

GEOS 1303-001- (**Introductory Physical Geology**) - Fall 2016, Section 001

Monday, Wednesday, and Fridays 9:00- 9:50 AM; **SOM 11.210**

“To lose our tranquility will not hurry geology; nothing hurries geology.”

--- Mark Twain

John Geissman, Department Head; Office: 2.301G Second Floor, West Side, ROC;
I can also be found in 1.5-2 or 1.5-1, First Floor, ROC; Email: geissman@utdallas.edu

Office Hours: Monday 1-2 PM, Tuesday 4-5 PM, Wednesday 1-2 PM

Textbook: Physical Geology: The Science of Earth, 2nd Ed. by Fletcher

Many online course materials, including readings, available thru UTD ELearning

Course Goals:

Welcome to GEOS 1303! I assume that you are enrolled in Introductory Physical Geology (or perhaps better stated: “The Science Behind How the Earth Works”) because this course provides a great means to pursue or continue your exploration of the natural world around you. If this class is the only one you will ever take that examines the natural processes that have and will continue to affect our planet, then you are in the right place! On the other hand, this class is also intended to provide a solid foundation for future studies in the Earth Sciences; I note that some of you plan to be Geoscience majors. If Physical Geology is the only geology class you ever take, it will still be important to your future, as the sustainability of the human race on this, the only home that we have, becomes an issue of greater and greater concern. Just pay attention to the news every day, like the literally thousands of temperature records being set over the past several years, and the demise of the corn and soybean crops throughout the midcontinent, and the fact that the partial pressure (concentration) of carbon dioxide in Earth’s atmosphere is now well over 400 ppm and rising steadily. This class promotes scientific literacy, in that close to every facet of our lives is in one way, shape, or form defined by science and technology, contrary to what some influential people spout. Scientific literacy is the knowledge that is necessary to understand a sufficient amount about scientific concepts and processes to make informed opinions about issues relevant to society. Numerous important societal concerns such as climate change and energy resources are directly related to science and specifically the earth sciences. I hope that this class will help you to become a more educated and thoughtful citizen.

By the end of this course you will be able to use the scientific method in analyzing and making decisions on complex issues that are presently facing and will continue to face humanity. This course will give you an understanding of deep time and how very closely human life is tied to earth processes. You will learn why some regions of the globe have frequent earthquakes, why others have plentiful oil reserves, and why others have large landslides, and why others are going to get very, very warm and very dry (and burn up) for years to come. You will learn about fundamental geologic concepts including minerals, rocks, weathering, plate tectonics, mountain building, and composition and dynamics of Earth's interior. You will learn about surface processes including wind and mass movements and you will learn more about local resource issues such as groundwater.

GEOS 1303 is a great introductory science course that can be a doorway to careers in earth sciences and other environmental fields such as hydrogeology, oil and mineral exploration, climate change, remediation, and alternative energy. GEOS 1303 will also serve as an essential building block for careers outside of geosciences including law, forensics, education, medicine, public policy, writing, journalism, and many, many other fields.

How to succeed in this course:

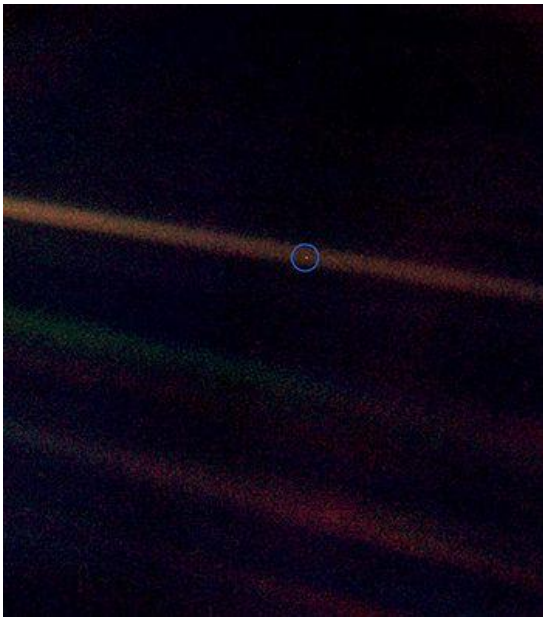
The best way to succeed in this course is to attend lectures. The second best is to read your text, Physical Geology: The Science of Earth! Remember to take the time to understand the figures in the book as well. There will be a few eLearning-based homework exercises, most based on reading assignments. In principle, lectures will not just be a rehash of the assigned reading; they will be interactive and reinforce the concepts introduced in the reading. In lectures you will have the opportunity to learn to evaluate new information and make informed decisions based on facts and critical thinking and you will be encouraged to **ASK MANY QUESTIONS!**

[As the Voyager 1 spacecraft headed out of the Solar System in 1990, it looked back and snapped a "family portrait" of the Sun and planets. From beyond Pluto the Sun looks like a bright star surrounded by a few faint dots. The Earth is one of those dots. Reprinted below is an excerpt from a presentation made by Carl Sagan in 1996 about that striking image.]

ON THE VIEW OF EARTH FROM 3.7 BILLION MILES AWAY AS A PALE BLUE DOT:

We succeeded in taking that picture, and, if you look at it, you see a dot. That's here. That's **home**. That's us. On it, everyone you ever heard of, every human being who ever lived, lived out their lives. The aggregate of all our joys and sufferings, thousands of confident religions, ideologies and economic doctrines, every hunter and forager, every hero and coward, every creator and destroyer of civilizations, every king and peasant, every young couple in love, every hopeful child, every mother and father, every inventor and explorer, every teacher of morals, every corrupt politician, every superstar, every supreme leader, every saint and sinner in the history of our species, lived there on a mote of dust, suspended in a sunbeam. The earth is a very small stage in a vast cosmic arena. Think of the rivers of blood spilled by all those generals and emperors so that in glory and in triumph they could become the momentary masters of a fraction of a dot. Think of the endless cruelties visited by the inhabitants of one corner of the dot on scarcely distinguishable inhabitants of some other corner of the dot. How frequent their misunderstandings, how eager they are to kill one another, how fervent their hatreds. Our posturings, our imagined self-importance, the delusion that we have some privileged position in the universe, are challenged by this point of pale light. Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity -- in all this vastness -- **there is no hint that help will come from elsewhere to save us from ourselves. It is up to us.** It's been said that astronomy is a humbling, and I might add, a character-building experience. To my mind, there is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly and compassionately with one another and to preserve and cherish that pale blue dot, the only **HOME** we've ever known.

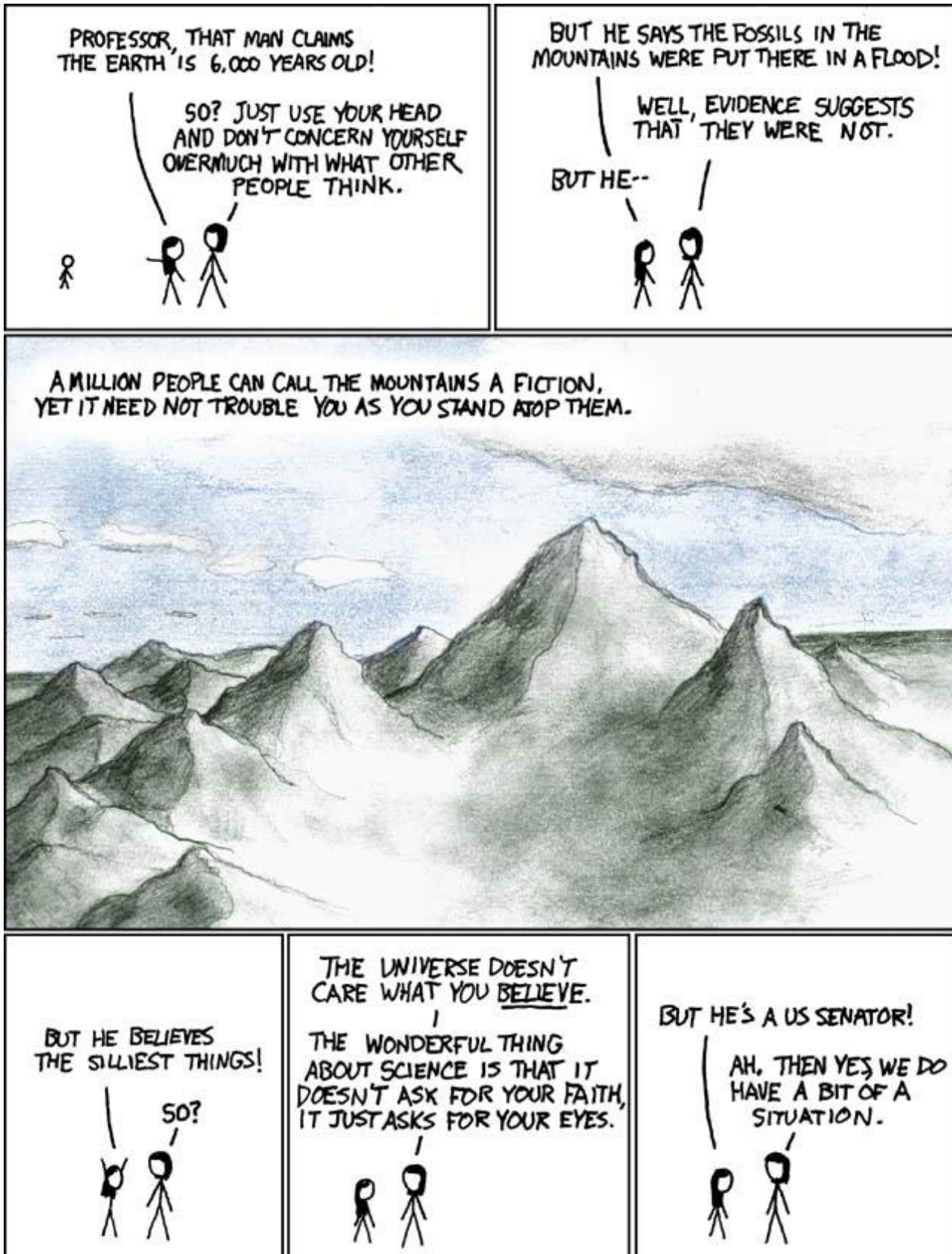
-- Carl Sagan (1934-1996) -"You Are Here," *Pale Blue Dot*, pp. 8-9.



Student Learning Objectives/Outcomes (Prepared by JWG):

Upon completing this course, students will gain:

- (a) An understanding of the global unifying theory of plate tectonics, and how natural phenomena like earthquakes and volcanism can be directly explained by plate tectonic processes.**
- (b) An appreciation and understanding of the different general types of geologic materials (i.e. rocks) and how they are related to one another through the rock cycle.**
- (c) An understanding of the essential building blocks of geologic materials (minerals) and how their chemistry and internal structure dictate the properties of geologic materials.**
- (d) An appreciation of the concept of deep time as applied to the history and evolution of Earth, and a solid understanding of the geologic time scale and how numerical age determinations have been used to define an ever improving quantitative history of Earth.**
- (e) An appreciation and understanding of the nature and origin of Earth resources (e.g., C-based fossil fuels, base and precious metals, water, etc.) and recognition of the fact that these are finite in quantity, certainly at the time scale of human consumption.**
- (f) An understanding of the fact that Earth's climate has changed (to a degree, cycled) over geologic time. Anthropogenic activities over the past few centuries have modified Earth's environment and have added a very new element to, or influence on, Earth's ca. 4.65 Ga evolutionary history. A recognition that we now have discovered a sufficient quantity of C-based fossil fuels to, if combusted, increase carbon dioxide concentrations in the atmosphere to some 800 ppm; some species on Earth will survive at this point.**
- (g) An understanding of the "critical zone" environment of Earth, where the lithosphere, hydrosphere, and atmosphere interact to provide an, until now, sustainable environment for life on our planet.**



TENTATIVE CLASS SCHEDULE:

Week	Date	Lecture Content	Reading (chapters in Fletcher) *= handouts available on eLearning	HW (tentative)
1	M Aug. 22	Earth Science and the scientific method	1	#1 Avail
	W Aug. 24	Origin of the Earth and Plate Tectonics	2	
	F Aug 26	Plate Tectonics – Science in Practice	3	
2	M Aug 29	Minerals 1	4	
	W Aug 31	Minerals 2	4	
	F Sept. 2	Reading the Rock Record	12,13	
3	M Sept. 5	No Class, Labor Day		#1 Due
	W Sept. 7	Igneous Rocks	5,6	
	F Sept. 9	Igneous Processes	5,6	
4	M Sept. 12	Volcanism and Volcanic Hazards	6	
	W Sept. 14	Weathering, Erosion, Transport, Sedimentation	7	
	F Sept. 16	Sedimentary Rocks	8	
5	M Sept. 19	Sedimentary Rocks and Hydrocarbons	8	
	W Sept. 21	Metamorphic Rocks and Processes	9	
	F Sep 23	Test I		
6	M Sept 26	Geologic Time – Deep time concept	12,13	
	W Sept 28	Geologic Time and Absolute Dating	12,13	#2 Avail.
	F Sep 30	The Interior of the Earth	11	
7	M Oct. 3	Convection and Earth's Magnetic Field	11	
	W Oct. 5	Rock Deformation	10	#2 Due
	F Oct. 7	Rock Deformation & Earthquakes	10	
8	M Oct. 10	Earthquakes II	11	
	W Oct. 12	Earthquakes as a Geologic Hazard	11	
	F Oct. 14	Plate Tectonics	3	
9	M Oct. 17	Plate Tectonics II	3	
	W Oct. 19	TEST II		
	F Oct. 21	Isostasy and Floating Continents	10	#3 Avail.
10	M Oct 24	Mountain Building and Plate Tectonics	10	
	W Oct 26	Weathering and Soil Development	7	
	F Oct 28	Climate Change	14 The sixth great extinction*	
11	M Oct 31	Climate Change	14	#3 Due
	W Nov. 2	Paleoclimatology	15	#4 Avail.
	F Nov. 4	Paleoclimatology	15	
12	M Nov. 6	Surface water and Groundwater	15	
	W Nov. 9	Surface water and Groundwater	17	
	F Nov. 11	Deserts and Wind	19	
13	M Nov. 14	Desertification and Wind	19	
	W Nov.16	Earth Resources	*	
	F Nov. 18	Test III		
14	M Nov. 21	Thanksgiving Break		
	W Nov 23	Thanksgiving Break		
	F Nov 25	Thanksgiving Break		
15	M Nov 28	Earth Energy Resources	When will we run out of oil?*	
	W Nov 30	Earth Energy Resources	*	#4 Due
	F Dec 2	Selected Topics (natural “disasters”)	*	
16	M Dec 5	Selected Topics	*	
	W Dec.7	Selected Topics, Last Day of Class	*	
		FINAL EXAM, Finals Week		

Course Materials:

Textbook: Physical Geology: The Science of Earth, 2nd Edition, by Charles Fletcher, (Wiley). There are three purchasing options for this book, as Wiley E-text, as a loose-leaf printed version, or as a paperback text. Purchasing the book also allows you access to a very wide array of student resources. The E-text can be accessed anywhere you have web access. The student companion site has online quizzes and active art animations to help you learn concepts presented in class. Please use these resources-- you have paid for them and they will only help you succeed in the course!

You should be aware that this is the second time that I have used this text for Physical Geology. I find the book very approachable, and exceedingly well organized in the context of learning objectives. In addition, the book emphasizes most if not all of the very relevant and critical global issues facing humanity, as Earth's human population will swell to over 9 billion by 2050.

The following is a direct quotation from Wiley CourseSmart:

"You can find the book I'm using at CourseSmart.

http://www.coursesmart.com/IR/6766139/9781118559680/15?__hdv=6.8

Free trial access is available for most eTextbooks. You can experience the benefits of going digital and decide if it's the right option for you.

CourseSmart's eTextbooks look just like the print textbook. Plus you get the convenience of anytime, anywhere access and useful study tools to highlight text, take notes, print pages and more -- all while saving up to 60% off print textbooks"

eLearning. There is a companion eLearning site. Please become familiar with it! As you will discover, there is a LOT of useful information available to you. You will need a UTD user name and password in order to access this site. **Be sure to log on to eLearning every couple of days to check for announcements and assignments!**

Course Assignments:

- 1) There will be three 50 minute exams during the semester (the tentative times for each are identified on the course schedule). Each test will be worth 100 points. Tests will contain short and long-answer questions, interpretation of diagrams and graphs, and multiple choice questions. **There will be no makeup Tests!** (Except in a case of debilitating illness, with appropriate documentation). A missed test will result in a score of zero. Please note that examples of previous tests are available on eLearning!
- 2) Final Exam: The final exam will be during finals week. The final exam will NOT be cumulative and will be worth 100 points. There will be no makeup of the final exam.
- 3) eLearning based homework: There will be four homework assignments during the semester. Homework assignments will be obtained from eLearning.

Course Grading:

Your final grade will be based on the total points you accumulate during the semester. Pluses and minuses will be assigned at my discretion. I emphasize that I do not have a predetermined

number score that you must achieve in order to receive a particular grade in the class. In large part, your final grade in this class is based on your standing relative to your current peers. If 90 of you deserve A's in the class, you will indeed get A's!

Assignment	Points
50 minute Tests, 3	300
Homework	50
Final Exam	100
Total	400

Attendance: Attendance is the very, very, very best way to ensure your success in this class! Please strive to attend EVERY class. If I am aware that you miss more than three classes without talking to me about your absence, I will drop you from the course.

Plagiarism: Study groups are an excellent way to study the material and foster a learning environment. I encourage you to interact with and take advantage of your colleagues in this class, in the context of forming informal study groups. Maybe you meet at Fuzzy's, or at Starbucks, or the Cindy's, or whatever. Ok to meet at a watering hole, but how about after an exam? However, ALL written work, including tests, quizzes, and homeworks must be in your own words with your own sketches. Violations of this policy will result in a zero for the assignment or exam for all students. Please do not let anyone copy your homework!

Important Dates: I believe that these are correct. The last day to change grading options is **September 17**. The last day to drop a course without a grade is **September 10**. The last day to withdraw with a WP or WF is **November 12**.

Electronic devices: Please turn off all electronic devices before class. This includes cell phones, tape recorders, and laptops!!

FINALLY, DO NOT FORGET:

