

# **Biochemistry for the Analysis and Management of Freshwater**

## **Course Instructor:**

Dr. Sam Mula  
sm09la@brocku.ca

## **Course Administrator:**

Dr. Colin N. Yates, PhD  
cyates@uwaterloo.ca

**Teaching Assistant:** TBA

**Credits:** 0.5

**Prerequisites:** ENVS 200 (ERS 340 considered significant asset)

**Credits:** 0.5

**Term:** Winter 2014

## **Course Dates:**

Daily February 16 – February 21

**Course Fee: \$440** (includes accommodation, gourmet lunches and dinners for 5 days, transportation for field trips, all lab equipment and reagents)

## **Course Description:**

Today's environmental technologists not only require extensive theoretical background in a wide variety of system processes, but also hands-on practical skills and experience to analyze numerous environmental parameters.

This course will challenge students to become competent in a laboratory setting while expanding their understanding of biochemical cycles, concentration curves, various water quality measures (i.e. pH, salinity, heavy metals content) and how they can be applied in environmental technologies. Through a week long field practicum students will operate analytical instruments in order to analyze waters from natural and man-made systems.

Students will be expected to competently and independently analyze parameters such as BOD<sub>5</sub>, cBOD<sub>5</sub>, NH<sub>3</sub>, total phosphorus, dissolved oxygen, bacteria, solids as well as many others.

## **Course Objectives:**

1. Students will become competent in operating various analytical instruments in a laboratory following Standard Methods for the Analysis of Water and Wastewater.

## **Biochemistry for the Analysis and Management of Freshwater**

2. Students will be able to identify expected normal ranges from different sources of water.
3. Be able to efficiently perform machine calibrations and data calibration curves, dilution factors, and various other quality control and quality assurance processes.

### **Evaluation:**

#### ***Annotated Bibliography —20%***

Each student is required to produce an original bibliography containing at least 20 references from peer-reviewed academic publications, 5 of which must have been published between 2013 and 2014. Under each reference 3 critical points must be given from the content of the article. The annotated bibliography will be used to help you research your term paper. Each reference should be specific to your topic (specific contaminants, technologies and biochemical mechanisms) in order to guide your research.

#### **Lab/Field Notes – 20%**

*Field Notes – 10%* (Due Date: March 7, 2015)

Each student is required to create and maintain a comprehensive set of field notes which will be submitted as part of the final report. Field notes should include weather conditions, geographic locations, dates and environmental data collected. Field notes should also include important points discussed during field trips. Any other pertinent information should also be recorded. Notes will be marked on their comprehensiveness and effectiveness. Notes can be submitted as original handwritten notes or with digital format if illegible to grader.

*Lab Notes – 10%* (Due Date: March 7, 2015)

Each student is required to create and maintain a comprehensive set of lab notes which will be submitted as part of the final report. Lab notes should include information on data analysis, results and methodology. Any other pertinent information should also be recorded. Notes will be marked on their comprehensiveness and effectiveness. Notes can be submitted as original handwritten notes or with digital format if illegible to grader.

#### **Lab Test – 15% (February 19, 2015)**

Each student will be required to complete a timed lab test during the lab/field component of the course. This test will examine your ability to accurately and efficiently analyze various water quality parameters, calculate calibration curves and dilution factors.

#### **Quizzes – 20%**

## **Biochemistry for the Analysis and Management of Freshwater**

Each student will complete 4 online quizzes. Each quiz will be based on a reading provided the week prior. Each reading will explore a different biochemical cycle, process or technology that is either found naturally or has been man-made.

### **Final Report –25%**

The term report will be a literature review of a current topic from a provided list. In your report you will be studying and reporting on the common treatment mechanisms used in the system(s) or technology of your choice. You must also find and research one case study commenting on what contaminants were being treated, how, where and why. Did the case study find the results they expected; if not, why?

Papers should not exceed 15 pages double spaced or 4000 words (not including a list of references).