

Bossier Parish Community College
Master Syllabus

Course Prefix and Number: PHSC 111

Credit Hours: 3

Course Title: Physical Geology

Course Prerequisites: Reading competency

Textbook: Physical Geology; Plummer, Carlson, and Hammersley, 15th Ed.

Course Description:

A descriptive, non-mathematical introduction to physical geology. Concepts covered include the dynamic physical processes of the Earth, with topics to include mineral formation, the rock cycle, volcanoes, earthquakes, weathering, plate tectonics, rivers, and availability and extraction of the Earth's natural resources. Additional discussions will focus on preserving environmental protection and stewardship in the process of natural resource extraction and usage.

Learning Outcomes:

At the end of the course, the student will be able to

- A. describe the origin and general compositional structure of the Earth;
- B. apply the foundational scientific concepts of matter underlying the formation and transformation of the Earth's geology;
- C. characterize the internal and external forces associated with changes in the Earth's geology;
- D. classify by origin, composition, and structure the major classes of rocks and minerals;
- E. develop an understanding of the Earth's geological lifetime and the major eras therein;
- F. develop an appreciation of the major theories and hypotheses associated with the Earth's dynamic geologic history; and
- G. apply basic concepts of geology to the environmentally responsible exploration and extraction of the Earth's natural resources.

To achieve the learning outcomes, the student will:

1. Describe both external and internal sources of energy that drive dynamic geological processes. (A, C)
2. Describe the Earth's composition in terms of spherical concentric zones. (A)
3. Describe the general atomic structure of elements and use of the Periodic Table of Elements. (A, B)
4. Apply the basics of chemical bonding as it applies to mineral formation. (B)
5. Describe the general structure of both silicate and non-silicate minerals. (B)
6. Differentiate between inorganic and organic processes of mineral formation. (B, C)
7. Classify and categorize minerals in terms of standard physical properties such as color, streak, luster, hardness, cleavage and fracture. (B, D)

8. Describe the various chemical processes used to identify minerals. (B, D)
9. Describe the various external (surficial) and internal (tectonic) forces involved in the rock cycle.
(C)
10. Differentiate between extrusive and intrusive processes involved in igneous rock formation. (C, D)
11. Describe the role of the Earth's geothermal gradient in the formation of rocks and minerals. (C, D)
12. Describe the composition of and formational processes involved in extrusive rock. (D)
13. Describe the various forms of mechanical and chemical weathering. (C)
14. Explain the role that climate plays in weathering processes and determining soil type. (C)
15. Identify the various processes involved in the formation of sedimentary rock, to include: sediment deposition, lithification, compaction, and cementation. (C, D)
16. Describe the conditions associated with the formation of metamorphic rock, and the physical variables associated with such processes. (C, D)
17. Describe the principle of uniformitarianism and the role it plays in geology. (B, C, E, F)
18. Apply the geologic concepts of original horizontality, superposition, lateral continuity, and faunal succession in determining past events in geologic history. (E)
19. Describe the concept of isotopic dating in determining geologic age. (E)
20. List the major eras, periods, and epochs associated with the Earth's geologic time scale.
(E)
21. Compare the types, causes, and implications of geologic mass wasting. (C)
22. Describe the various components of the Earth's hydrologic cycle and the role it plays in erosional processes, sediment deposition, as well as its implications in urban planning.
(C)
23. Discuss the porosity and permeability of rock formations, and the importance ground water plays in natural resource exploration and production processes. (C, D, G)
24. Describe the variety of tectonic forces involved in the deformation of the Earth's crust, to include compressive, tensional, and shearing forces. (B, C, F)
25. Identify the basic geologic concepts of seismology to include geographic and geologic susceptibility, earthquake measurements and impacts, and infrastructural building considerations. (C)
26. Describe the process of sea-floor spreading and the variety of submarine geologic formations to include ridges, trenches, abyssal plains, and continental shelves. (C)
27. Describe the early continental drift theory proposed by Wegener and its contribution to the theory of plate tectonics. (E, F)
28. Describe the variety of geologic boundary zones associated with plate tectonics, to include, divergent, convergent, and transform boundaries. (C, E, F)
29. Describe the availability and extractability of the Earth's non-renewable geologic energy resources, to include, coal, petroleum, natural gas, and fissionable radioisotopes. (G)
30. Discuss the challenges and techniques employed in fossil-fuel exploration and production. (G)
31. Describe subsurface geologic structural features associated with the exploration and production of fossil fuels. (D, G)
32. Discuss environmental consequences and considerations inherent in the exploration and production of fossil-fuel and other energy resources. (G)

33. Describe renewable alternative energy resources, to include, geothermal, hydroelectric, wind, and solar power, their applications, and their current usage and future feasibility as energy sources worldwide. (G)
34. complete an in-class flashcard assignment relating to rock and mineral classification. (D)

Course Requirements: To earn a grade of “C” or higher the student must earn 70% of the total points for the course and meet all of the following course requirements.

- minimum average of 70% on tests
- homework portfolio (minimum 75% complete)
- minimum 50% on comprehensive final test

Course Grading Scale:

- A- 90% or more of total possible points with a minimum average of 70% on tests and a minimum of 75% on the homework portfolio and a minimum of 50% on the comprehensive final test
- B- 80% or more of total possible points with a minimum average of 70% on tests and a minimum of 75% on the homework portfolio and a minimum of 50% on the comprehensive final test
- C- 70% or more of total possible points with a minimum average of 70% on tests and a minimum of 75% on the homework portfolio and a minimum of 50% on the comprehensive final test
- D- 60% or more of total possible points with a minimum average of 60% on tests and a minimum of 75% on the homework portfolio and a minimum of 50% on the comprehensive final test
- F- less than 60% of total possible points or less than 60% average on tests or less than 75% on the homework portfolio or less than 50% on the comprehensive final test

Attendance Policy: The college attendance policy is available at

<http://www.bpcc.edu/catalog/current/academicpolicies.html>

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COORDINATOR FOR SECTION 504 AND ADA

Angie Cao, Student and Disability Services Specialist

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Equity/Compliance Coordinator

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Reviewed by K. McNamara/ May 2022