

CEE 601

Chemistry and Biology of Environmental Systems Laboratory

- Catalog data:** 20-CEE-601. Chemistry and Biology of Environmental Systems Laboratory. 1 ug./gr. cr. Theory and laboratory experiments. Chemical principles of lime/soda ash drinking water softening and biological principles of activated sludge sewage treatment.
- Prerequisites:** Chemistry.
20-CEE-471. Introduction to Environmental Engineering. 3 ug. cr.
Concurrent registration in: 20-CEE-600.
Chemistry and Microbiology of Environmental Systems. 3 ug./gr. cr.
- Textbook:** Course packet prepared by the coordinator.
- References:** Viessman and Hammer, *Water Supply and Pollution Control*, 6th Edition, Addison Wesley, Menlo Park, CA, 1998.
- Coordinator:** Dr. Daniel B. Oerther, Assistant Professor of Environmental Engineering, 746 ERC, 556-3670, Daniel.Oerther@uc.edu
- Goals:** This course provides a hands-on introduction to the chemistry and microbiology of environmental systems using the experimental analysis of chemical drinking water softening plants and biological activated sludge sewage treatment plants as extended examples. This course is intended to reinforce the concepts explored in lecture and to serve as a vehicle for authentic learning of chemical and biological principles.
- Lecture or Lab Topics:**
1. Determining pH of an unknown sample. (1 class)
 2. Determining hardness & alkalinity of an unknown sample. (1 class)
 3. Monitoring pH, hardness, & alkalinity during the determination of the optimum dose of lime/soda ash to chemically soften unknown samples. (1 class)
 4. Determining biochemical oxygen demand of an unknown sample. (1 classes)
 5. Determining chemical oxygen demand of an unknown sample. (1 class)
 6. Determining suspended solids concentration of an unknown sample. (1 class)
 7. Continuous daily operation of a pilot-scale biological activated sludge sewage treatment plant. (2 weeks)
- Computer usage:** Spreadsheet collection and organization of raw experimental data and statistical analysis of data according to quality assurance criteria.
- ABET criterion 3:** a, b, d, k
- ABET criterion 8:** a, b, d, f
- Date prepared:** December 30, 2002 , Last Update April 25, 2007

Specific Examples of ABET Criterion 3

a: Each laboratory class meeting requires the students to use their understanding of chemistry or biology to conduct the lab assignments.

b: The primary purpose of the lab course is to teach students to design and conduct experiments as well as collecting, analyzing, and interpreting data. After each lab assignment, students are required to write individual lab reports describing their results and predicting the identity of the unknown compounds.

d: Each lab assignment is conducted by a team of two to three students with each team member acting as a scribe as well as a hands-on experimentalist.

k: The lab assignments test routine skills that are needed for all environmental engineers including measuring biochemical oxygen demand, chemical oxygen demand, and determination of suspended solids.

Specific Examples of ABET Criterion 8

a: Basic understanding of chemistry and biology is necessary to successfully complete each lab assignment.

b: After completing each lab assignment, the students have learned routine skills that are needed for all environmental engineers including measuring pH and hardness.

d: See the description in B, above.

f: Laboratory skills in chemistry and biology are presented to support engineering design of water softening and activated sludge, respectively.

