

## **GEOLOGY 111 - PRINCIPLES OF GEOLOGY – SPRING 2012**

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**LECTURES:** MWF 12:00 noon

**LAB:** W 2-4 pm OR Th 8-10 am OR Th 2-4 pm

**FACULTY:** Tekla A. Harms, 320 BEBU, x2711  
Anna Martini, 202 BEBU, x2067

**OFFICE HOURS:** Th 4:30-5:30 for homework / everything else is open door

**TEXT:** *Earth: Portrait of a Planet*, S. Marshak, ISBN 978-0-393-93518-9, W.W. Norton and Company – FOURTH Edition (2012)

### **COURSE REQUIREMENTS:**

**LABS:** Labs, including write-ups, can be completed within the lab period. Lab write-ups are informal but will be handed in and checked. The lab sequence will include 4 rock and mineral identification quizzes. Some of our regular labs will be field trips, weather permitting. You should routinely bring adequately warm outer clothing and heavy footwear to lab as some of these trips may be spontaneous. (10% of final grade)

**FIELD TRIPS:** Geology 11 includes one all-day field trip. The field trip is an integral part of the course and attendance is required. The field trip will be offered on two dates: SATURDAY, APRIL 14 or SUNDAY, APRIL 15 (10% of final grade)

**EXAMS:** There will be 3 one-hour exams in this course.

EXAM I:	WEDNESDAY, FEBRUARY 29	Covers lectures, reading, and labs from Jan 23-Feb 22.	(10% of final grade)
EXAM II:	FRIDAY, APRIL 6	Covers lectures, reading, and labs from Feb 24-April 2.	(10% of final grade)
EXAM III:	FRIDAY, MAY 4	Covers lectures, reading, and labs from April 4–May 2.	(10% of final grade)

**HOMEWORK:** Each week there will be a homework exercise designed to help you consolidate new material and integrate new ideas into your growing knowledge base. Plan for 1-2 hours per week for homework. Exercises will be given out on Fridays and due the following Friday. (10% of final grade)

**FINAL PROJECT:** The course culminates in an integrated geologic analysis that synthesizes all you have learned. The project is done in teams. Project materials are available from April 23 to May 11 and the project is due at 12:00 noon on Friday, May 11. (40% of final grade)

### **COURSE EXPECTATIONS:**

**ATTENDANCE:** Class, Lab, and Field Trip attendance is required. Absences must be discussed with the professor. On-time arrival for lectures and labs is an important courtesy. It is expected that you will not leave the lecture hall during class.

**READING:** Whether reading assignments are completed immediately before or immediately after the related lecture is a personal choice. Do what seems to serve you best. Whether or not to do the reading, however, is not a choice. Reading assignments are required. Failure to do so will adversely affect your performance in the class.

**WRITTEN ASSIGNMENTS:** Lab write-ups are due at the end of lab. Homework must be completed on time. Labs, homework exercises, and the final project are intended to be collaborative but all write-ups must be your own, individual work.

DATE	LECTURE	TOPIC	READING
<b><u>GEOLOGIC FUNDAMENTALS</u></b>			
M-Jan 23	1	Course introduction: Gross Earth Structure	Chapter 2
W-Jan 25	2	Geologic Fundamentals: Silicate Minerals and Rocks	Chapter 5; Interlude A; p. A2-A4
F-Jan 27	3	Geologic Fundamentals: Melting, Partial Melting and Crystallization	Sections 6.2-6.3
M-Jan 30	4	Geologic Fundamentals: Rock Rheology & Flow in the Solid State	Section 11.2
W-Feb 1	5	Geologic Fundamentals: Plate Tectonics and the Dynamic Earth	Chapter 4
F-Feb 3	6	Geologic Fundamentals: Isostasy	Sections 4.2 & 11.7; Box 4.1
M-Feb 6	7	Geologic Fundamentals: The Rock Cycle & Geologic Time	Interludes A&C; Figure 12.24; p. 460-461
<b><u>EARTH SEISMICITY</u></b>			
W-Feb 8	8	Seismicity I: Earthquakes and the Earth's Interior	Chapter 10; Interlude D
F-Feb 10	9	Seismicity II: Earthquake analyses; Plate boundaries	Chapter 10; Figure 4.2c
M-Feb 13	10	Earthquakes as Geohazards: Predictions and Predictability	Chapter 10
<b><u>IGNEOUS ROCKS AND PROCESSES</u></b>			
W-Feb 15	11	Igneous Rocks I: Magmas, Volcanoes, and Plutons	Chapter 6; Chapter 9
F-Feb 17	12	Igneous Rocks II: Igneous Rock Types	Chapter 6
M-Feb 20	13	Igneous Rocks III: Crystallization (and Melting)	Chapter 6
W-Feb 22	14	Igneous Rocks IV: Magma Evolution in the Laboratory and the Earth	Chapter 6
<b><u>THE SEDIMENTARY ROCK RECORD AND GEOLOGIC TIME</u></b>			
F-Feb 24	15	Weathering, Erosion & Detrital Particles; Sediment Transport & Sorting	Chapter 7
M-Feb 27	16	Sedimentary Rocks	Chapter 7
W-Feb 29	17	<i>EXAM I</i> <i>Covers Lectures # 1 - 14</i>	
F-Mar 2	18	Depositional Systems, Sedimentary Rock Units	Chapter 17; Sections 18.2; 18.5-18.7
M-Mar 5	19	Interpreting Sedimentary Rocks	Chapter 12; Interlude B; Section 7.5
W-Mar 7	20	Absolute Time	Section 12.7-12.9
F-Mar 9	21	Stratigraphy and Relative Geologic Ages	Chapter 12; Interlude E
<b><u>ROCK DEFORMATION AND ROCK STRUCTURES</u></b>			
M-Mar 12	22	Rock Deformation, Faults and Folds, Strike and Dip	Chapter 11
W-Mar 14	23	More Structures	Chapter 11
F-Mar 16	24	Still More Structures	Chapter 11

<b>DATE</b>	<b>LECTURE</b>	<b>TOPIC</b>	<b>READING</b>
<i>March 19-23</i>			
<b><i>SPRING BREAK</i></b>			
<b><u>METAMORPHIC ROCKS AND PROCESSES</u></b>			
M-Mar 26	25	Metamorphism I: Metamorphic Changes	Chapter 8
W-Mar 28	26	Metamorphism II: Metamorphic Realms	Chapter 8
F-Mar 30	27	Metamorphism III: Protoliths and their Metamorphic Equivalents	Chapter 8
M-Apr 2	28	Metamorphism IV: Metamorphism and Mountain Belts	Chapter 8
<b><u>EARTH'S MAGNETIC FIELD AND ROCK MAGNETISM</u></b>			
W-Apr 4	29	Magnetism I: The Earth's Magnetic Field	Section 3.3
F-Apr 6	30	<i>EXAM II</i> <i>Covers Lectures #15 – 28</i>	
M-Apr 9	31	Magnetism II: Field Reversals, Magnetic Anomalies, and APW paths	Chapter 3
<b><u>PLATE MOTION AND PLATE BOUNDARY PROCESSES</u></b>			
W-Apr 11	32	Divergent Boundaries I: MOR's and Ophiolites	Chapter 4
F-Apr 13	33	Transforms	Chapter 4
<b><i>SATURDAY, APRIL 14 or SUNDAY, APRIL 15 – ALL-DAY FIELD TRIP: APPALACHIAN OROGENESIS</i></b>			
M-Apr 16	34	Hot Spots, Plate Kinematics	Chapter 4
W-Apr 18	35	Divergent Boundaries II: Continental Rifting	Chapter 4
F-Apr 20	36	Continental Extension and the Continental Margin	Chapter 4; Section 18.2
M-Apr 23	37	Introduction to the Final Project	
W-Apr 25	38	Convergent Boundaries I: Island Arcs and Andean Arcs	Chapter 4
F-Apr 27	39	Convergent Boundaries II: Trenches and Accretionary Wedges	Chapter 4
M-Apr 30	40	Continental Collision and Orogeny	Chapter 4; Sections 11.6-11.10
W-May 2	41	Course Synthesis	
F-May 4	42	<i>EXAM III</i> <i>Covers Lectures #29 - 41</i>	