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Spring 2-1-2018

GEO 103N.01: Introduction to Environmental Geology

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Class meeting times: Monday, Wednesday, Friday 2:10-3:00

Course Outcomes: The learning outcomes (what you will take away) from this class are as follows:

- 1) understanding the general principles associated with environmental geology, including the spatial and temporal frameworks involved, Earth's materials (minerals, rocks, water, air), natural hazards, water and air pollution, energy, water, and, soil resources, flooding, coastal erosion, and climate change.
- 2) Understanding the methods and activities geologists use to gather, validate, and interpret data related to environmental geology. How do geologists use the scientific method to gain knowledge and develop practices related to environmental geology?
- 3) Detect patterns in environmental geology data, draw conclusions, develop conjectures and hypotheses and test these by appropriate means and experiences. For example, we will study the discovery, scientific evaluation, and remediation of the Milltown Superfund site upstream of Missoula in the context of its environmental geology.
- 4) Understanding how scientific laws and theories are verified in environmental geology by quantitative measurements, scientific observation, and logical/critical reasoning. For example, we will study the types and dynamics of different types of erupting volcanoes, learn how scientists continue to develop ideas about different volcanic hazards and then test those ideas by making various measurements of volcanoes, evaluating the results, and deriving conclusions.
- 5) Understanding the means by which analytic uncertainty is quantified and expressed in environmental geology. Every scientific measurement is imperfect, even if the uncertainty of the measurement is very very tiny. In this class, we will explore what is meant by scientific uncertainty and how that uncertainty is incorporated into all phases of the scientific process as applied to environmental geology.

Hendrix Office Hours: Monday, Wednesday, Friday 1:00-2:00 p.m. or by appointment.

Hendrix email address: marc.hendrix@umontana.edu

Hendrix cell phone: 406-544-0780

Moodle Web Site: Aside from lectures, Hendrix office hours, and scheduled appointments, formal communications relative to class content and announcements will be handled through the course moodle page and the UM email system.

Course Grading System: Final grades for this course will be based on the following:

5% course attendance: Each lecture is required. You are permitted to miss three (3) lectures without any penalty, but attendance will be taken every lecture via iclicker. For each lecture absence beyond three, you will need a written excuse from your doctor or must have a family emergency about which you have notified Professor Hendrix.

10%: iclicker questions during each lecture: Each lecture, three iclicker questions will be posed for credit. Additional iclicker questions may be posed solely so the instructor can assess how well the class is understanding the concepts covered. Each iclicker question will be identified as practice (assessment purposes) or 'for credit' ahead of time. The lowest 'for credit' total iclicker scores for three (3) different lectures (including any unexcused absences) will be dropped and will not count against your final grade.

25%: Midterm Exam 1: Friday, February 23

25% Midterm Exam 2: Monday, April 9

25% Final Exam, Monday, May 7 from 3:20-5:20pm

Each midterm exam will consist of 50 multiple choice questions. The final exam will consist of 75 multiple choice questions.

10% field trip exercise: This course will have one all-day Saturday field trip on April 21. The field trip will involve a field exercise that will be collected and scored.

Course Book: This course will utilize the textbook Environmental Geology (7th ed.) by Carla W. Montgomery. The book is available through the UM Bookstore and through Amazon.com. In addition to course content delivered via lectures, you are responsible for keeping up with the assigned reading.

Weekly Course Schedule:

<i>Weekday/Date:</i>	<i>Lecture/discussion topic</i>	<i>Assigned Reading</i>
Week 1		
Monday, January 22	Course introduction, pre-course assessment	Montgomery, Ch. 1
Wednesday, January 24	Earth in space and time	
Friday, January 26	Impact of the Human Population on Earth	
Week 2		
Monday, January 29	Intro to matter and solid earth materials	Montgomery, Ch. 2
Wednesday, January 31	Minerals, silicates and non-silicates	
Friday, February 2	Plate tectonics – an overview	Montgomery, Ch. 3
Week 3		
Monday, February 5	Evidence supporting plate tectonics	
Wednesday, February 7	Plate movements – how far? how fast?	
Friday, February 9	Earthquake Theory	Montgomery, Ch. 4
Week 4		
Monday, February 12	Earthquake severity, hazards, and forecasting	
Wednesday, February 14	Volcanoes and volcanic processes	Montgomery, Ch. 5
Friday, February 16	Volcanic hazards	
Week 5		
Monday, February 19	NO CLASS – President's Day Holiday	
Wednesday, February 21	Forecasting volcanic eruptions	
Friday, February 23	Midterm Exam 1 – through volcanic hazards	
Week 6		
Monday, February 26	The hydrologic Cycle, intro to streams	Montgomery, Ch. 6
Wednesday, February 28	Flooding and consequences	
Friday, March 2	Coastal processes	Montgomery, Ch. 7
Week 7		
Monday, March 12	Coastline erosion and stabilization	
Wednesday, March 14	Mass movements and slope stability	Montgomery, Ch. 8
Friday, March 16	Types of mass movements and human impacts	
Week 8		
Monday, March 19	Global climate change	Montgomery, Ch. 9

Wednesday, March 21	Groundwater storage and mobility	Montgomery, Ch. 10
Friday, March 23	Impacts of groundwater withdrawal	
Week 9		
Monday, March 26	NO CLASS – Spring Break	
Wednesday March 28	NO CLASS – Spring Break	
Friday, March 30	NO CLASS – Spring Break	
Week 10		
Monday, April 2	Water use and water supply	
Wednesday, April 4	Soil formation and basic properties	Montgomery, Ch. 11
Friday, April 6	Soils and human activities	
Week 11		
Monday, April 9	Midterm Exam 2 – through groundwater	
Wednesday, April 11	Mineral and rock resources	Montgomery, Ch. 12
Friday, April 13	Environmental impacts of mining	
Week 12		
Monday, April 16	Energy resources – fossil fuels	Montgomery, Ch. 13
Wednesday, April 18	Environmental impacts of fossil fuels	
Friday, April 20	Alternative energy resources	Montgomery, Ch. 14
Saturday, April 21	All-day field trip to Milltown Superfund Site – attendance required	
Week 13		
Monday, April 23	Alternative energy resources, continued	
Wednesday, April 25	Solid waste disposal	Montgomery, Ch. 15
Friday, April 27	Liquid waste disposal	
Week 14		
Monday, Monday, April 30	Liquid waste disposal	
Wednesday, May 2	Water Pollution, basic principles	Montgomery, Ch. 16
Week 15		
Monday, May 7	Water pollution mitigation and clean up	
Wednesday, May 9	Air pollution	Montgomery, Ch. 17
Friday, May 11	Air pollution mitigation	
Week 16 (Finals Week)		
Monday, May 7	Final Exam, 3:20-5:20pm	Final is comprehensive