Origin of Mountains, Geo-325
Block 7, 2019

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Office: Norton 204 (x. 4302)
Office hours: by appointment
Textbook: none; articles (on Dropbox)
Course meeting times: 9:00-11 and 1-2:30

Course description: Mountains are one of Earth's most awesome features. Mountains have served a role in organismal evolution by forming barriers to migration and by offering wide ecological diversity over short distances; mountains can change climate; mountains are the location of the majority of our natural mineralogical resources; mountains are also often a major source of fresh water. Mountains have challenged, inspired, frustrated, and fascinated humans since the beginning. We go to mountains for our vacations, especially for recreational purposes and for the beautiful scenery. In some parts of the country (or world) the rich people live in the mountains, but in some parts of the country the poor people live in the mountains. Hence, mountains also dictate where people live, how they make their living, their economic and social status and even, to some extent, their political leanings.

Of course, mountains are formed by a wide variety of geological processes, but it turns out that we can use the same methods to decipher the geologic history of any mountain belt. The purpose of this class is to provide you with the tools necessary for understanding any mountains and the processes involved in forming those mountains. We will read and discuss current literature on a range of related topics, including tectonostratigraphy, petrology, structural geology, thermobarometry, and geochronology.

Prerequisites: Geo-306, Geo-307 *or* Geo-212 & Geo-214 & permission of instructor

Course Objectives:
1) Students will be able to synthesize data from the literature and begin to evaluate author interpretations.
2) Students will be able to predict and evaluate tectonic models given the geological history of an area.
3) Students will be able to apply skills/knowledge gained in this and previous courses (Mineralogy, Petrology, Tectonics, Sed/Strat, Paleontology) to reconstruct the complicated tectonic history of a mountain range.
4) Students will be able to conceive of and develop an appropriate and feasible research project proposal based on their knowledge of a given area.
**This course supports the Educational Priorities and Outcomes of Cornell College with emphases on knowledge, inquiry, reasoning, and communication.*

Course information:
Course structure
This course will be taught as a seminar-style course. Students will identify a modern or ancient mountain belt that we will explore together in class. After a day of researching the literature, we will pool our articles, and I will sort them into big picture categories (listed below). We will spend the first week and a half reading and discussing the articles, with the goal of learning everything we can about the chosen mountain belt. The emphasis for the first week, then, will be on how to read the literature, synthesize data from the literature, and evaluate author interpretations. Students will take charge of class presentations and discussion in the morning; afternoons will be used for additional lecture and lab where appropriate. During the second week, students will begin to identify possible research questions that could plausibly be asked and answered within the context of the mountain belt. Over the rest of the course, students will work to turn these research questions into individual, mock NSF-style research proposals. Class will continue with discussion about different parts of the proposals, discussions about articles, lectures/lab as

appropriate, and peer review workshops. The students will give a final presentation of their proposed research and hand in a final NSF-style proposal.

Course Accommodations

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising (Brooke Paulsen) and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.

Academic Honesty

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. Any student in this course who is involved in academic dishonesty (portraying another person's work or ideas as their own, submitting the same or similar papers in more than one course without permission from the course instructors, facilitating plagiarism, etc.) will not earn credit for the relevant assignments, may be formally charged with academic dishonesty, and may receive an F in the course.

Graded Work:

Grading

50% Articles/discussion/participation 15% Final presentation 35% Proposal

Articles/discussion

We will read 2-4 articles per night. Each of you will read each article, summarize the main points in a paragraph, and write 3 thoughtful questions. Bring these to class to help our discussion. Each of you will also be assigned articles for which you will lead discussion. *It will be the job of the student leader to engage the rest of the class in discussion, touching on important points in the article and answering (and asking) questions*. I expect that you will look up words and concepts you do not know as you read the articles, but I also expect the articles to lead us into larger discussions/lecture/lab on topics that are new.

*You all know that reading peer-reviewed journal articles can be challenging. By the end of this course, you will have developed an efficient and meaningful way to internalize and synthesize the data provided by these articles. Really push yourselves to understand the articles, but also to begin to evaluate the science and interpretations in the articles. Approaching a new field area and coming up with a research project can be daunting (as can be writing the proposal to get your research funded), but it is something that gets easier with practice.

Final presentation

On Tuesday of the final week, you will each present your research proposal to the class in a ~10–15-minute presentation. This should be a PowerPoint presentation—although we will all have read many of the same papers, you will find that you will need *extra* papers to fill out the details of your proposal. Also, while we will have discussed the geology of the mountains together in class, each of you will need to *focus on different aspects of this background* for your proposals; this means that the presentations will not

be entirely repetitious. It also means that it *will be important for you to really determine the most important aspects of the geology that need to be emphasized* to convince us that your research project is appropriate and feasible.

Final proposal

The major objective of this course is to reconstruct what we know about the geology of a certain mountain range so that we can then propose original research to be done in the area. Your final paper will be a research proposal, written in the format of an actual NSF proposal. These are difficult to write for anyone, so we will spend time discussing format and language and workshopping our ideas and proposals. Much more will be said about this in class.

Course schedule: The following is a tentative course schedule—I may change the order of, add or cull subject material depending on course progress.

Week 1 (March 18-22):

Monday	Course intro, brainstorming & paper search
Tuesday	Course organization
Wednesday	Large-scale geologic orientation & tectonostratigraphy
Thursday	Building a large-scale understanding of the orogen (formation models)
Friday	Structural and plate tectonic associations

Week 2 (March 25–29):

Monday	Rock associations; interplay of plate tectonics and rock formation
Tuesday	Geochemistry & geochronology; brainstorming project ideas
Wednesday	Discussing NSF grant proposals w/ examples; **8 pm Research questions due**
Thursday	Individual meetings
Friday	**Student presentations of research questions** & discussion

***Sunday noon: Biographical sketch due**

Week 3 (April 1–5):

Monday	Afternoon workshopping Biographical Sketch; **8 pm Project Summary due**
Tuesday	Afternoon workshopping Project Summary; **8 pm Budget & Justification due**
Wednesday	Afternoon discussion of Budget & Budget Justification
Thursday	Work day: **Full drafts due by 8 pm**
Friday	Individual meetings

Week 4 (April 8–10):

Monday	Work day
Tuesday	**Student presentations** and discussion
Wednesday	**Final proposal due**