FORS 4160/6160*: Environmental Monitoring

Instructor: Jay Shelton Office - Room 4-430 (542-3108)
Lab - Whitehall Fisheries (369-5730)
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Meeting time and place:
Lecture: 11:00 - 12:15 pm. (Tues., Thurs.) Room 1-303
Lab: Tuesday 2:00 – 4:45 pm. Meeting location is variable.
Be prepared for field work rain or shine, but bring paper and a calculator.

Course Material:
There is no required text for this class. However, you will be expected to print material from various sources and will receive several handouts during the semester.

Example References:
GAWRD. 2000. Draft standard operating procedures for conducting biomonitoring of fish communities in the Piedmont Ecoregion of Georgia. Revised June 9, 2000. Georgia Department of Natural Resources, Wildlife Resources Division, Fisheries Section.
GAWBP. 2004. Draft standard operating procedures: Freshwater macroinvertebrate biological assessment. Georgia Department of Natural Resources, Water Protection Branch.
Keith, L.H. 1988. Principles of Environmental Sampling. American Chemical Society
EPA EMAP: http://www.epa.gov/emap/index.html
GA EPD: http://www.dnr.state.ga.us/dnr/environ/
Dunnett's Procedure: http://www.epa.gov/nerleerd/stat2.htm

Course Objectives:
1. Present and discuss terminology and methodology used in environmental sampling programs (water, air, soil, and biota).
2. Present critical factors to be considered in designing and planning environmental sampling programs.
3. Discuss practical considerations required to successfully implement field sampling programs for environmental systems.
4. Discuss considerations that assure representative sampling so that realistic decisions can be made concerning entire environmental systems.

Expectations: We will meet for lecture twice weekly. We will either have an organized lab or field trip each week. Labs will often be based on field collections. **All field trips are required - Missing lab will result in loss of participation points.** Material presented on field trips cannot be made up. In addition, you will have to spend time outside of scheduled class or lab time in order to finish some assignments. Because lab work is conducted in groups, you will not be required to be present for every outside-of-class activity. However, you are expected to know what happened.

Grades:
The final grade will be based on the combined performance in lecture and lab.

Evaluation:
Avg of midterm and final = 33%
Avg of lab reports = 33%
Participation = 33%

Grading	Points
Midterm Test	100
Final Exam	100
Lab Reports	(100 x 3)
Participation	100

The midterm and final are take-home exams and are due 1 week (7 days) after being assigned. Similarly, lab Reports are due one week after completion of the lab exercise.

Academic Misconduct: All students are expected to do their own work, expect when told they can work together on a problem or lab assignment. All tests and lab reports should be written individually.

*** Note that requirements for graduate students may be slightly different than for undergraduates.**

Example Topics:

Topic	Subject	Parameters	Processes
Water	Physical/chemical properties	Temperature Dissolved oxygen	Diffusion
Water	Physical/chemical properties	Temperature Dissolved oxygen	Diffusion
	Chemical properties/solids	Dissolved oxygen Turbidity/TSS, TDS, Spec. cond.	Bioactivity
	Nutrients	pH, alkalinity, hardness Nitrogen Phosphorous	Equilibrium Biological cycling Chemical cycling
	Carbon, organic matter	BOD, COD, Sag curve	Decomposition
Air	Particulates, atmospheric composition	PM10, smog, ozone, other gases	Volatilization, Deposition, photo-activity
Soil	Sediment	Turbidity, particle size distribution	Erosion/ sedimentation
	Soil/water interactions	CEC	Sorption
	Metals	Heavy metal concentrations	Bio-transformation Oxidation/reduction
	Organic matter	BOD	Decomposition
Biota	Bio-monitoring	Toxicity, indicator species, HSI	Production
	Bio-monitoring	Diversity, abundance, IBI	Bio-accumulation

Week	Topic*	Lab*
1	Introduction Twelve Step Sampling Process Environment Process Connectivity	
2	Sampling: Who/What/When/Where Governing Laws	Data resources for environmental monitoring (computer lab)
3	Water: Physical/Chemical Properties/Nutrients	**Lab Report 1 Due** (Group Report) Physical/Chemical Stream Characterization
4	How to write a report (with citations) Biomonitoring	Macroinvertebrate Sampling
5	How to Calculate an IBI Application and Interpretation of Results	Fish Sampling
6	Toxicity Testing	Calculate IBI scores for Fish and Macros
7	Guest Speaker: LUST Program Heavy Metal Concentrations	Handout Take-Home Midterm Exam **Lab Report 2 Due**/ Collect material for Toxcity Lab
8	QA-QC Defining Control Sites and Blank Sample Needs	**Midterm Exam Due**/ Stock Toxicity Test
9	Introduction to Air Quality Guest Speaker: EPA Air Quality Division	QA/QC Lab
10	Guest Speaker: Monitoring for Govt Agencies	*No Lab: Fall Break*
11	Introduction to Erosion/Sedimentation	Finish Toxicity Test
12	TMDLs Guest Speaker: Monitoring for Consulting Firms	**Lab Report 3 Due** Guest Speaker: Soil Erosion/Sedimentation
13	Volunteer Monitoring Programs Guest Speaker: Volunteer Monitoring Network	Lecture
14	Using what you have learned: Real Scenario	*No Lab: Thanksgiving Break*
15	Wrap-Up/Catch-Up Review for Final: Hand out take-home final	EPA Tour
16	Environmental Monitoring and Global Conditions	**Final Exam Due**

*Tentative – subject to change.