

COURSE DESCRIPTION:

Chemistry 230 is a course designed to introduce students to fundamentals of Analytical chemistry, also known as “Quantitative chemistry”. Students will be exposed to many concepts and methods that are useful to develop skills to solve analytical problems encountered in all fields of science and medicine in a quantitative manner.

COURSE OBJECTIVES:

1. The student will learn important fundamentals and concepts in solution chemistry, equilibrium calculations, redox chemistry, electrochemistry, spectrometry, and chromatography.
2. The student will gain hands on experience on carrying out analytical techniques in the laboratory and understanding limitations and optimization of analytical methods.
3. The student will enhance their knowledge of solution preparations
4. The student will learn application of statistical methods and will understand the importance and the difficult task of estimating accuracy and precision of data

STUDENT LEARNING OUTCOMES:

1. The student will demonstrate critical thinking and quantitative reasoning skills related to analytical problems.
2. The student will acquire hands on experience in carrying out analytical techniques in the laboratory and will understand the limitations and optimization of analytical methods.
3. The student will demonstrate competence in the statistical evaluation of experimental data.

GRADING POLICY:

• Quizzes (20 minutes in length, periodically throughout the semester)	30%
• Homework	5%
• Tests (3)	30%
• Finals	10%
• Laboratory	<u>25%</u>
	100%

Letter Grade Breakdown:

<u>Letter</u>	<u>Equivalent %</u>
A	93-on
A ⁻	90-92.9
B ⁺	87-89.9
B	83-86.9
B ⁻	80-82.9
C ⁺	77-79.9
C	73-76.9
C ⁻	70-72.9
D ⁺	67-69.9
D	60-66.9

ATTENDANCE: Attendance at lecture is required. If you miss a lecture, you are responsible for the lecture material, any assignments given, announcements, handouts or any other information that was provided in class. Attendance will be taken. Any absence from a quiz or a test requires a valid written excuse from the Dean of Students' Office (illness or family emergency). It is a good idea to meet with me as soon as you return to school in order to make-up lost work.

If these procedures are not followed, no make-up will be given and the student will receive a zero for the quiz, test, or lab.

Class Participation: You are expected to attend class and arrive on time. In general, you will understand the material better and do well on quizzes and tests if you participate in class. If you miss a class you may fall behind and will not do well in the course.

TESTS/QUIZES: Quiz dates will be announced in class. Tentative test dates are given in the syllabus below. Final exam will be cumulative and will be given on the day set by registrar (**NO EXCEPTIONS!**). You will be getting a study guide for all major tests and the Final exam.

HOMEWORK: Homework will be assigned and will be collected on the announced due date. Work on these problems together as a group. It is essential to the understanding of this course to be able to solve problems. Answers to these problems will be posted on the bulletin board in the Science center next to the entrance to the Oberkotter center.

IA SESSIONS/RECITATION: There is no official IA or recitation sessions assigned for this course. However three recitation classes will be held during lab prior to the three major tests. During recitation, I will go over problems from homework, quizzes at your request and assign additional problems to solve. This is an excellent opportunity to get help on concepts and problems you find difficult.

LABORTAORY: Attendance is MANDATORY. All experiments must be completed as scheduled and reports submitted at the beginning of the next laboratory period. Any laboratory material submitted after the due date will NOT be accepted. Failure in the laboratory will result in failure in the course, independent of other results from lecture. Grade for the laboratory will be based on performance with respect to three items: the actual experiments (80%), a final lab exam (10%), and maintenance of lab note-book (10%). Each experiment grade will be based on experiment report sheets (error calculations and graphs, if applicable) and post lab questions. On the first laboratory period you will be given the guidelines for proper notebook maintenance.

Many students find this course somewhat difficult. My advice to you is not to miss classes, be responsible for learning the material, work hard and keep up. I will do my best to help you any way I can. Please feel free to stop by anytime if I am in my office and have no scheduled appointment.

TENTATIVE SCHEDULE CHE 230 FALL 2009

<u>WEEK OF</u>	<u>LECTURE</u>	<u>LAB</u>
8/24	Syllabus, Intro, The analytical process, ch. 1 Units, solutions, dilutions, calculations, ch. 4	NO LAB
8/31	Errors in Chemical Analysis, ch. 5 and 6 Statistical data analysis, ch. 7	Introduction Error Analysis
9/8	Aqueous solutions, chemical equilibria, ch. 9 and 11	Exp. 1
9/14	Effects of electrolytes on equilibria, ch. 10	Recitation I
9/21	Gravimetric methods of analysis, ch. 12	Exp. 2
----- <i>TEST 1 (ch. 4, 5, 6, 7, 9, 10, 11): Thursday, October 1</i> -----		
9/28	Principles of Neutralization Titrations, ch. 14 and 15 Test 1	Exp. 2 continued
10/5	Complexation reactions and titrations, ch. 17	Exp. 3
10/12	No class on October 13 (Fall Break) Introduction to Electrochemistry, ch. 18, 19	Exp. 4
10/19	Potentiometry, ch. 21	Recitation II
----- <i>TEST 2 (ch. 12, 14, 15, 17, 18, 19): Thursday, October 29</i> -----		
10/26	Redox Titrations, ch. 20 Test 2	Exp. 5
11/2	Electrogavimetry and Coulometry, ch. 22	Exp. 6
11/9	Introduction to Spectrochemical Methods, ch. 24	Exp. 7

11/16	Molecular Absorption Spectrometry, ch. 26 Molecular Fluorescence Spectroscopy, ch. 27	Recitation III
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-----*TEST 3 (ch. 20, 21, 22, 24): Tuesday, November 24*-----

11/23	Test 3 No class on November 26 (Thanksgiving)	NO LAB
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11/30	Introduction to Analytical Separations, ch. 30 Final Exam Review	LAB FINAL
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DECEMBER 8 – FOLLOW FRIDAY SCHEDULE

EXPERIMENT TITLES

- Exp. 1 Introduction to Volumetric Glassware:
Use of Volumetric Flasks, Pipets, and Burets
- Exp. 2 Gravimetric Determination of Chloride in a Soluble Sample
- Exp. 3 pH Titration and Determination of Molecular Weight and Acid dissociation
Constant of a Weak Acid
- Exp. 4 Spectrophotometric Determination of pH of a buffer and Investigation of
Acid-Base properties of an Indicator
- Exp. 5 Potentiometric Titration of I⁻/Cl⁻ mixture and determination of K_{sp} of AgI
and AgCl
- Exp. 6 Potentiometric determination of F⁻ ion in drinking water using an Ion
Selective Electrode
- Exp. 7 Determination of Fe in water using Absorption Spectroscopy

Handouts on each experiment will be given one week prior to the lab. There are pre-lab reading assignments for each experiment. This is important in order to prepare for each lab.

In lecture we will be covering chapters 1, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 17, 18, 19, 20, 21, 22, 24, 26, 27, and 30. At the beginning of each chapter you will be given the information on sections that will be covered, reading assignments, and home-work problems pertinent to the chapter.

PHILOSOPHY/CONDUCT/PROTOCOL

Honor Code: I expect each student to abide by the college's honor code (please read discussion in the "Customs Book"). The following statement regarding **classroom protocol** is supported by the college Faculty and Administration.

"Appropriate classroom behavior is implicit in the Cedar Crest College Honor Code. Such behavior is defined and guided by a complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations, and any other behaviors that might disrupt instructions and/or compromise students' access to their Cedar Crest College education."

Academic Conduct:

As a student at Cedar College, each student shall:

- Only submit your own work.
- Adhere to the rules of acknowledging outside sources as defined by the instructor. Never plagiarize or misrepresent intellectual property.
- Neither seek nor receive aid from another student, converse with one another when inappropriate, nor use material not authorized by the instructor.
- Follow instructions of the professor in any academic situation or environment, including taking of examinations, laboratory procedures, the preparation of papers, properly and respectfully using college facilities and resources, including library and computing resources to ensure that these resources may be effectively shared by all members of the College community.

All cellular phones must be in the silence or vibrating mode.

College Policy Regarding Learning Disability

Students with documented disabilities who may need academic accommodations should discuss these with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the advising Center.

