Review for Lab Exam 2 (week of October 31, 2016)

This Exam will begin at the beginning of lab and will include questions from the Igneous rock, Sedimentary rock, and the Groundwater/streams labs.

The lab will be open for review during tutor times, and some additional times so that you can review the rock samples and study the groundwater maps. See D2L for the open review times.

Igneous Rocks:

1) Given an igneous rock sample*, you should be able to answer the following:

- Is it intrusive or extrusive?
- Describe the cooling history of the rock (did it cool slowly, quickly, or both?)
- What is its composition? (felsic, intermediate, mafic)
- You must be able to identify 1 or more of the coarse grained minerals in the rock
- What texture best describes the rock? (coarse, fine, porphyritic, pegmatitic, vesicular, glassy)

***Note**: You should be able to answer these questions for any igneous rock we give you, even if you've never seen that particular rock sample before. The samples for this portion of the exam will not necessarily be exactly the same as the ones you saw in lab.*

2) You should also be able to identify the igneous rocks. The key to identifying igneous rocks is to know the following rock chart. That way, if we give you a coarse grained, felsic rock, you will know that it's a granite, even if you've never seen the rock before. You will have to ID igneous rocks that look different than the ones in lab, so do not just try to memorize what the rocks look like!

	Felsic	**Intermediate**	**Mafic**
Extra coarse grained	granite pegmatite	--	--
Coarse grained	granite	diorite	gabbro
Porphyritic	porphyritic rhyolite	porphyritic andesite	--
Fine grained	rhyolite	andesite	basalt
If a rock is vesicular, you must include "vesicular" in the name of the rock (e.g. vesicular basalt)			
Pumice and obsidian do not have any minerals (they are made of volcanic glass). As a consequence they do not fit into this chart. You must be able to identify them, but you will not have to answer questions about their composition (felsic, intermediate, mafic).			

Sedimentary Rocks:

***Note**: You should be able to answer these questions for any sedimentary rock we give you, even if you've never seen the rock before. The samples for this portion of the exam will not necessarily be exactly the same as the ones you saw in lab.*

1) Given a sedimentary rock sample**, you should be able to answer the following:

   •Is the rock clastic, biochemical or chemical?

2) You must be able to identify the dominant mineral(s) in each of the following rocks:

   •quartz sandstone
   •arkose sandstone
   •all limestones
   •rock gypsum
   •chert

3) For *clastic rocks only*, you should be able to relate the grainsize of the rock to the energy of the environment in which it was deposited (low, moderate, or high energy environment)

4) You should also be able to identify the sedimentary rocks. The key to identifying sedimentary rocks is to know how to classify them (see below). **Do not just try to memorize what they look like!**

Clastic Sedimentary Rocks: classified 1st by size, 2nd by mineral content or roundness (when applicable)

- silt/clay sized (fine grained), <u>tends to break into layers</u> = **shale**
- sand sized = **quartz sandstone** or **arkose sandstone**, depending on the mineral content
- gravel sized = **conglomerate** or **breccia**, depending on whether the grains are mostly rounded or angular

Biochemical and Chemical Rocks: classified by <u>composition</u>, typically composed of just one mineral. Identify the rock by identifying which mineral it's made of, or by recognizing special features such as fossils or ooids. Remember, limestone will react with readily with HCl as it is composed of predominantly calcite.

Chemical Rocks:

- **oolitic limestone**: (calcite) can be recognized by the presence of "ooids" which are small spherical grains of calcite
- **rock gypsum**: (gypsum) soft, can be scratched easily with fingernail
- **chert**: (quartz) made of microcrystalline quartz, therefore it is very smooth, has conchoidal fracture and is harder than glass
- **dolostone**: made of the mineral dolomite ($CaMg(CO_3)_2$), which is similar to calcite, but will react to acid only when powdered. This rock should be softer than glass (unlike chert). Some of our samples in lab may scratch glass due to quartz impurities, but you can identify this rock by the fact that it reacts to acid when you powder it.

Biochemical Rocks:

- **fossiliferous limestone**: (calcite) can be recognized by the presence of whole and/or broken fossils
- **coal**: black, carbon-rich, low density

Stream Processes (Ch. 8)

- Know where in a meandering stream channel the stream flow velocity is highest and lowest.
- Be able to label the sites of lateral erosion and point bars in a diagram of a meandering stream, as in Fig. 8.6 on p. 119 of your lab manual

Groundwater (Ch 9):

- Know how to determine the elevation of the water table on a topographic map.
- Be able to determine the direction of groundwater flow using a topographic map (similar to p. 133), or using a contour map of the water table (similar to p. 137).
- Know how to calculate the slope of the water table (a.k.a. the hydraulic gradient).
- Be familiar with the major components in the Groundwater Models assignment (Figs. 1, 2, & 3 beginning on p. 130a), such as:
    - Be able to <u>label a cross section diagram</u> with these major components.
    - What is the difference between a confined and unconfined aquifer?
    - What is an aquitard (a.k.a. confining layer)?
    - What does the water table look like when groundwater is flowing?