GENERAL GEOLOGY: INTRODUCTION TO PHYSICAL GEOLOGY

Class Purpose: To introduce undergraduate students to physical geology, Earth’s internal structure and materials, and Geologic Time. Emphasis will be on developing close connections between Earth materials and processes within a Plate Tectonic framework.

Some Expected Learning Outcomes:

- An understanding of geologic time and dating methods.
- Development of skills to recognize major rock types, their constituent minerals, and their origin.
- An appreciation of how the Scientific Method relates to the development of the Theory of Plate Tectonics.
- An introduction to the origin and distribution of natural resources.
- An understanding of three-dimensional analysis of Earth structures, and the stresses that produce them along with how major landforms relate to geological processes.
- An appreciation of origin of major geologic hazards and their impacts.

Text:

Grading:
Lecture: Three in class Partial Examinations (non-cumulative - 60% of Final Grade) and one two hour Final Examination (cumulative - 40% of Final Grade). Periodic quizzes and additional assignments (up to 5% Bonus Points). Lowest of the three partial examination grades may be dropped without penalty. All students are required to take the final exam.

No makeup exams will be given. If you must miss an exam for an excusable reason, please contact me at least 24 hrs prior to the scheduled exam period.

Laboratory: Independent course and grade.

Inclement Weather Policy: Lecture will be cancelled if Fayetteville Public Schools are closed. Assignments/examinations will be due or rescheduled for the next class meeting.
Attendance: Class attendance is not required, but is strongly recommended. There will be periodic quizzes to determine who is in class and test very simple concepts related to the material under discussion.

Academic Honesty: All students are expected to complete their own work. Copying and or cheating of any kind will not be tolerated. Minimum penalty will be failure on the assignment or exam with possible additional disciplinary action. See appropriate section in UARK Catalog of Studies (http://catalogofstudies.uark.edu/documents/06_06_Acad_Reg.pdf)

Tentative lecture topics and exam schedule. Any changes to this syllabus will be discussed in class, as necessary.

Part I – Rocks and Minerals

Week 1
T, August 25 – Course particulars: syllabus, grading, etc., course overview; Introduction to Physical Geology and Earth Materials; Assessment exam
R, August 27 – Minerals I: Atoms and chemical bonding; Mineral II: Crystal structures and macroscopic properties
Reading: Chapter 1 (p. 3 – 27) and Chapter 2 (p. 29 – 55)

Week 2
T, September 1 – Igneous rocks I: Identification and classification
R, September 3 – Igneous rocks II: Magmatic processes and plate tectonics
Reading: Chapter 3 (p. 57 – 83)

Week 3
T, September 8 – Volcanic rocks I: Volcanic hazards and volcanic activity
R, September 10 – Volcanic rocks II: Extrusive igneous rocks and processes; Weathering and soil formation
Reading: Chapter 4 (p. 85 - 115) and Chapter 5 (p. 117 – 137)

Week 4
T, September 15 – Sedimentary rocks I: Clastic sediments, transportation and deposition
R, September 17 – Sedimentary rocks II: Sedimentary facies and environments
Reading: Chapter 6 (p. 139 – 169) and Chapter 7 (p. 171 – 193)

Week 5
T, September 22 – Metamorphic rocks I: Metamorphic agents and classes; Metamorphic rocks II: Hydrothermal rocks and Plate tectonic context
R, September 24 – PARTIAL EXAMINATION I (Chapters 1-7)

Part II – Geologic Time and Surface Processes
Week 6
T, September 29 – Discussion of exam results; An Introduction to Geological Time
R, October 1 – Geological Time: Relative age dating and correlation; Radiometric dating methods
Reading: Chapter 8 (p. 195 – 221) and Chapter 9 (p. 223 – 245)

Week 7
T, October 6 – Mass Wasting and the Hydrologic Cycle; Intro. to Streams
R, October 8 – Streams I: Channel characteristics, discharge, erosion, and transport; Streams II: Valley development, braided streams, and flooding
Reading: Chapter 10 (p. 247 – 281) and Chapter 11 (p. 283 – 305)

Week 8
T, October 13 – Groundwater; Introduction to Glaciers
R, October 15 – Glaciers and glacial processes; Deserts and Wind Action
Reading: Chapter 12 (p. 307 – 337) and Chapter 13 (p. 339 – 359)

Week 9
T, October 20 – Beach environments, features, and processes I & II
R, October 22 – PARTIAL EXAMINATION II (Chapters 8-14)
Reading: Chapter 14 (p. 361 – 379)

Part III – Deformation, Earthquakes, and Earth Structure

Week 10
T, October 27 – Discussion of exam results; Introduction to Geological Structures
R, October 29 – Geological Structures I: Stress and strain; Folds; Geological Structures II: Fractures and faults - Petroleum traps
No Penalty Drop Day – Oct. 30th (http://catalogofstudies.uark.edu/4393.php)
Reading: Chapter 15 (p. 381 – 403) and Chapter 16 (p. 405 – 439)

Week 11
T, November 3 – Earthquakes I: Causes and seismic waves
R, November 5 – Earthquakes II: Global distribution, effects, and plate kinematics
Reading: Chapter 17 (p. 441 – 465)

Week 12
T, November 10 – Earth’s Interior Structure: Constraints from seismology
R, November 12 – Magnetism, Isostasy, and Interior Heat
Reading: Chapter 18 (p. 439 – 459)

Week 13
T, November 17 – The Sea Floor I: Methods of study and gross features
R, November 19 - The Sea Floor II: Sediments, ophiolites, and age relations
Reading: Chapter 19 (p. 491 – 525)

Week 14
T, November 24 – HOUR EXAMINATION III (Chapters 15-19)
R, November 26 – No Class – Thanksgiving Break
Reading: None

Part IV – The Big Picture: Plate Tectonics and Orogenesis

Week 15
T, December 1 – Discussion of Exam; Plate Tectonics I: Evidence for Continental Drift
R, December 3 – Plate Tectonics II: Paleomagnetism and Sea Floor Spreading; Plate boundaries and driving forces
Reading: Chapter 20 (p. 527 – 549); Reading: Chapter 21 (p. 551 – 581)

Week 15
T, December 8 - Mountain Building: Mountain Belt morphology and age; Orogenesis and continental growth
W, December 9 – Dead Day

Week 16
Monday, December 14 – Final Exam 10:00 AM to 12:00 PM in Ozark 25

NB: FINAL EXAMINATION SCHEDULED BY REGISTRAR
(http://www.uark.edu/registrar/classes/Fall09Exam.html)