ESG 198 Fundamentals of Engineering Chemistry (Required)

Course website: http://www.matscieng.sunysb.edu/esg198/

Course Catalog description:

A quantitative introduction to chemistry (stoichiometry, bonding, states of matter, equilibrium) with emphasis on topics of interest to students in engineering (metals and semiconductors; thermochemistry; electrochemistry and corrosion; polymers). Labs include an introduction to analytical techniques, electrochemistry and chemical synthesis. Both quantitative and qualitative methods are emphasized. May not be taken for credit in addition to CHE 131/133, 141/143.
4 credits

Pre- or Corequisite(s): PHY 132 or 142 or 126 and 127;MAT 127 or 132 or 142 or AMS 161

Text(s) or other required material: JA Beran, Laboratory Manual for Principles of General Chemistry, Wiley; 7 edition (April 15, 2004), ISBN 0471214981;

Course learning outcomes:

Students will gain an understanding of oxidation and reduction reactions as they relate to engineering applications, such as corrosion.
Students will learn to balance chemical equations, using proper nomenclature.
Students will perform laboratory experiments related to solubility and pK.
Students will perform laboratory experiments in electrochemistry.

Topics Covered:

Week 1.	Nomenclature/introduction
Week 2.	Oxidation and reduction reactions
Week 3.	Periodic table and Periodic Law;
Week 4.	States of matter
Week 5.	Acids, bases, salts, pH
Week 6.	Equations (e.g., stoichiometry)
Week 7.	Equilibrium
Week 8.	Metals and nonmetals
Week 9.	Solubility product; pK
Week 10.	electrochemistry
Week 11.	Organic chemistry (nomenclature, structure, qualitative and quantitative analyses)
Week 12.	Organic chemistry (balanced equations, reactions, synthesis)
Week 13.	Introduction to nuclear chemistry

Class/ Laboratory Schedule, i.e. number of sessions each week and duration of each session:

ESG	198	Fundmntls of Engineering Chem	LEC	1	MW	6:50 PM	8:10 PM
			LAB	L01	TH	9:50 AM	12:50 PM
			LAB	L02	TH	2:20 PM	5:20 PM
			LAB	L03	F	9:35 AM	12:35 PM

Contribution of Course to meet requirement of Criterion 5:

This lecture and laboratory class clearly meets the outcomes for engineers to apply basic chemistry/science skills, conduct experiments in teams, analyze the results, communicate these results, while all in a safe, professional, and ethical manner.

Relationship of course to program outcomes:

10% Engineering Science, Laboratory Experience 40%, Mathematics 10%, Basic Science 40%, General Education 0%, Design Experience 0%

(a) During the ESG 198 course students learn about electrochemistry and use mathematical formulas to determine whether a electrochemical cell is spontaneous and if so what is the voltage of the electrochemical cell. Students learn about acids and bases and the effect of acids and bases on metals. They also learn to determine which metal is more reactive with hydrogen.

(b) Throughout the ESG198 course students conduct 30 various experiments which support the material that was presented in the lecture regarding oxidation, reduction, acids, bases – for example.

(e) Students identify, formulate and solve engineering problems regarding problems that oxidation, reduction, exposures to acids and bases cause for metals.

Person(s) who prepared this description and date of preparation:

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