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The Earth

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Geology 101 - THE EARTH - Spring, 2021
Monday, Wednesday and Friday at 9:05 AM via Zoom

Instructor: William P. Clement

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Office Hours: Tuesday and Thursday, 2 – 3 PM

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Lab TAs: Meng Liu (mengliu@umass.edu), Pedro Matos Llavona (pmatosllavon@umass.edu), Berry Williams (raspberrylwil@umass.edu), and Frances Griswold (fgriswold@umass.edu).

Labs will meet remotely through zoom and start the week of **February 8th**.

Required materials

Written in Stone: A Geological History of the Northeastern United States, by Chet Raymo and Maureen E. Raymo (~\$16.00); Abbreviated as **WIS** in the schedule.

We will read this book to better *enjoy* Geology. Since it is about New England geology, I hope the book will help you put the material we learn in class into a context you can better understand and identify with. When we learn about a geological process in class, WIS can help you identify that process somewhere in New England, maybe some place you have been or know about. Fascinating geology is right here at our fingertips. This book does not cover all the material and it does not go into great depth in many places. That is what the lecture and the optional texts are for. If you do not understand a concept, *and you must judge for yourself your understanding*, then you should read the appropriate section in the **Physical Geology** on-line text. The Physical Geology text is available free, on-line in a number of formats.

Physical Geology, by Steven Earle; abbreviated as **PG** in the schedule. You can get this **free, on-line textbook** directly from the BCcampus OpenEd web site: <https://opentextbc.ca/physicalgeology2ed/>

Lab Manual: Earth Science Investigations will be available as a pdf file on the class Moodle site. I will have each lab as a separate pdf file. Make sure you have the lab manual accessible for every lab.

Packback on-line learning system (\$25.00).

Overview and Goals

GEOLOGY 101 — THE EARTH is a 4-credit introduction to the Geosciences. This course is required for several majors in the College of Natural Science at the University of Massachusetts Amherst. These majors include Earth Systems, Environmental Science, and Geology. The course also fulfills a 4-credit Physical Science (PS) General Education requirement and may be an elective science course in a number of other majors.

Our goal in GEOLOGY 101 is to provide a basic knowledge of how the Earth works, the role of the geologist in contemporary society, and the application of geologic knowledge in solving real

world problems. These are broad themes that reflect the spirit and value of the general education curriculum that is part of your UMass experience. You should leave this course with greater understanding about the age and composition of the Earth, environments in which different rocks are found, processes that shape our landscape, and how these influence and shape our lives.

You have enrolled in a course designed to inform you about the features and functions of our planet. You can expect to become better at observing the world around you, at understanding of geological processes that shape our landscapes, at applying logic to natural phenomena, and at recognizing that geologic processes, resources, and hazards greatly influence human society.

Learning Goals

The learning goals for this course are for you to understand the method of science and to see the impact of Geology on your life. At the end of this course, students will be able to:

- Realize that *science is accessible* to a largely non-scientific audience by gaining exposure, familiarity, confidence, and interest in our planet and our place in it.
- Grasp *fundamental concepts* about how the Earth works as an integrated system comprising the geosphere (solid Earth), hydrosphere (liquid water), atmosphere (gases), cryosphere (ice), and biosphere (life).
- Relate *common experiences* to our understanding of the world around us and to gain a clearer perspective of our collective *human impact* on the Earth system.
- Ask *how we know what we know*.
- Explore *scientific inquiry as a process* that reveals the details and splendor of our natural world.
- Challenge ourselves to become *better stewards* of our planet.

Learning Resources

The UMass **Learning Resource Center** (LRC; www.umass.edu/lrc/) provides academic support for undergraduate students. Its academic support programs are for all undergraduate students, not just those who are struggling academically. Peer Tutors, Supplemental Instruction (SI) Leaders, and ExSEL Leaders are model students trained to assist their peers in achieving academic success. It's a great resource. Don't hesitate to use it!

Course Format

This course involves both lectures and labs that use different means to reach the course goals. Lectures and labs present fundamental questions, ideas, and methods of inquiry and analysis used in the Geosciences.

Lectures discuss how Geoscientists view their work in relationship to both history and contemporary society. Much of the material in GEOLOGY 101 addresses the relevance of Earth Science and its impact on our society. For example, weekly "Geo in the News" assignments highlight the role of Earth Science in our communities.

Within the lab, you have the opportunity to make geologic observations, analyze data, and develop interpretations. In this manner, you learn to think like geoscientists and to apply geologic knowledge in solving real world problems.

Course Expectations

- You should attend each lecture and your weekly scheduled laboratory section. Please consult this website for official UMass policy regarding excusable absences: http://www.umass.edu/registrar/gen_info/class_absence.htm
- You are expected to complete the readings *prior* to discussion of this material in class.
- You must have access to a computer on which you can complete on-line assignments.

Class meetings will be interactive. You are expected to maintain regular attendance, keep up with readings, complete in-class exercises and activities, hand in all assignments, and participate in discussions.

Please note the following basic statements below for our expectations of student conduct.

1. Please arrive at your classes and labs on time. Late arrivals and early departures can be disruptive and can result in you missing important information. We understand if there are special circumstances when you may have to arrive late or leave early. If this happens please make your arrivals and departures as subtle as possible.
2. If you miss a lab, learning assessment, or lecture it is your responsibility to catch up with the material.
3. Please let us know immediately if you have a problem that is preventing you from performing at the level you want to be at in this class.
4. Please treat your classmates, teaching assistants, and instructors with respect. There may be times when you are frustrated with something that is going on in the course and it is challenging to be patient, however in order for this to be mutually respectful and constructive environment we ask that you are respectful of others in your words and actions.

Below is what you can expect of us (instructors and teaching assistants) this semester.

1. We will treat you with respect and try to make our expectations about how to succeed in this class clear.
2. We will do our best to help facilitate your learning by designing assignments and assessments that provide you timely feedback.
3. We will aim to start and end classes and labs on time.
4. We will be available to you for help outside of classroom times (through office hours, appointments and/or email) should you want to review concepts that you do not understand, discuss study strategies or learn material beyond the course content.
5. We will manage the class/lab environment to the best of our ability so that you have a safe and distraction free learning environment.

Assessments

Lab grade:		30%
	3 Best exams (each worth 10%)	30%
	Weekly Geoscience in the News submissions	10%
Lecture grade:	In class and outside of class exercises	10%
	Weekly Packback sessions	10%
	Weekly Photo Ops	10%
Total Lecture Grade		70%
Total Course Grade		100% + extra credit

Course Policies

Grading Policies

	B+ 87 - 89	C+ 77 - 79	D+ 67 - 69	
A > 92	B 83 - 86	C 73 - 76	D 63 - 66	F < 60
A- 90 - 92	B- 80 - 82	C- 70 - 72	D- 60 - 62	

Class Schedule

The schedule of classes, reading assignments, and exams is at the end of this syllabus. The class schedule is subject to change and will be updated as necessary in class and on Moodle. The dates of the one-hour examinations are fixed so that the material covered on these exams will be adjusted accordingly.

Important Dates

Each hour exam (including the fourth) treats a new block of material but may have a few questions repeated from earlier exams. The last exam is *not* cumulative. It is scheduled for the Final Exam period.

About the Exams

Table 1: Important Dates

Day	Date	
F	February 12	<i>Last day to drop/add w/out record</i>
F	February 26	FIRST EXAM
F	March 19	SECOND EXAM
M	March 29	<i>Last day to drop with 'W' and select 'P/F'</i>
F	April 9	THIRD EXAM
F	May — Finals time (TBD)	FOURTH EXAM

Your Exam grade (30% of your total grade) will consist of the *best three grades of the four exams*. If you miss one, your exam grade will be based on the three exams you have taken. Make-up exams will be arranged with the professor.

Your exams will consist of multiple-choice questions. The *one-hour* final exam will be similar to the other exams. *The exams will be held via Moodle.* We will decide on the timing.

Geoscience in the News

The science of geology is pervasive in the news and events of our daily lives, but this can often be overlooked. To connect geoscience with current events, you should explore the news media each week to find articles and stories that include an element of geology. Starting *Friday, February 12th*, you are expected each week to submit an on-line assignment to Moodle titled “Geosciences in the News”. These assignments must be submitted *before* the start of class on Friday of each week. Late submissions are not accepted. For each assignment, you are expected to find and read a news article published during the last week or so that involves topics within the field of geology. You should use actual news sources such as the NY Times, the Washington Post, The Economist, your hometown paper, etc., not nerd science sites like Science Daily, Science News, or Yahoo science news, although the nerd sites might help you track down good stories. The point of the assignment is to see how geology affects your life on a daily basis. description of your article.

These Geoscience in the News submissions must include the following three numbered items:

1. The title of the news article.
2. Where and when it was published.
3. *At least one sentence* in your own words that describes how the topic of the article involves the science of geology. You may write *a few sentences* if you wish, **ONLY ONE SENTENCE IS REQUIRED!** But think about the sentence you want to write. What do you want to say? How do you want to say it? I like to think I am writing a postcard. I want to share what I am doing (on vacation), but I have a limited amount of space. Or you could think about writing a tweet; short and sweet.

Note that evidence of plagiarism, of either the primary source or other students, will be handled according to UMass Academic Dishonesty Policy.

Photo Ops for Geology

Each Wednesday, *starting February 17th*, submit a photo that you took of some geology related feature that you have come across in your wanderings. The photo doesn’t have to be fancy. The point of this exercise is to realize that geology is everywhere. You don’t have to look hard to find it if you are creative and have your eyes open. Even urban environments have abundant examples of geology! Submit the photo via Moodle and include *at least* one sentence explaining the geology you see. You can write more than one sentence, but not too many. Follow the guidelines for the Geoscience in the News writing.

Remember to submit your photo *before* the start of class (9:05 am).

Packback

We are using Packback this semester.

Participation is a requirement for this course and the Packback Questions platform will be used for online discussion about class topics. Packback Questions is an online curiosity community where you can be fearlessly curious and ask BIG questions about how what we’re studying relates to life and the real world. Writing amazing questions and answers on Packback will:

- Help you develop writing skills necessary for any career path;
- Reinforce the imperative skill of justifying thoughts and claims with credible evidence — and then citing the evidence;
- Enhance critical thinking sought out by employers;
- Deepen your understanding of the course content by gaining diverse insights and perspectives from your peers;

My goal for using Packback is for you to develop your critical thinking skills by asking questions about the readings.

Your participation on Packback will count towards 10% of your final grade.

In order to receive your points per week, you must *post 1 question and 2 answers per week* relevant to our class subject matter.

Before you start posting, be sure to read the Community Guidelines found in the tutorial on Packback. If your post doesn't follow the Packback Community Guidelines, there is a chance it will be removed and you won't receive points for that post. Starting *February 15th* here will be a *Monday 11:59 PM* deadline for submissions in your community each week. Note: It takes 24 hours for the Packback team to moderate a post and send a coaching email. If for any reason your post is moderated because it does NOT meet the Community Guidelines, you will need to edit and re-publish your post to receive credit for the week. This is why it is important that you complete your Packback questions and responses far before the deadline in case your post is moderated.

How to Register on Packback:

You will receive a welcome email from help@packback.co prompting you to finish registration and payment.

Packback has already created an account for you with your school email, all you need to do is reset your password. This email may be directed to spam or filtered out, so make sure you do a thorough scan of your inbox if you can't find the email.

Backup Registration Instructions:

If you search your inbox and still can't find the welcome email, or if you are new to the course, you may manually register by following the instructions below:

1. Navigate to <https://Packback.co/questions> and click "Sign up for an Account". Note: If you already have an account on Packback you can login with your credentials.
2. Make sure to register with your UMass email address and real first name and last name.
3. Enter our class community's Community Lookup Key into the "Looking to join a community you don't see here?" section on the dashboard. Please note, the following Community Lookup Key is only for locating the community; it is NOT a coupon code or access code. Our Community Lookup Code is **2f6aaac7-e1aa-44cf-9cb2-b1c66d104627**
4. Follow the instructions on your screen to finish your registration.
5. Packback requires a paid subscription. Refer to www.packback.co/product/pricing for more information.

If you have ANY questions or concerns regarding Packback throughout the semester, please contact the customer support team at help@packback.co!

For a brief introduction to Packback Questions and why we are using it in class, watch this video: vimeo.com/packback/Welcome-to-Packback-Questions

Class Meetings

This course is an introduction to the processes that result in the rocks, resources, structure, and evolution of the Earth. Attendance in class is expected. Exams will stress concepts developed in class meetings. Classes will often take the assigned material and consider how it relates to geologic problems, many of which will be included on the exams.

A Note About How to Study for This Course

Geology, like any physical science, has a vocabulary all its own, but because it is a composite discipline, it also utilizes a background in biology, chemistry and physics. Because of this, geology often requires *repeated reading* to grasp many of its concepts. I recommend that you:

1. Read the assignments *before* the topic is covered in class. If you do this, you'll know what's in the book, and what is discussed in class, and won't have to get bogged down with extensive note-taking. You'll also be better able to ask questions and participate in class.
2. Read the assignment *again after* the class period to make sure you understood.
3. **Study with your friends:** answering each other's questions is the best way to be sure you know the subject.
4. Drag your friends in with yourself to see me, or come yourself during my *office hours* if things need discussing or you want to know more about some topic.

Laboratory Sections

The first Lab begins Monday, **February 8th** and meets via zoom at your scheduled time.

Lab schedule

We will cover the following subjects in the lab, but not necessarily in this order. The order may change due to weather or to the bizarre Monday holiday rescheduling.

Subject
Plate Tectonics
Hard Rocks and The Stories They Tell
Sedimentary Rocks: A Journey Back in Time
Glacial and Fluvial Processes
Dating the Rock Record and Principles of Stratigraphy
Deerfield Basin Field Trip
Deforming the Earth — Structural Geology
Topographic Maps: 2-D and 3-D Thinking
Sea Level Rise in Response to Anthropogenic Warming
Climate Reconstruction: Vostok Ice Core, East Antarctica

The lab section has 2 virtual field trips.

There are no scheduled make-up labs or virtual field trips. If you miss a lab during your assigned period, view the recorded zoom file for that lab, and coordinate the work done with your Lab instructor.

Laboratory work will be evaluated by the TA and grades for the lab account for 30% of your grade for the whole course. Get to know your Teaching Assistant well. Learn her or his office hours, whether or not you have problems.

On-Line Resources

1) Moodle: There is a dedicated page for this course on Moodle. Log on from the Moodle link (moodle.umass.edu) on the OIT home page using your campus ID. (Information to get started for students new to Moodle is at www.oit.umass.edu/support/moodle/help-students).

2) Google Earth™ is a great way to explore the geologic processes of our planet. You can zoom into any place on Earth. Google Earth™ is definitely a fun and interesting way to see the Earth.

Emergencies

If you find yourself in a situation where you are unable to participate in your courses, contact the Dean of Students. They are there to help you and will contact all your professors for you.

Statement of Accessibility

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a disability and require accommodations, please register with Disability Services (161 Whitmore Administration building; phone 413-545-0892) to have an accommodation letter sent to your faculty. Information on services and materials for registering are also available on their website www.umass.edu/disability.

Respect for Diversity

Students from all diverse backgrounds and perspectives will be well-served by this course. Students' learning needs will be addressed both in and out of class and the diversity that students bring to this class will be viewed as a resource, strength and benefit. I will present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups.

In addition, in scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Table 2: Schedule for Geology 101

Week	Date	Day	Theme/Topic	Reading Assignment
1	Feb. 1	M W F	Introduction In the Beginning	PG 1 PG 22
2	Feb. 8	M W F Last Drop/Add Day Feb 12	Plate Tectonics Minerals	PG 10; WIS Chapter 1 WIS Chapter 2
3	Feb. 15	M W F	Igneous Rocks Igneous Rocks and Volcanoes	PG 3 PG 4
4	Feb. 22	M W Wellness Wednesday F	Weathering and Soils No Class Exam 1	PG 5
5	Mar. 1	M Wednesday Schedule W F	Sedimentary Rocks	PG 6 PG 12; WIS Chapters 3 & 4
6	Mar. 8	M W F	Metamorphic Rocks Geologic Time	PG 7 PG 8; Robbins — “Finding Time”
7	Mar. 15	M W F	Earth’s Interior Exam 2	PG 9; WIS Chapters 5 & 6
8	Mar. 22	M W F	Earthquakes Geologic Structures	PG 11; Schulz — “The Really Big One” PG 12
9	Mar. 29	M Last Day to select P/F Mar. 29 W F	Economic Resources/ Sustainability Streams	PG 20; Bendixen, et al. — “Time is running out for sand” PG 13; WIS Chapters 7 & 8
10	Apr. 5	M W F	Ground Water Exam 3	PG 14
11	Apr. 12	M W Wellness Wednesday F	Ground water No Class Glacial Geology	“Shannon — The Water Wars of Arizona” PG 16 & WIS Chapters 9 & 10
12	Apr. 19	M T Wednesday Schedule W F	Climate Change Oceans and Shorelines	“Kolbert — A Song of Ice” PG 19
13	Apr. 26	M W F	New England Geology	PG 18
14	May. 3	M T Th	Last Geology 101 Class Last Day of Classes Finals begin	