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TEXT: *Earth Revealed*, by McGeary, Plummer and Carlson, was selected to be used in combination with the "Earth Revealed" video/tape series. Starting with the 6th edition you may purchase any edition you choose.

MANDATORY CLASS MEETINGS WILL BE HELD EVERY TUESDAY IN X-102 FROM 5:30 PM-6:45 PM FOR DISCUSSIONS, QUIZZES AND TESTS. SUPPORTING VIDEO LECTURES ARE AVAILABLE ONLINE.

COURSE OUTLINE:

Physical geology is a survey of the natural sciences of our physical world. It is the study of the earth we live on. We will discuss the topics related to earth materials and their distributions; landforms; and the processes that create and alter them; time concepts; the unifying theory of plate tectonics and more, as time permits.

TENTATIVE TOPICAL OUTLINE:

Introduction; Building Blocks; Atoms To Minerals; Igneous Rocks and Volcanism; Weathering and Soils; Sediments and Sedimentary Rocks; Metamorphism and Metamorphic Rocks; The Rock Cycle; Geologic Time; Earth Structure and Earthquakes; Deformation; Plate Tectonics; Erosional Processes; Mass Movements; Surface and Groundwater; Glaciers, and more as time permits.

EVALUATIONS:

In as much as all quizzes, tests, projects and assignments in this course require students to demonstrate their scientific reasoning skills (such as deductive or inductive inference, control of variables, application of a model to a new situation, interpretations based on fundamental theories, and interpretation of data in both tabular and graphical form), if a student earns a grade of C or higher on a designated assignment, the comprehensive final exam or the overall grade in the course, that is also indicative of the extent to which they understand and are able to apply these broader General Educational Learning Outcomes (GELO) skills.

30% for quizzes/homework
10% for attendance
20% for the First exam
20% for the Second exam
20% for the final exam
100%

TESTING FORMAT:**There will be three (3) exams for GL Y 2010 Hybrid**

NOTE: All three exams will consist of multiple choice (80%) and essay questions (20%). A **Scantron** (8 ½ x 11) is required for the multiple choice questions on all exams. For all three exams, the multiple-choice questions are similar to if not the same as the multiple choice questions associated with the net notes and the quizzes. For all three exams the essay questions will be chosen from the study questions we have listed on this syllabus.

The first exam will be _____. It will cover the first five weeks of videos and class work and it will be worth **one fifth** of the total course grade. We will choose a total of no fewer than 15 of the listed essay questions for this test. You will be asked to answer five questions out of those chosen for a total of 30 points. The remainder of the exam will consist of eighty points of multiple-choice questions (40 questions @ 2 points a piece). As stated above, they will be similar or identical to the multiple choice questions that you find in the internet notes and the quizzes will generally emphasize the major concepts reviewed in the videos as well as those in the essay questions.

The second exam will be _____. It will cover the videos and class work for weeks 6-9. The test format will be the same as the one used for the first exam. It will also be worth **one fifth** of the total course grade.

The third and final exam is scheduled on _ _____. It will cover the last weeks of videos and class work. The third exam will be worth **one fifth** of your total grade. All questions will be restricted to the material covered in the last four weeks of the course. It will be the same format as previous exams. Multiple-choice questions will be similar or identical to the multiple choice questions associated with the notes on the net, and your quizzes. The essay questions will come from the list of study questions.

Final Grades: The entire course is curved, but final grades are arrived at subjectively and individually. Traditional distributions are still honored!

90% = A

80% = B

70% = C

60% = D

Americans with Disabilities Act (ADA)

If you are a student with a disability: In compliance with Santa Fe College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first week of the semester (except for unusual circumstances) so arrangements can be made. You must be registered with Disabilities Resource Center (DRC) in S-229 for disability verification and determination of reasonable academic accommodations. For more information, see http://www.sfcollege.edu/student/drc/index.php?section=faculty_resources/rights_responsibilities

Discrimination/Harassment Policy

SF prohibits any form of discrimination or sexual harassment among students, faculty and staff. For further information, refer to College Rule 2.8 at

http://dept.sfcollege.edu/rules/content/media/PDF/Rule_2/2_8.pdf

Student Rights & Responsibilities

The purpose of this document is to provide students with a general overview of both their rights and responsibilities as members of the Santa Fe College community. For a complete list of students' rights and responsibilities go to

http://www.sfcollege.edu/studentaffairs/index.php?section=policies/student_rights

COURSE MATERIALS and RESOURCES

You have resources to help you prepare for the exams

1) The Text

Our text, "Earth Revealed", by McGary, Plummer and Carlson, was selected to be used in combination with the "Earth Revealed" tape series. You may purchase any editions of the book from the 6th edition on.

2) The Net Notes

We have developed a series of notes available on the Internet:

<http://dept.sfcollege.edu/natsci/physsci/jean.klein/html/geo1.htm>

These notes should help with both the essay questions and especially the multiple-choice questions

3) The Videos

The primary source of information for this course is "Earth Revealed"; a series of 26 taped episodes specifically designed for television, produced by the Southern California Consortium, with major funding for production provided by the Annenberg/CPB Project. Each televised program runs about 28 minutes. The 26-episode series documents evidence of geological principles and was filmed at geographically diverse sites. In these videos, emphasis is placed on the role of plate tectonics, the most comprehensive model for explaining earth processes and evolution.

Watch "Earth Revealed" as a video stream from Learner.org at the following website address:

<http://www.learner.org/resources/series78.html>

There is no charge for this and the viewer can watch videos at their convenience.

Earth Revealed Viewing Schedule for Exam One

VIDEOS

- | | |
|-------|--|
| No. 1 | Down to Earth - introduces the vast field of study that is Geology. |
| No. 2 | The Restless Planet - revisits the beginnings of our solar system and the evolving Earth. |
| No. 3 | Earth's Interior - demonstrates how seismic waves occur and explains the measurement of gravity, heat flow and earth magnetism, to provide information about the Earth's interior. |
| No. 9 | Earthquakes - explores the nature and consequences of earthquakes, the factors that cause quakes, their location and characteristics. |
| No. 5 | Birth of a Theory - traces the origin of the ideas of continental drift and sea floor spreading, and their contributions to the plate tectonics theory. |

- No. 4 The Sea Floor - examines major sea-floor features: The mid-oceanic ridge, oceanic trenches and fracture zones.
- No. 6 Plate Dynamics - introduces theory and concepts about the movements of the Earth's plates.
- No. 8 Earth's Structures - illustrates how bedrock responds to tectonic forces originating within the Earth.
- No. 7 Mountain Building and Growth of Continents -shows how major mountain belts and continents have evolved.

Viewing Schedule for Exam Two

- No. 12 Minerals - covers the origins, classifications, and uses of minerals.
- No. 14 Intrusive Igneous Rocks - unveils the rock forming processes of magmas that do not reach the Earth's surface but solidify underground.
- No. 13 Volcanism - explains how volcanoes formed, and assesses the importance of volcanic activity to Earth's geology and climate.
- No. 15 Weathering and Soils - demonstrates how minerals and rocks change when subjected to the physical and chemical conditions that exist at the Earth's surface
- No. 17 Sedimentary Rocks - illustrates the importance of sedimentary rocks in understanding the Earth's surface.
- No. 18 Metamorphic Rocks - interprets the causative factors of metamorphism and the kinds of rocks produced.
- No. 10 Geologic Time - helps viewers develop a sense of the vast amounts of time over which geologic processes have been at work.
- No. 11 Evolution Through Time - chronicles the development of life on Earth.

Viewing Schedule for Final Exam

- No. 16 Mass Wasting - examines the causes, types and effects of mass wasting.
- No. 21 Groundwater - explains how groundwater is distributed and measures its importance to human
- No.19 Running Water - Erosion and Deposition; analyzes the role of running water in sculpting Earth's surface, discusses tectonic and hydrologic cycles and how they work together to shape the land.
- No. 20 Running Water - Landscape Evolution; recognizes the roles human activity can play in intensifying or reducing flood danger, and describes the process by which streams shape valleys and landscapes are formed.

- No. 23 Glaciers - presents the properties of glaciers and assesses their importance in sculpting the Earth's surfaces.
- No. 22 Wind, Dust and Deserts - covers the formation and location of deserts and their geologic features.
- No. 24 Waves, Beaches, and Coasts - demonstrates the importance of waves affecting coastal landforms.
- No. 26 Living with the Earth: Preserving the Legacy- explores the impact of human activity on Earth and discusses ways in which people can shape their actions to benefit the Earth.

Additional Notes

- Missed exams: No make-ups without a well-documented excuse. No make-ups after specific exam has been handed back and reviewed by the class.
- Cheating: Will not be tolerated. Zero on the individual item for a first offense; a second offense will result in failure of the course!
- **Important Dates:** (fill-in the appropriate dates)

1. First day of class: _____
2. Holiday(s): _____
3. Last day to drop:
(in order to have course removed from record) _____
4. Last class day: _____
5. Final Exam day & time: _____

"ESSAY" QUESTIONS

Questions for Exam One**Introduction, Earth's Interior**

1. Explain the formation of the Earth. Be sure to include the differentiation process in your answer.
2. Describe some of the methods used to reveal the interior of the earth.
3. Draw a cross section of the earth's interior, and label the major layers.

Earthquakes

4. What are earthquakes and how are they produced?
5. Explain how seismic waves are used to determine the internal structure of the earth (use diagrams).
6. Describe the two scales used to measure earthquakes and explain the difference between an earthquake's intensity and its magnitude.
7. What factors make some earthquakes more devastating than others?
8. Describe how to locate the epicenter of an earthquake.
9. What makes the areas around New Madrid, MO or Charleston SC dangerous places to live?
10. Describe the global distribution of earthquakes.

Earth Structure

11. Describe stress and the various ways in which materials respond to stress.
12. What are some obvious lines of evidence that the earth's crust and lithosphere have been structurally deformed?
13. Describe folds and explain the differences between anticlines, synclines and monoclines. What forces are involved in creating these features?
14. Describe joints; describe normal, reverse, and strike slip faults; describe the forces responsible for creating these features.

Continental Drift

15. What was the accepted model for crustal evolution before the ideas of continental drift, sea floor spreading and plate tectonics evolved?
16. Describe Alfred Wegener's continental drift hypothesis.
17. List and explain what lines of evidence Wegener used to support his idea of continental drift.
18. Why were Wegener's ideas not initially accepted by the scientific community?

The Sea Floor Spreading

19. What techniques are used to explore the ocean floor and what do they tell us?
20. List some of the features found in the deep ocean basin.
21. Describe the earth's oceanic ridge system.
22. Explain how rock becomes magnetized and then describe the paleomagnetic pattern on the ocean floor.
23. Explain how the paleomagnetic pattern on the sea floor is central to understanding sea floor spreading.

Plate Tectonics

24. Briefly explain the theory of plate tectonics.
25. Describe the structure, composition and behavior of the crust and the upper mantle; include the lithosphere and asthenosphere.
26. Discuss the global distribution of earthquakes and volcanoes. Offer a possible explanation for the patterns.
27. Draw diagrams showing divergent, convergent and transform boundaries and label the features associated with each boundary.
28. Why are shallow focus earthquakes usually generated at divergent and transform boundaries?
29. Why are intermediate and deep focus earthquakes usually found at convergent plate boundaries?

30. Explain the origin of the following features in the context of plate tectonics: (plate motions, plate boundaries) motions = divergent, convergent, or transform
boundaries = cont./cont., cont./oceanic, or oceanic/oceanic (if applicable)
- a. Iceland
 - b. Andes Mountains
 - c. San Andreas Fault
 - d. Himalayan Mountains
 - e. Hawaii
 - f. Appalachian Mountains
31. What seems to be the driving mechanism of plate tectonics? (Why do the plates move?)
32. Describe the different types of mountains.
33. Describe how oceanic mountains are formed.
34. Describe how continental mountain ranges such as the Andes are formed.
35. Describe how continental mountain ranges such as the Himalayas, Appalachians or Urals are formed.
36. Explain how continental lithosphere evolves from oceanic lithosphere.
37. Explain why plate tectonics is known as a unifying theory.

Questions for Exam Two

Minerals

38. Describe the basic layout of any atom using the basic particles, their characteristics and their arrangement in the atom.
39. What is an element?
40. Describe the geologically important ways in which atoms make bonds.
41. Define mineral and rock. Explain why "mineral" and "rock" are not the same term. What characteristics make them different? Not all rocks are composed of minerals. Give two examples of rocks that contain no minerals. Give two examples of rocks that contain only one mineral.
42. Explain the difference between classifying minerals chemically (groups) and identifying them using physical properties.
43. List the major elements that combine to form 98% of the materials in the crust.
44. Discuss silicates. What is their basic structure? How is this structure linked to form silicate minerals?

Intrusive Igneous Rocks

45. Offer three reasons why igneous rocks are called primary rocks.
46. What does Bowen's reaction series tell us about igneous minerals and rocks?
47. Explain how a single magma can give rise to rocks of felsic, intermediate and mafic composition.
48. Name the three basic igneous rock textures and discuss the factors that determine where and why they occur.
49. Explain the importance of granite and basalt.
50. How, where and why does magma originate? What are the tectonic processes involved?
51. Compare and contrast a sill, dike, laccolith, stock and a batholith.

Volcanism

52. Explain the relationship between volcanism and plate tectonics.
53. What factors control the viscosity of a lava?
54. Describe, compare and contrast the shape, internal structure and lava characteristics (including composition, temperature and viscosity) of plateau basalts, shield and composite volcanoes, plug domes and cinder cones.
55. Compare quiet and explosive eruptions. What are the factors that cause them to be different?
56. Explain how volcanic eruptions affect climate and the atmosphere.

Weathering and Soils

57. What are the major agents, processes and products of mechanical (physical) weathering?
58. What are the major agents processes and products of chemical weathering?
59. Explain why the minerals formed early in Bowen's reaction series are also most susceptible to weathering.
60. List the major physical components of a soil and explain their role in supporting plant life.
61. Discuss the factors that control soil formation (be sure to focus on the importance of climate).
62. Describe the development of a soil profile.
63. Describe the main types of soils.

Sedimentary Rocks

64. Describe how sediment becomes a sedimentary rock.
65. Explain the basis of the classification of sedimentary rocks.
66. Name the three most common sedimentary rocks. What are their relative abundances and why?
67. Sedimentary rocks may contain cross beds, graded beds, mudcracks ripplemarks and/or fossils. Describe how these features can be used to interpret their environments of formation.
68. Define sedimentary rocks and identify what makes them important to us.

Metamorphic Rocks and The Rock Cycle

69. Discuss the conditions involved in the metamorphism of a pre-existing rock. Discuss the agents and the actual changes that take place in the rock.
70. Name and briefly describe the principal types of metamorphism? Where do they occur most commonly? Relate them to plate tectonics if possible.
71. Describe, step by step, how a shale might evolve into a gneiss.
72. Diagram the rock cycle to show the relationship between the three rock types.

Geologic Time

73. What is the significance of Hutton's concept of uniformitarianism? How did it change how we interpret the earth's history, and how has the concept itself changed over time?
74. Describe the difference between absolute and relative time.
75. List the methods that are used to establish a sequence of events in a local sequence.
76. Explain the significance of fossils to a geologist (at least 4 uses); include the use of fossils in establishing a relative time scale, and for correlation.
77. Explain how radioactive isotopes are used to figure out absolute time. How are absolute dates used in the time sequence?
78. Explain how the geologic time scale has been constructed. What are the major eras of the Phanerozoic Eon based upon?

Questions for Final Exam**Mass Wasting**

79. List some factors that affect the movement of materials down-slope.
80. How are mass-wasting processes classified?

81. Why are the slow movements like creep and solifluction important geologically?
82. Explain the importance of mass wasting processes to the erosional cycle in general.

Ground Water

83. Define the water table.
84. What is the difference between porosity and permeability?
85. What is an aquifer?
86. What is the difference between a spring and a well?
87. Explain how artesian flow occurs.
88. What are the environmental problems associated with groundwater?
89. Describe what the features are and how a landscape in which groundwater is the dominant agent of erosion evolves.

Running Water

90. Diagram and label the hydrologic cycle and explain what drives it.
91. How do streams and rivers develop?
92. What are the factors that determine the velocity of any stream?
93. Explain the concept of base level and describe its importance.
94. Explain the concept of equilibrium in river systems and offer examples of how streams adjust their course to achieve this equilibrium.
95. Describe the evolution of a landscape where surface water is the dominant erosional process.
96. Describe the relationship between stream evolution and plate tectonics.

Glaciers

97. Describe the processes by which snow is transformed into glacial ice.
98. How does a glacier move? What is a glacier's movement controlled by?
99. Describe the two types of glaciers.
100. List the landforms created as a result of glacial erosion.
101. List the features produced as a result of glacial deposition.

102. List several hypotheses to explain the cause of continental glaciation (ice sheets).
103. How did sea level change during each period of advance and retreat of glaciers? How did those changes affect land?

Wind, Dust and Deserts

104. Describe the misconceptions we have about deserts.
105. Where are the deserts of the world?
106. Describe the dust bowl event of the 1930's.
107. What is the origin and importance of loess deposits?

Waves, Beaches and Coasts

108. Describe the geologic processes that shape our coastlines and the resultant features (erosional and depositional).
109. Explain what the tides are and how they are produced.
110. Discuss coastal evolution and plate tectonics.

Living with the Earth, Preserving a Legacy

111. Explain how social conflicts over mineral, other economic resources, and territory could ultimately be considered to be the result of plate tectonics.
112. Give two examples of how geology has an everyday effect on your life. Think resources, environmental quality, hazards, etc.
113. Diagram the rock cycle in as much detail as possible. How does it relate to the tectonic, and the erosional cycles?