Exam I - Friday Sept 27

Exam will cover material discussed in class and readings up to and including Wednesday Sept 18th.

Exam I potential essay questions below. Note that all materials covered in lecture and labs will be included on the exam. In addition to a couple essay questions there will be short answer/fill in the blank/true-false questions.

Describe how reaction time, relaxation time and response time relate to threshold and equilibrium conditions. What is the difference between dynamic and static equilibrium?

List the 3 dating techniques discussed in class. Describe the principles behind each technique (concept), what is material is dated, and limitations of each technique. What does the age obtained from each technique tell us? Give an example of a useful application of each technique to a question related to geomorphological research.

The Quaternary Period is divided into marine isotope stages. Explain how this works. First start big and explain what is driving cyclic changes in marine isotope values. Then provide more specifics on what processes lead to depletion and enrichment of oxygen isotopes in the ocean during glacial and interglacial conditions. When are isotope values more heavy (more positive) and why?

Draw the marine isotope curve for the last 200 kyrs and label the marine isotope stages covering that interval. What is the numbering convention? Label the LGM and define what this means. Label the Holocene and the previous interglacial periods.

Part of the Geomorphologist’s toolbox are remote sensing tools. What is the difference between Active and Passive Remote sensing methods? Provide an example of each and why they are active or passive.

LiDAR and InSAR sound really similar. What are these methods? How do they work? What types of questions would you apply toward each technique?

Describe and contrast Orogeny and Epeirogeny. How are all of these processes related?

Describe Pratt’s and Airy’s Hypotheses. How do these concepts related to the elevation of continental and oceanic crust?

Walk me through the concepts of Surface uplift, Rock uplift and Exhumation. What is the Geoid and how do these concepts relate to the geoid?
Know your founding fathers of Geomorphology and what they contributed to the science.

Explain to me why the heights of mountain peaks can increase in elevation over time due to erosion of the valley bottoms. What happens to the mean elevation of the mountain range at the same time? Use terms such as Isostatic compensation, exhumation and the difference between lithosphere and the mantle to explain. Draw a figure (and equation?) to depict what you are describing. What eventually leads to the end of the processes of peak uplift?

Parts of North America (particularly surrounding Hudson’s Bay) are rapidly uplifting, while other regions radially to the south (such as Chesapeake Bay and the Washington DC area) are subsiding. Why? Explain using terms related to isostatic loading/depression and forebulge (define these). How is the Asthenosphere/mantle involved in these surface elevation changes?

Describe flexural isostasy and how it related to spatial changes in surface uplift and depression through the buildup of a mountain range and foreland basin.

Physical weathering of rocks involves the mechanical breakdown of rocks. Dominant factors controlling physical weathering are related to processes that cause Expansion of Rocks. List and describe four processes that cause fracturing of rocks through expansion.

Briefly describe how Bowen’s reaction series relates to the stability of minerals on the Earth’s surface and their susceptibility to Chemical weathering. Specifically, what mineral is most stable (weathers last), why?

Describe the relationship between the Yellowstone Hotspot and Earthquake hazards in Cache Valley and the Wasatch front. What type of fault is the East Cache Fault and the Wasatch Fault? How do they relate to the Basin and Range?

Describe how the benches along the mountain front in Cache Valley relate to the Great Salt Lake. In general describe the past lake level history of Cache Valley. What does this tell you about past climate? Why is the Great Salt Lake salty?