**Study Guide for Limnology Exam #1**

**Overall**

* Be able explain how the properties of water and light and the processes of photosynthesis and respiration result in stratification of temperature and oxygen in lakes.
* Be able to explain what different parameters (e.g. turbidity, conductivity, **~~pH~~**, etc.) measure. Understand how they might be related to one another.
* Be able to answer the italicized questions in the lecture outlines
* Be familiar with the general ideas in the reading [Cristofor et al.  1994](http://science.kennesaw.edu/%7Ejdirnber/limno/Christofor%201994.pdf)

[**Intro Lecture**](http://science.kennesaw.edu/~jdirnber/limno/LecIntro/LimnoIntor.htm)

* Know the advantages and disadvantages of observational (indirect) types of experiments and of manipulative (direct) types of experiments.
* Provide two reasons why it is important to study freshwater systems.
* Distinguish between:
  + primary vs secondary productivity
  + eutrophic vs oligotrophic
  + benthic vs planktonic vs nektonic vs neustonic
  + lotic vs lentic
* Define drainage basin (i.e. watershed)

[**Physical Limnology of Lakes**](http://science.kennesaw.edu/%7Ejdirnber/limno/LecPhy/LecPhy.html)

* Describe ways in which natural lakes can be formed. Describe ways that artificial reservoirs differ from natural lakes. Explain why natural lakes are relatively rare features on the surface of the Earth.
* Distinguish between dissolved and suspended solids (be able to provide examples), and discuss ways that these two types of matter can be estimated.
* Explain why light is important in aquatic systems, and the possible fates of light as it strikes the surface of a lake and passes into the water.
* Describe ways in which light is measured in water. Explain what information vertical illumination (light penetration) measurement might provide that visibility (by secchi disk) and turbidity do not.
* Know the sources and sinks of heat in aquatic systems.
* Describe how matter in water affects light penetration.
* Describe the relationship between temperature and the density of water.
* Describe the epilimnion, metalimnion (thermocline) and hypolimnion. Explain how these layers are formed, and how they change over the seasons of the year and over the life of a lake as it becomes more eutrophic.
* Describe (or draw) the motion of water in waves, and how it influences the vertical distribution of heat in a lake.

[**Chemical Limnology of Lakes**](http://science.kennesaw.edu/%7Ejdirnber/limno/LecChem/LecChem.html) **(Exam #1 covers only the first part of this lecture through** Eh **~~Carbon Dioxide (and pH)~~)**

* Know the sources and sinks of oxygen and carbon dioxide in aquatic systems.
* Explain how water temperature and oxygen saturation are related.
* Explain how oxygen stratification in lakes occurs and how it changes as a lake becomes more eutrophic.
* Explain the difference between Eh (Redox potential) and pH. Describe what happens to Eh as oxygen gets very low (i.e. the environment becomes anoxic), where this might occur, and what type of organisms would be found there.
* ~~Describe the relationship between carbon dioxide and pH.~~
* ~~Explain what if means if alkalinity of water is high.~~
* ~~Know how carbon dioxide and pH are related, and what biological process would result in changes in pH in lake water.~~
* Know the reactants and products of photosynthesis and of respiration.
* Define eutrophication and distinguish between oligotrophic, mesotrophic, and eutrophic.