

This is a SouthArk Master Syllabus. The course syllabus distributed by the instructor may include additional requirements, must be followed by the student in the given term, and is considered to supersede the Master Syllabus.

Course Number
 GEOL 1004/L

Course Title
 Physical Geology/Lab

Course Description
 Study of earth materials and general principles of the physical processes that shape the earth: weathering, erosion, vulcanism, earthquakes, rock deformation, and mountain building. Recommended as a general education course.
 Lecture: three hours. Laboratory: two hours per week

College Mission
 South Arkansas Community College promotes excellence in learning, teaching, and service; provides lifelong educational opportunities; and serves as a cultural, intellectual, and economic resource for the community.

College Wide Student Learner Outcomes

Critical Thinking Responsibility Communication

ACTS Course **Program Course**

ACTS Outcomes

The student will be able to explain, describe, discuss, recognize, and/or apply knowledge and understanding of the following topics:

1. Scientific Method and Inquiry
2. Basic chemistry of Mineral compounds
3. Composition, formation, and characteristics of igneous, sedimentary, and metamorphic rocks
4. Earthquakes
5. Seismology
6. Soil formation
7. Geologic structure
8. Continental drift, sea floor spreading, and plate tectonics
9. Effects of surface water, wind, and ground water
10. Geologic time and dating
11. Interior of the earth
12. Ocean basins and their margins

Program Outcomes

Course Learner Outcomes

CLO #	Course Outcomes	Unit Outcomes/ Competencies	ACTS outcomes	Program Outcomes	Critical Thinking	Communication	Responsibility	Assessment
	The student will be able to explain, describe, discuss, recognize, and/or apply knowledge and understanding of the following topics:							

CLO 1	Scientific method/inquiry	116, 7	1		CT5	C1	R2	Comprehensive final exam
CLO 2	Basic chemistry of mineral compounds	14,15,16,17, 18,19,20,21, 22,23,24,25	2			C1	R2	Comprehensive final exam Final exam
CLO 3	Composition, formation, and characteristics of igneous, sedimentary, and metamorphic rocks	26-41; 49-55; 56-62	3		CT3			Comprehensive final exam Final exam
CLO 4	Earthquakes	75-79	4			C1		Comprehensive final exam
CLO 5	Seismology	63-74	5		CT2			Comprehensive final exam
CLO 6	Soil formation	42-48	6			C1		Comprehensive final exam
CLO 7	Geologic structures	66,67,68	7			C1		Comprehensive final exam
CLO 8	Continental drift, sea floor spreading, and plate tectonics	11-13	8		CT4			Comprehensive final exam
CLO 9	Effects of surface water, wind, and ground water	92-98	9			C1		Comprehensive final exam
CLO 10	Geologic time and dating	99-108	10			C1		Comprehensive final exam
CLO 11	Interior of the earth	8-13	11			C1		Comprehensive final exam
CLO 12	Ocean basins and their margins	114-115	12			C1		Comprehensive final exam

Unit Outcomes/ Competencies/ Objectives

1. Define geology.
2. Name at least three different areas requiring the knowledge and application of geology.
3. Tell that the study of geology includes the occurrence and understanding of natural hazards such as volcanic eruptions, tsunamis and earthquakes, landslides and the formation and location of geologic resources such as water, soil, building materials and energy resources.
4. Tell what the Principle of Uniformitarianism is and how it is different from the doctrine of Catastrophism. Tell how Aristotle, Archbishop Ussher, James Hutton, and Darwin contributed to the study of geology.
5. Tell how relative dating differs from absolute dating. Tell how the Geologic Time Scale was developed.
6. Be able to describe the Principle of Faunal Succession and the Principle of Superposition and apply it to a cross-section to tell what rock unit or event is older than the other.
7. The different parts of scientific inquiry are the hypothesis, theory, and observation. Relate the study of Plate tectonics and scientific inquiry.
8. Tell that the origin of Earth began with a solar nebular and accretion of matter into planets.
9. Earth's four layers are the crust, mantle, outer core and inner core.
10. The rock cycle and the three rocks types are igneous, sedimentary, and metamorphic rocks.
11. Distinguish between the three plate boundaries and give the geographic location of each boundary.

12. Define, diagram and label the layers of the Earth including the lithosphere, asthenosphere, crust and mantle.
13. Tell that Alfred Wegener first defined continental drift.
14. Diagram an atom showing the position and number of subatomic particles.
15. Define and give examples of an element. Identify an element in a chemical compound.
16. Tell what the Periodic Chart is and tell where metals and nonmetals are located on that chart.
17. Define and give at least two examples of an isotope.
18. Tell which elements are most abundant in the universe.
19. Tell which elements are most abundant on Earth.
20. Tell which elements are most abundant in the Earth's crust.
21. Define mineral.
22. Define rock.
23. Tell how each of the following can be used to help identify a mineral: crystal habit, cleavage, twinning, striation, hardness, specific gravity, color, streak, luster and special properties such as magnetism, react with acids, fluorescence, solubility, fracture, smell, and taste.
24. Discuss the major groups of rock-forming minerals and give at least two examples of each. (native element, halides, oxides, sulfides, carbonates, sulfates, silicates, ferromagnesian, non-ferromagnesian)
25. Tell what a silicate tetrahedra is and give three examples of minerals that have the tetrahedra as part of their structure.
26. Define geothermal gradient.
27. Define heat flow and discuss heat within the Earth coming from radioactive decay of heavy elements
28. Define magma, lava, and pyroclastic debris.
29. Identify and describe Bowen's Reaction Series distinguishing between the discontinuous and continuous series.
30. Identify igneous rocks by identifying texture as glassy, phaneritic, aphanitic, or porphyritic.
31. Define and give characteristics of concordant tabular plutons, also known as sill; and discordant tabular plutons, also known as dikes.
32. Define, give the characteristics, and give a geographic location of lopoliths, laccoliths, stocks and batholiths.
33. Tell that volcanoes are classified into shield, composite and cinder cones and give a geographic location of each type.
34. Describe the classification of lavas as based primarily on their silica content as follows: 1. basic, less than 50% silica; intermediate, 50-70% silica; or 3. acidic or silicic, 70% or more silica content.
35. Name the gases that most frequently released by a volcano.
36. Name pyroclastic debris from the smallest size particle to the largest size.
37. Discuss the worldwide effects of volcanic eruption using the following volcanoes: Asami, Japan; Laki, Iceland; Mayon and Mount Tambora, and East of Java.
38. Discuss the formation of a caldera using Crater Lake, Oregon as an example.
39. Match the histories of the following volcanoes with their names: Mt. St. Helens; Vesuvius; Krakatoa, (East of Java); Paricutin, Mexico; and the Hawaiian Islands.
40. Tell how basalt plateaus form and tell where there is a basalt plateau in the United States.
41. Define and identify weathering, mechanical and chemical, and erosion.
42. Discuss the weathering of the major mineral groups, quartz, feldspars, ferromagnesian.
43. Discuss the rates of weathering as related to Bowen's reaction series.
44. Define pedology.
45. Tell how humus is formed and where it is found.
46. Describe the three layers of the typical soil profile as A, B, and C; all lying above unweathered bedrock.
47. Tell how the zone of leaching forms, and how the zone of accumulation is formed.
48. Tell how tropical or lateritic soils form and how desert caliche layers form.
49. Describe the origin of sedimentary rocks as detrital, chemical, or organic (biochemical).
50. Tell how detrital sediments differ from chemical deposits and give examples of each.
51. Discuss textures of sedimentary rocks. (clastic, nonclastic, sorting, roundness, and sphericity)
52. Define diagenesis, cementation, crystallization, and lithification.
53. Complete a sedimentary rock classification chart based upon texture, particle size and mineral composition of the rock.
54. Define sedimentary structure such as ripple marks, mudcracks, flute casts, bioturbation, geodes, fossil (and fossilization).
55. Describe examples of sedimentary environments of deposition as beach, lakes, swamp, reef, lagoon, rivers, delta, alluvial fans, glacial, and desert environments.
56. Define metamorphic rocks, tell how they form, and how they are classified based upon texture and composition.
57. Define and be able to identify in a hand sample metamorphic rock textures such as foliation.
58. Discuss the types of metamorphism as contact and regional metamorphism and give examples of each.

59. Define contact metamorphism, hydrothermal metamorphism and regional metamorphism.
60. Define index mineral and name one index mineral.
61. Identify how plate tectonics and metamorphism are related.
62. Describe the hydrothermal processes and metamorphism.
63. Relate metamorphic rocks with plate boundaries.
64. Define and identify on a geologic map - dip and strike.
65. Define isostasy. \
66. Define, and be able to identify compressional features such as folding, monoclines, anticlines, and synclines.
67. Tell how compressional or tensional forces can form such structures.
68. Identify the folds in a cross-section view.
69. Define normal, reverse, thrust faults and joints.
70. Label the head wall, foot wall, strike of the fault, and dip of the fault on a geologic map.
71. Define seismology.
72. Describe the waves produced by earthquakes and identify P, S, and surface waves on a simple seismogram.
73. Define focus and epicenter of an earthquake. Describe how faults and earthquakes are associated.
74. Describe the effects of earthquakes, fire, landslide, and tsunami. Tell how earthquake are measured and how the source of an earthquake is located. Tell what the Richter Scale and Mercalli Scale are and how each can be used.

75. Tell how seismology was used to determine the structure of the Earth and delineate the layers of the earth.
76. Define geothermal gradient.
77. Tell what the Earth's magnetic field is and how it formed. Define paleomagnetism.
78. Define continental drift and tell that Alfred Wegener first describe continental drift, giving the evidence for continental drift.
79. Define plate boundaries as being either divergent, convergent and transform boundaries. Define terms such as rift valley, spreading center, and subduction zone and the Theory of Isostasy.
80. Describe the water cycle and be able to define the terms associated with the water cycle such as evaporation, precipitation, and transpiration.
81. Define base level, headwaters, mouth, flood plains, and stream channel.
82. Define show where there is a drainage basin on the map of the United States.
83. Name the factors that determine stream flow as gradient, shape, size and roughness of the channel.
84. Define porosity and permeability.
85. Define and identify in a diagram water table, zone of saturation, and capillary fringe.
86. Define aquifer and give an example of the aquifer supplying our local water.
87. Define and identify an artesian well.
88. Define and identify recharge; tell how groundwater is recharged.
89. Discuss the formation of a cave, sinkhole, and karst topography.
90. Tell how stalagmites and stalactites are formed.
91. Define and tell how hot springs and geysers and where there are some hot springs in Arkansas and one other place in the world.
92. Define alpine and continental glacier and tell how glaciers form.
93. Tell where glaciers are located on Earth. Name the parts of a glacier.
94. Tell how glaciers move and name the parts of a glacier.
95. Name and define the erosional landscapes associated with glaciers, moraines, eskers, drumline, arêtes, and cirque.
96. Identify the erosional landscape formed by a glacier on a topographic map.
97. Name the effects of past glaciation on the landscape.
98. Name some characteristics of deserts and desert formations. Name and describe sand dunes. Give examples of where there are preserved sand dunes.
99. Identify James Hutton as the father of geology
100. Discuss Hutton's principle of Uniformitarianism as the concept that geologic processes operating at present are the same processes that operated in the past.
101. Differentiate between actual time and relative time.
102. Define the principles used to determine relative age as the principle of original horizontality, superposition, lateral continuity, and cross-cutting relationships.
103. Define contact as the boundary between different rocks types or rocks of different ages.
104. Define formation as a useful, mappable rock unit.
105. Define correlation as a means of determining time equivalents of rock units. Demonstrate how rocks units can be related using physical continuity, similarity of rock type, and correlation of fossils.
106. Define William "Strata" Smith's principal of faunal succession.
107. Define the parts of the geologic time scale as era, period and epochs.

108. Tell that each era is marked by periods of mountain building and give examples of the mountain chains that were formed at that time.
109. Define an isotope and how a radioactive isotope “decays”. Calculate the age of a rock when given the quantity and the half-life of a given radioisotope found in the rock.
110. Name and tell how other radioactive isotopes such as K/Ar and carbon – 14 can be used.
111. Be able to tell the different ways Earth’s age has been calculated.
112. List the principle characteristics that make Earth unique among the planets.
113. Outline the major stages in the evolution of the Earth from the Big Bang to the formation earth.
114. Be able to identify the different parts of the ocean floor and the ocean basins.
115. Label ocean margins and identify intertidal, abyssal plains, continental slope and continental rise.
116. Describe and use the different part of the Scientific Method in working through a problem.

Assessment Description(s)

Pearson’s masteringgeology.com assignments and assignments turned in throughout the semester.

Materials and Technological Requirements

Lecture: Tarbuck, E. J. and Lutgens, F. K., 2011, The Earth – An Introduction to Physical Geology, 10th edition, Prentice Hall, ISBN 0-321-66304-7; www.pearsonhighered.com . An “access code” for the text book will be required for this course and is provided with the text from the Southark bookstore.

Lab Manual: Busch, R. M., and Tasa, D., copyright 2015, Laboratory Manual in Physical Geology, Tenth edition, produced under the auspices of the American Geosciences Institute, www.agiweb.org; and the National Association Geoscience Teachers, www.nagt.org; published by Pearson, www. Pearsonhighered.com. This lab manual comes with an access code to Pearson’s Masteringgeology.com and a course associated with the lab. There will be some very short assignments from this course that you will hand in for a grade. Other assignments will serve as study guides for completing assignment in the lab manual.

Class Attendance Policy

Students are expected to attend all classes in which they are enrolled. If a student is absent from a class session, it is the student’s responsibility to make arrangements to complete or make up any work missed. No make-up work for missed classes will be allowed without the approval of the instructor. Students who enroll late must assume all responsibility for work missed. Classes not attended as a result of late enrollment may be counted toward excessive absences. Students not attending the entire class period may be counted absent for that period. An instructor may drop students with a grade of “WE” if students have been absent for an excessive number of days. Warning letters will be sent to the students advising them of the consequences of nonattendance and urging them to contact their instructors immediately. Excessive absences are defined as follows:

Regular Semester

Courses which meet once a week	2 absences
Courses that meet twice per week	3 absences
Courses that meet four times per week	5 absences

Summer Session

Courses that meet four times per week in a five week session	3 absences
Courses which meet two evenings per week in a 10 week session	3 absences

Students enrolled in special programs or individualized instruction should contact their program director/instructor regarding specific attendance requirements for the program/course. Some of the selective-admission, health-science programs have specific criteria regarding attendance. Students are encouraged to refer to program policies in these matters.

Jury Duty/Military/Official School Function

Scheduled absences are those that occur due to college-related activities or as a result of summons to jury duty or military duty. Classes missed as a result of scheduled absences will not be counted as excessive absences if the instructor is notified and provided documentation prior to the absence(s). Make-up work for scheduled absences will be at the discretion of the instructor.

In all instances, documentation must be provided to the instructor within 24 hours of receipt. Documentation should come from an appropriate party on letterhead or other official stationery with a signature and contact information. Documentation should list the corresponding dates of the leave.

Medical leave

For medical-related absences, documentation must include written notice from the treating medical professional documenting time needed off related to medical reasons and time student may resume classes. The medical reason does not need to be listed on the documentation; the documentation must include only that there is a medical reason, the amount of time the student needs to be absent, and the time the student should be able to return to classes. Students who elect to work at home while on excused leave must meet with their instructors to make arrangements to do so. Working on coursework while on medical leave is not a requirement but can be requested by students. If students request that they be allowed to work at home while on an excused leave, the instructor will make every reasonable effort to ensure that the student is able to do so.

For students who have a medical condition necessitating time off or accommodation:

- 1) They may work at home on assignments if they choose to if on medical leave approved by a medical professional
- 2) Receive appropriate accommodations related to coursework (i.e., excused from labs with potentially harmful chemicals, have a larger desk, etc.)
- 3) Resume their studies where they left off once they return to classes
- 4) Be allowed to make up any missed work related to medical leave
- 5) Receive incompletes on their transcripts until coursework is completed, according to the incomplete grade contract.
- 6) Be given a reasonable time frame in which to complete missed coursework

Academic Honesty Policy

Students enrolled at South Arkansas Community College are expected at all times to uphold standards of integrity. Students are expected to perform honestly and to work in every way possible to eliminate academic dishonesty. Academic dishonesty includes cheating and plagiarism, which are defined as follows:

- Cheating is an attempt to deceive the instructor in his/her effort to evaluate fairly an academic exercise. Cheating includes copying another student's homework, class work, or required project (in whole or in part) and/or presenting another's work as the student's own. Cheating also includes giving, receiving, offering, and/or soliciting information on a quiz, test, or examination.
- Plagiarism is the copying of any published work such as books, magazines, audiovisual programs, electronic media, and films or copying the theme or manuscript of another student. It is plagiarism when one uses direct quotations without proper credit or when one uses the ideas of another without giving proper credit. When three or more consecutive words are borrowed, the borrowing should be recognized by the use of quotation marks and proper parenthetical and bibliographic notations.

If, upon investigation, the instructor determines that the student is guilty of cheating or plagiarism, the following penalties will apply:

- The student will receive a penalty of no less than a zero on the work in question.
- The instructor will submit a Student Academic Misconduct Form, written report of the incident, to the appropriate dean.
- The dean will submit form to Vice President for Learning to determine disciplinary action.
- The Vice President for Learning will determine whether further disciplinary action will be taken.
- All decisions may be appealed for review through the college's academic appeals procedure.

Equal Opportunity-Affirmative Action Statement

South Arkansas Community College does not discriminate on the basis of age, race, color, creed, gender, religion, marital status, veteran's status, national origin, disability, or sexual orientation in making decisions regarding employment, student admission, or other functions, operations, or activities.

Library Services

Library Homepage: <http://southark.libguides.com/homepage> Library Contact: LibraryStaff@southark.edu or 870.864.7115

Procedures to Accommodate Students with Disabilities:

If you need reasonable accommodations because of a disability, please report this to the Vice President of Student Services with proper documentation. . VPSS Contact: 870.875.7262

The Early Alert System

In an effort to ensure student retention and success, South Arkansas Community College employs an Early Alert System to identify and support at-risk students as soon as possible in a given semester. The intent of Early Alert is to

provide this assistance while there is still time to address behaviors or issues that have the potential of preventing students from completing their courses and degree plans. Students referred through the Early Alert System will be required to work on a corrective action plan with their student advising coach and to include attendance accountability and mandatory academic tutoring either in the academic division or in the Testing and Learning Center (TLC).

Once the Student Advising Coach has met with the referred student, and again when the student has met the prescribed corrective actions, the coach will update the Early Alert System so that the instructor is kept informed of the progress in resolving issues.

Behavioral Review Team

At South Arkansas Community College (SouthArk), we are committed to proactive leadership in student wellbeing and campus safety. By focusing on prevention and early intervention with campus situations that involve any person experiencing distress or engaging in harmful or disruptive behaviors, the BRT will serve as the coordinating hub of existing resources to develop intervention and support strategies and offer case management. Students, faculty, staff, and campus guests are encouraged to report any person on campus who is a concern. BRT Contact: 870.875.7262 BRT@southark.edu

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Master Syllabus