EOSC110 STUDY GUIDE FOR LAB FINAL - FINAL EXAM DAY - FRIDAY 12/8, AT 2:30PM

CHANGES WILL BE ANNOUNCED on Blackboard and in lecture

How to prepare: REVIEW: 1) ppt slides from lab lectures on Bb; **2) lab and field worksheets from reader**; **3)** helpful websites in respective Bb folders; **4)** websites below; **5) maps on reserve in Library** (Yosemite topo map, Devils Fence geologic map, La Jolla geologic map).

TOPOGRAPHIC MAPS:

- Know essential rules of contours (see ppt lecture and lab manual): focus on rules you used during the lab exercises.
- Know how to interpret topographic features (valleys, hill, alluvial fans, direction of stream flow, ridge, etc.).
- Understand contour interval.
- Know how to calculate **1)** relief, **2)** distance using map scales, **3)** slope gradients (ft/mile), **4)** Convert gradient to % slope
- Understand how to read, and write, latitude and longitude. Be able to locate features, or places, on a map by giving the latitude and longitude.
- Friday lab: be familiar with the UTM coordinate system
- Express the orientation or trend *(northwest, south, etc)* of features on a map. Using quadrant and azimuth, give a bearing (direction).
- Understand map scales: ratio, verbal, bar. How to figure magnetic declination and how to locate adjacent maps.
- Know how to **calculate vertical exaggeration**
- **HELPFUL WEBSITES: WORTH LOOKING**
    - http://serc.carleton.edu/mathyouneed/slope/index.html
    - http://serc.carleton.edu/mathyouneed/slope/slopes.html
    - http://geokov.com/education/elevation-profile.aspx
    - http://academic.brooklyn.cuny.edu/geology/leveson/core/linksa/vertexag.html
- **SEE practice problem in Prep for lab final folder…..a Bb practice quiz**

GEOLOGIC STRUCTURES and GEOLOGIC MAPS

- Know the difference between normal dip slip, reverse dip slip, right lateral and left lateral strike slip faults. Type of stress responsible for each. Hanging wall vs footwall.
- Be able to recognize, interpret, and/or draw before and after figures showing fault displacement (map and x-section view).
- Be able to classify and interpret upright and plunging folds on a map and cross-section view. Know difference between symmetrical vs asymmetrical by looking at strike and dip symbols and axial planes.
- Be familiar with the following: plunge, fold axis, limb, plunge direction, strike/dip symbols of faults and beds, formation, trend. Know how interpret strike and dip symbols.
- Be able Interpret geologic structures on a geologic map and a cross section view
- **SEE practice problem in Prep for lab final folder**

RELATIVE DATING

- Understand **principles used for relative dating** (superposition, cross cutting, inclusions)
- Know the difference between the **3 types of unconformities** (see lab manual p.211-212)
- Review your relative time exercises
- **SEE practice problem in Prep for lab final folder**

TOURMALINE BEACH: See prelab lecture in Tourmaline Beach folder

- Know the 1) age, 2) type of sedimentary rock, 3) anything unique to formation (e.g. Poway clast), and 4) depositional environment for the Cabrillo Formation, Mt. Soledad Formation, Scripps Formation, and San Diego Formation.
- Understand how environment changed between deposition of formations (sea level rise vs. fall)
- Remember the 3 types of unconformities. *You do not have to remember type of unconformity you saw on the field trip.*
- Know what type of fault near the base of Tourmaline stratigraphic section and that it is associated with the Mt. Soledad uplift. How does this work?
- What is a marine terrace and wave-cut bench (abrasion platform) and how do they form?
- Know the location for the source of the Poway Clast, clast composition, and be able describe the tectonic events that have occurred since the time of its deposition.
- **SEE: 1) figures in Tourmaline Beach supplemental handout, 2) Poway clast animations, and 3) videos in the folder (on Bb also)**.

SATURDAY BACKCOUNTRY FIELD TRIP: ***review pre-field lecture ppt slides and your desert worksheet notes (look at the figures!)***

- 4 stages of tectonic activity: passive margin, subduction, extension, and strike slip faulting (transform).
    - Be able to give examples of supporting geologic evidence for each stage (e.g. batholith; basin and range topography;).
    - When did each tectonic stage approximately occur? (for example: stage 2 is Subduction: ~ 140 Ma to 80 Ma = Mesozoic).
- What is a **passive margin**? A modern-day example?
- What initiated **subduction**?
    - Reason for a western and eastern batholith?
    - Know the difference between eastern and western batholith. (age, rock type, subduction angle, arc system, which formed deeper, etc.)
    - Why did subduction stop? Why did extension (tension) develop after subduction?
- Geologic evidence to support **extension stage?** Why did tensional stress develop? Type of faults and topography?
- 3 strike slip faults in the Salton Tough? Why a trough?
- What else is contributing to the "extended Salton Trough" and geothermal/volcanic activity of the region?
- Understand how **transpression** develops:
    - uplift of Mt. Soledad along Rose Canyon Fault or the "big bend" in the SAF (LA region)
- Where do you find the majority of sedimentary rocks (marine vs nonmarine) in SD? Where are the majority of the igneous rocks? Where is the coastal plain? The batholith? Salton Trough (why called

trough)?
- Coastal Plain: where? How did it form? Rock types? Marine vs nonmarine?
- Connection between Poway clast (which formation) at Tourmaline beach and PRB/ancient arcs?
- BATHOLITH STOPS BELOW:
  - Stop 2 – Western Zone rocks: Lake Morena Pluton:
    - Describe rock's general lithology (texture/mineralogy)
    - Plate tectonic setting when pluton formed?
    - Age of pluton?
    - Depth of pluton emplacement?
    - Position in relation to magnetite/ilmenite boundary
  - Stop 4 - Eastern Zone rocks: La Posta Pluton
    - Describe rock's general lithology (texture/mineralogy)
    - Plate tectonic setting when pluton formed?
    - Age of pluton?
    - Depth of pluton emplacement?
    - Position in relation to magnetite/ilmenite boundary
  - How do we know that the PRB rocks formed in a volcanic arc setting?
  - What happened around 100 Ma that caused the PRB to change from western to eastern plutonism?
  - What did the eastern zone magmas have that the western zone magmas lack? Hint: Source rock
  - Where are the gabbro plutons located in the batholith? Why are these gabbro bodies predominantly super-rich in hornblende instead of pyroxene? Hint: What causes magmas to form in subduction zones?
  - The present Earth surface exposes batholithic rock that formed 10 km to 20km underground. How did these rocks make it to the surface? And where did all the overlying arc material go?

FOSSILS:

- Be able to identify fossils using specific taxonomic terms or general name (see below). **A word bank** will be given to choose names of fossils (word bank will look like example below **without** eras and mixed-up).
- Be able to determine assemblages of fossils that represent a specific geologic Era (Paleozoic, Mesozoic, Cenozoic). Like the sample quizzes during fossil lab.
- Be able recognize common modes of fossilization: 1) permineralization (petrification), 2) replacement/recrystallization *(do not have to differentiate),* 3) carbonization 4) preservation without alteration
- Be able recognize the following trace fossils: burrows (borings) and tracks.
- Be able to recognize an internal and external mold, no casts
- Understand the **diversity diagrams**: see **Fossil guide used in lab, posted on Bb also**

FOSSIL ASSEMBLAGES OF GEOLOGICAL ERAS: KEY "INDEX FOSSILS" FOR EACH ERA

Paleozoic – 542 to 251 Ma

Phylum Arthropoda, Class Trilobita, "**Trilobites"**
Phylum Echinodermata, Class Crinoidea, "**Crinoids"**
Phylum Cnidaria, Class Anthozoa, Order **Rugosa "horn corals"**
Phylum Cnidaria, Class Anthozoa, Order **Tabulata "tabulate corals**"
Phylum Brachiopoda, "**Brachiopods"**
Phylum Mollusca, Class Cephalopoda, "**nautiloids"** **simple sutures**

Mesozoic – 251 to 66 Ma

Phylum Mollusca, Class Cephalopoda, “ammonites” Genus ***Baculites*** ***= straight with complex sutures***

Phylum Mollusca, Class Cephalopoda, **“belemnites**” ***internal skeleton***

Phylum Chordata, Class Vertebrata, reptilia, “dinosaurs”.

Cenozoic – 66 Ma to present

Phylum Mollusca, **Class Bivalvia**

Phylum Echinodermata, Class **Echinoidia (sea urchins, sand dollars)**

Phylum Mollusca, **Class Gastropoda, “gastropods”**