards or use a smartphone flash card app to study outside the lab room.
- C. Come to OPEN labs (time T.B.D.)
- D. Ask Questions!
- E. Never use just one physical property to identify a mineral or rock.

Part 2 – Multiple choice short answer (about 40 points)

Part 3 - You will work with partners (up to 3), you may use your lecture notes (hand written or digital), you may use your text book, and you cannot use the internet... You will be given a geology problem to address, applying your developing knowledge...