Week 3: Introduction to Water Quality

<u>Learning outcomes</u>: After participating in the lectures and case study, students will be able to:
- Analyze the water cycle and distribution of water on earth, and connect this understanding with the limited accessible fresh water available for human consumption. Why we need to keep our water clean!
- List metrics of water quality, define each parameter and explain how each is related to overall water quality. When is water safe to drink?
- Examine societal responses to ensure and maintain water quality (ie legislation), and recommend responses to emerging water contaminants.

Lecture Session 1
<u>Session 1, Pre-class reading</u>: (est 1 hr)
Miller textbook chapter on water cycle and water quality

<u>Session 1, Lecture outline</u>:
5 min Announcements
5 min fast 5 reading recall
10 min Water cycle and distribution of water on earth
25 min water quality parameters **Emphasis on the parameters measured in lab**
Dissolved oxygen, pH, electrical conductivity, nutrients (ammonia, nitrate, sulfate, potassium, phosphorous), cations and anions (esp. elements, anions, chloride, iron), alkalinity/carbonate, particulates (total dissolved solids), bioindicators, microbial pathogens, taste and smell
5 min wrap-up

Lecture Session 2
<u>Session 2, Pre-class reading</u>: (est 1 hr)
Case study- *Tricolsan in water treatment – from research to regulation in Minnesota*
"A new source of dioxins: clean hands" by J. Rayloff from Science News (May 18, 2010).
https://www.sciencenews.org/blog/science-public/new-source-dioxins-clean-hands
"Minnesota's ban on triclosan adds fuel to the chemicals debate" by Leigh Stringer from The Guardian (June 19, 2014).
http://www.theguardian.com/sustainable-business/2014/jun/19/minnesota-ban-triclosan-germ-killing-chemical

<u>Session 2, Lecture outline</u>:
5 min Announcements
5 min Review of session 1
15 min water contaminants (historical and emerging) and history of water quality legislation
15 min detailed discussion of case study on triclosan
5 min overview of keys to successful sampling of surface waters (preparation for lab 5)
5 min wrap-up

<u>Session 2: homework:</u> (est 2 hrs)

Responses to case study discussion questions will be posted to blackboard discussion groups. Students are also required to respond to the contributions of at least two other students.

Case study Discussion points:
- Where does the water in your community come from?
- How does society handle perceived issues of water quality?
- What is tricolsan used for? Why is it of concern in fresh water? Why is it banned in MN?
- What water quality issues or contaminants might be of concern in your community?

Lab 3: Drinking Water Analysis (est 3 hrs)
- eScience lab (Env. Sci. Lab 8)- water treatment
- Distance students - Test pH probe with tablet, prepare for sampling (week 4)
- On-campus students – Prepare for arrival and analysis of samples from distance students (week 5).

Appendices:
Reading: Miller Ch 14- Water Resources
Case study reading: "A new source of dioxins: clean hands" from Science News
"Minnesota's ban on triclosan adds fuel to the chemicals debate" from The Guardian
eScience lab- Water Treatment