GH529 Group Project
Microbiologic Monitoring of Water and Wastewater at the Emory Water Reclamation Facility
Fall 2014

The goal of this project is to introduce you to water testing methods that are applicable to field settings in developing countries. These methods and sampling strategies may be useful for your GFE, practicum, thesis, or future jobs. In addition, this project will introduce you to the newest component of the Emory Sustainability Initiative, the Emory Water Reclamation Facility (WRF).

Background. Emory University has partnered with Sustainable Water to construct an on-site wastewater reclamation facility. On-site wastewater reclamation provides several advantages: 1) it reduces the burden on the DeKalb Wastewater Treatment Plant; 2) it provides a reliable source of water for non-potable uses (cooling towers, landscape irrigation, toilet flushing); and 3) it significantly lowers the sewer and water fees charged to the University.

During the Fall 2014 semester, the WRF will begin the biological commissioning process. This process develops the necessary biosystem (plants + microbes) for wastewater treatment and production of reclaimed, usable water. Once complete, this biosystem will be able to reduce the pathogen load in wastewater extracted from the Emory sanitary sewer and reduce the available nutrients in the reclaimed water, lowering the potential for microbial regrowth. In addition to the biological treatment process, reclaimed water will be further treated using traditional technologies (filtration, UV disinfection, and chlorination) before being distributed across campus. These treatment stages will begin coming on line in October.

The GH529 group project will explore the changes in treatment efficacy during the biocommissioning process, as well as the reduction in pathogen load associated with each step of the reclamation process. You will be using total coliforms and *E. coli* as indicators of pathogen load, a widely used technique in the WASH field.

Schedule.

Date	**Task**	**Deliverable**
Aug. 27-Sept. 24	Complete Emory Biosafety and Lab Safety training courses	Completion certificates sent to TAs
Sept. 17	Introduction to lab methods, Site orientation visit to WRF	
Sept. 22-Oct. 29	Weekly sampling/testing*	Data uploaded to class spreadsheet weekly
Nov. 14	Group report due	Report sent to TAs
Nov. 20, noon, location TBD	Presentation to stakeholders	Assigned slides sent to TAs by Nov. 14

*Each group will be assigned a specific sampling site for each week. Please refer to the sampling schedule to ensure that your group is collecting from the correct site each week.

Safety Training. For this project, you will be handling wastewater that is known to contain pathogens. It is critical that the proper precautions are taken to avoid exposure to pathogens and potential illness. In the first two weeks of the semester, you must complete the Emory online Biosafety and Lab Safety training courses. These courses are accessed through the ELMS system. Directions can be found at http://www.ehso.emory.edu/training/. You are required to take course 240120 (Biosafety) and 240150 (Lab Safety). Once you have completed the courses, save a PDF of the completion certificates (directions at above website) and send them to the TAs. ***Failure to complete these training courses will mean that you cannot participate in the group project and you will receive a 0 for the project grade.***

In addition to the Emory safety training, the class will receive a safety orientation to the WRF site during class on Sept. 17th. This is an active construction site. Failure to heed the site operator's instruction can put you, your classmates and the site workers at risk of injury. Participation in this site orientation is required. ***If you do not attend, you will not be allowed to collect samples from the WRF site.***

Sampling and Processing. Each group will be responsible for sampling one site each week. Sampling and processing duties should be rotated among the group members so that everyone gains experience with the process. You may find it easier to sample and process in pairs, but this is not required. All samples will be tested for *E. coli* and total coliforms using the IDEXX ColiLert system. A sampling schedule with sample access/open lab times and the assigned sampling locations will be posted on Blackboard. A data collection form (available on Blackboard) should be completed for each sample collected.

Although the groups will work independently of each other, the data will be compiled into a single class dataset for analysis. Each week, your data should be entered into the Google spreadsheet set up for the class dataset. This upload will include raw data and the calculated results. For the final report, you will present your group's data, as well as the complete class dataset. Your conclusions will be based on the class dataset. The panel presentation will use the complete dataset. As with any dataset, datachecks are important. You are encouraged to check the raw data and calculations for all of the samples to ensure that they are realistic and correct.

Presentation of Results. As a scientist, it is important to be able to present your results to other scientists as well as non-scientists who have a stake in the outcome of your research. To this end, the results of this project will be presented in two ways: a final report and a panel presentation.

Final Report. Each group will write a final report presenting their results, as well as the overall class results. This report will be structured as a scientific

manuscript with the following sections: title, abstract, introduction, materials and methods, results, conclusions, literature cited. Examples of final reports will be posted on Blackboard. This report is due to the TAs on Nov. 14th. The final report is worth 20% of your overall class grade.

Panel Presentation and Discussion. As a class, we will present the results of this study to a group of project stakeholders, including the designer of the system, the environmental engineer in Campus Services overseeing the project, and members of Facilities and Landscaping who will be end-users of the reclaimed water. Each group will be assigned a section of the PowerPoint presentation to prepare and present based on the class dataset. The slides are due to the TAs on Nov. 14th. After the presentation, there will be a panel discussion with the stakeholders, which will allow you to answer any remaining questions you may have, as well as answer any questions the panelists have for you. The panel discussion will be held on Nov. 20th from 12-1, location TBD. The panel presentation and discussion is worth 10% of your overall class grade.