Course: ***CIV_ENV 365-0: Environmental Laboratory, Winter 2017***
Credits: 1 unit credit; contact hours: 4 hrs lab experiments; 5 hrs lab/project report per week
Instructor: Yun Wang
Recommended

(1) Laboratory Manual
(2) *Analytical Chemistry 2.1* ebook by Prof. David Harvey
(3) *Instrument Protocols*
(4) *Detailed Theoretical Guidelines for Various Techniques covered by This Class*

Other :
Materials: Laboratory description handouts, websites, power point documents, etc.
Description: This course will provide students with hands on experience in chemical analysis for assessing water quality issues (with specific goals and program outcomes outlined below).
Prerequisites: CIV_ENV 367
Required (?): Required

Specific Goals for the Course:

1. to learn basic chemistry laboratory skills used by environmental engineers for assessing the chemical quality of a water sample;
2. to learn how to determine concentration of key chemical species;
3. to be able to plan and conduct an experiment;
4. to be able to effectively report, analyze and interpret laboratory results.

Program Outcomes as Defined for ABET That Are Directly Related to This Course:

a. an ability to apply knowledge of mathematics, science, and engineering (including biological and chemical science);
b. an ability to design and conduct experiments as well as to analyze and interpret data in one focus area (water);
f. an understanding of professional and ethical responsibility;
g. an ability to communicate effectively;
k. an ability to use the techniques, skills, and modern scientific tools necessary for engineering practice, including concepts of professional practice.

Course Goals	Outcome	Performance Indicator	Assessment	Proposed Action
1, 2, 3, 4	a	Revised lab report	88% / 100%	None
2, 3, 4	b	Results and discussion sections in lab reports	83% /100%	A lecture on statistical analysis in the beginning of the class.
3, 4	f	Lab notebooks	100% / 100%	None
4	g	Writing format in lab reports	100% / 100%	None Note: students were allowed to do revisions
1, 2, 3, 4	k	Ability to use instruments	100% / 100%	None

Topics Covered:

List of Experiments

A set of 9 experiments will be performed in this class (Students are required to submit laboratory reports for the first 8 experiments listed below). The first experiment – pH determination is performed by all on the first week of class – the next 8 experiments will be performed each week on a rotation basis.

1. **pH:** Determination of pH using a glass electrode –all in the lab week #1–
2. **Alkalinity**: Introduction to computerized titration methods
3. **Hardness, Ca and Mg**: by EDTA titration and flame atomic absorption spectroscopy, respectively
4. **Na, K, and Li:** by Flame emission spectroscopy
5. **Phosphate and Nitrate:** by colorimetry and second-derivative adsorption ultraviolet (UV) spectroscopy, respectively
6. **Major and Minor Anions:** by ion chromatography
7. **The Trace Metal Cu:** by graphite furnace atomic absorption spectroscopy
8. **Dissolved Organic Carbon:** by high temperature combustion
9. **The Organic Contaminant Triclosan:** by high performance liquid chromatography

Grade Distribution: Lab reports (90%) and lab notebooks (10%)

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