EOSC 256 Midterm Study Topics
(Study topics cover most questions. There will be some questions on topics covered in class, homework, or reading that are not on this list. These are just E. Hearn's)

Expect about 20-25 questions. All but about 4 questions are from Liz Hearn (because I have taught 5 weeks and Michael Bostock has taught one week). I will provide Michael's topics and/or example questions when I get them.

Intensity : what is it, how does it differ from magnitude, how is it obtained (instrumental intensity and community intensity), how it is used (PAGER), Mercalli scale, about how many at MMI (Maximum Mercalli Intensity) = X per year? about how many with MMI = VII or more? (MI for those You Tube videos was about VII)

Pre-1900 earthquake hypotheses which were later disproved: give some examples
Aristotle's hypothesis - what was it? what available observations did it explain?
What observations (seismic and at the surface) demonstrated that faults cause earthquakes? (1906 earthquake survey results, first motions, intensities and proximity to the fault.)

Reid's theory of elastic rebound, the concept of earthquake cycle (and coseismic and interseismic deformation).

Plate tectonics, plate boundaries, and types of earthquakes expected at different types of plate boundaries. Relative plate motion, strike of the plate boundary, and expected type (or types) of faulting.

Categories of faults, orientations of fault planes (azimuth and dip), slip vector.

What is LIDAR and how is it used to study faults?

How are long term slip rates of faults determined by geologists? How are individual pre-historic earthquakes identified by geologists (trenching)?

How are slip rates of faults estimated using GPS? How do we get coarse and precise positions of points on the ground from GPS (descriptive - obviously not much detail)?

Displacement gradient matrix and strain matrix, normal strain and shear strain, estimating rotation and strain from displacement gradients. Strain rate. *(I mentioned principal strain Feb 6, but I will not examine on that or principal stress until the final exam)*

Stress (definition), shear stress, normal stress, calculating stress from strain. Young's modulus, shear modulus.

(Feb 9 - 11)
Typical stresses in the Earth, lithostatic stress. Differential stress and why we do not really know it well. Static friction, Coulomb failure criterion.

Material through Feb 11 will be on the midterm, we will have Q and A session on the 11th - please bring your questions.

From Michael:

Example questions

1. Is it possible to build a perfectly undamped seismometer?
Explain.

A perfectly undamped seismometer will cause infinite amplification of ground displacement at the resonance frequency. This is of course impossible since any finite device is incapable of measuring an infinite response (ie it has to break at some point). In practice, all seismometers will have some component of damping that originates through transformation of elastic energy to thermal energy via friction.

2. Explain how strong motion seismometers differ from more conventional ones.

A: Strong motion seismometers employ accelerometers that are sensitive to changes in ground acceleration (as opposed to ground displacement or velocity). They are usually operated in a triggered mode (as opposed to operating continuously) so that they record only when strong accelerations (such as those produced by large or nearby damaging earthquakes) occur.