

## OUTCOMES BASED LEARNING MATRIX

**Course:**        **Physical Geology**

**Department:** **\_Physical Science**

### **Physical Geology**

This course is intended to acquaint students with the physical structure of the Earth, the nature and origin of the materials composing the planet, and the major processes which are responsible for constant change on the planet. Students will learn how geologists study the Earth and interpret its history. In the laboratory portion of the course, emphasis will be placed on becoming familiar with crustal rocks and minerals and the effects of geological processes as interpreted from topographic maps and aerial photographs.

<b>COURSE OUTCOMES</b>	<b>OUTCOMES ACTIVITIES</b>	<b>ASSESSMENT TOOLS</b>
Upon completing this course a student should be able to		
1. Explain what a geologist does and why their work is important to society	Study the text and lecture material	Quiz on the text and lecture material (R,W,)
2. Describe the steps and process by which science advances human understanding	Study the text and lecture material	Quiz on the text and lecture material (R,W,)
3. Explain the difference between a hypothesis and a theory	Study the text and lecture material	Quiz on the text and lecture material (R,W)
4. Describe the evidence suggesting that the Mediterranean has dried up in the past	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
5. Describe the tools and techniques used in geological research	Study the text and lecture material	Quiz on the text and lecture material (R,W)
6. Explain the meaning of Hutton's principle of Uniformitarianism	Study the text and lecture material	Quiz on the text and lecture material (R,W)
7. Explain how principles of Uniformitarianism, applied to layered rocks, unconformities and fossil assemblages, aid in interpreting Earth's history	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)

8. Describe the three classes of rock and how they are related in terms of the rock cycle	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
9. Contrast the internal vs. the external source of heat powering cycles of constant change within Earth	Study the text and lecture material View the film: Earth's Story	Quiz on the text, lecture material, and film (R,W,CT)
10. Name and describe the various zones that make up the Earth's surface and interior	Study the text and lecture material Complete the lab exercise on Earth's Dimensions	Quiz on the text, lecture material, and lab (R,W, CT,QS)
11. Discuss the evidence scientists identified that suggested the continents have moved over time	Study the text and lecture material Complete the lab on plate tectonics	Quiz on the text, lecture material, and lab (R,W,CT, QS)
12. Explain the importance of paleomagnetic evidence to the theory of plate tectonics	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
13. Describe the major topographic characteristics of the ocean floor and relate these features to the concept of sea-floor spreading	Study the text and lecture material View the film The Heat Within	Quiz on the text, lecture material, and film, (R,W)
14. Describe the three types of plate boundaries that occur and cite an example of each	Study the text and lecture material	Quiz on the text and lecture material (R,W)
15. Describe the topographic features associated with both passive and active plate boundaries	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
16. Describe the pattern of distribution of seismic activity on Earth	Study the text and lecture material Complete the lab on earthquakes	Quiz on the text, lecture material and lab (R,W, CT,QS)
17. Explain the elastic rebound theory for earthquakes	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
18. Explain the connection between earthquakes and plate tectonics	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)

19. Identify the primary seismic waves that accompany earthquakes and differentiate between them	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
20. Discuss the factors that affect earthquake damage	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
21. Explain how the passage of seismic waves through Earth helps geologists to understand the planets interior	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
22. Explain how our knowledge of the density and extent of the Earth's crust and mantle helps to reveal the nature of the core	Study the text and lecture material Complete the lab on the Earth's inner structure	Quiz on the text, lecture material, and lab (R,W,CT,QS)
23. Draw a diagram of a cross section of the Earth showing its various zones and describe their properties	Study the text and lecture material	Quiz on the text and lecture material (R,W)
24. Describe the circulation of heat within the Earth's mantle and its connection to plate tectonics	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
25. Discuss the source of the heat within the Earth	Study the text and lecture material	Quiz on the text and lecture material (R,W)
26. Describe the structural components in the atomic model and relate that to an atom's atomic mass, atomic number and electron shells	Study the text and lecture material	Quiz on the text and lecture material (R,W)
27. Explain what is involved when atoms bond with one another	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
28. Distinguish between ionic, covalent, metallic, and Van der Waals bonds and identify the common rock forming minerals using the identification tool from lab	Study the text and lecture material Complete the mineral identification lab	Quiz on the text, lecture material, and lab (R,W,CT)

29. List the various physical properties one uses to distinguish between the minerals	Study the text and lecture material	Quiz on the text and lecture material (R,W)
30. Identify the elements that make up the bulk of Earth's crust	Study the text and lecture material	Quiz on the text and lecture material (R,W)
31. Sketch a silicate tetrahedra and describe its importance as a component of rock forming minerals	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
32. Explain what distinguishes igneous rocks from other rock types and differentiate between plutonic and volcanic	Study the text and lecture material	Quiz on the text and lecture material (R,W)
33. Name and describe the major types of intrusive and extrusive igneous bodies	Study the text and lecture material	Quiz on the text and lecture material (R,W)
34. Explain the importance of the viscosity of a magma and the factors that influence it	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
35. Explain the role of composition and texture in classifying igneous rocks	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
36. Discuss the distinguishing characteristics of the major igneous groups found in the field classification tool and use it to identify igneous rocks	Study the text and lecture material Complete the identification of igneous rocks lab	Quiz on the text, lecture material, and lab (R,W,CT)
37. Discuss Bowen's reaction series as it affects the minerals crystallizing from a cooling melt	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
38. Describe the generation of magma at divergent plate boundaries and explain why this results in production of oceanic crust	Study the text and lecture material	Quiz on the text and lecture material ((R,W,CT)
39. Describe the generation of magma at convergent plate boundaries	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)

40. Sketch and label the parts of a volcano	Study the text and lecture material	Quiz on the text and lecture material (R,W)
41. Describe the mechanics of a volcanic eruption and the factors that differentiate explosive from quiet eruptions	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
42. Explain the relationship between volcanic belts and plate boundaries and describe the lavas produced in each tectonic setting	Study the text and lecture material	Quiz on the text, lecture material, and lab (R,W,CT)
43. Distinguish between shield volcanoes, composite volcanoes, cinder cones, fissure eruptions, and calderas in terms of their appearance, size, and eruptive style	Study the text and lecture material	Quiz on the text and lecture material (R,W)
44. Discuss the influence that volcanic eruptions may have had on past climate	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
45. Discuss the geologic and biologic importance of weathering	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
46. Distinguish between physical disintegration and chemical decomposition of rock and cite examples	Study the text and lecture material	Quiz on the text and lecture material ((R,W)
47. Distinguish between oxidation, dissolution, and hydrolysis and explain the role of each in weathering	Study the text and lecture material Complete the lab exercise on sediment texture	Quiz on the text, lecture material and lab (R,W,CT)
48. Discuss the influence that climate has on physical and chemical weathering	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
49. Draw and label a typical soil profile showing each of the major soil zones	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
50. Explain the nature of sedimentary rocks	Study the text and lecture material	Quiz on the text and lecture material (R,W)

51. Discuss the importance of sedimentary rocks as a component of the Earth's crust	Study the text and lecture material	Quiz on the text and lecture material (R,W)
52. Differentiate between detrital, chemical and biochemical sedimentary rocks	Study the text and lecture material	Quiz on the text and lecture material (R,W)
53. Use the identification tool from lab to identify sedimentary rocks	Study the text and lecture material Complete the sedimentary rock lab	Quiz on the text, lecture material and lab (R,W,CT)
54. Describe the textures characteristic of sedimentary rocks and relate each to a depositional environment	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
55. Explain the nature of metamorphic rocks	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
56. Identify the agents involved in the metamorphism of rocks and discuss the role each plays	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
57. Discuss the various ways that rocks become metamorphosed	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
58. Use the identification tool to identify each rock in the metamorphic set in lab	Study the text and lecture material Complete the metamorphic rock lab	Quiz on the text, lecture material and lab (R,W,CT)
59. Relate the metamorphic rocks to their parent precursors	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)
60. Relate regional and contact metamorphism to their tectonic settings	Study the text and lecture material	Quiz on the text and lecture material (R,W,CT)