

Chemistry 329
Syllabus
Spring, 2015

Chemistry 329 is a combined lecture/laboratory course that is an introduction to analytical chemistry. Rather than attempting a comprehensive survey of the vast array of methods available to an analytical chemist, the lectures will focus more deeply on equilibrium reactions in water solution, or as it is often called "wet chemistry". A sophisticated treatment of multi-component, multi-reaction aqueous equilibria will be given. This will include acid-base equilibria, solubility equilibria, complexation equilibria, and oxidation-reduction equilibria. In other words we will focus on developing techniques to understand the realistic typical situation in which many different chemical equilibria are established at the same time. The treatment will involve extensive use of distribution coefficients for speciation, logarithmic plots, computer calculations, and graphics. Electrochemistry will be covered in connection with the discussion of oxidation-reduction equilibria. Computer modeling of titration curves for many different types of titrations will be emphasized in this course, as will graphical methods for determining pH and cell potential.

Instructor: R. Claude Woods, 262-2892, rcwoods@wisc.edu
(please use only this e-mail address for all course related e-mail), 4337 Chemistry

Lectures: MW 11:00 am, B371 Chemistry. **Questions or discussion from class members are most welcome during lecture.**

RCW's Office Hours: Make an appointment, or try just stopping by.
Appointments may be made immediately after a lecture, or if necessary, by e-mail.

On line content: Learn@UW.

Text: Daniel C. Harris, *Quantitative Chemical Analysis* (Eighth Edition, W.H. Freeman and Company, New York, 2007). The material of Chapters 6-17 is the main subject matter of the lecture part of the course. Considerable additional material on these same subject areas that is not found in the textbook will also be covered in lecture. The lecture presentation will not follow the sequence of topics in the book or focus on the same aspects of the subject necessarily. The other chapters in Harris are mainly relevant to, or to some extent covered in, the laboratory part of Chemistry 329.

Safety Goggles: You are required to wear safety goggles at all times when in the laboratory. Further important information about laboratory safety issues is contained in the laboratory manual.

Mathematical and Plotting Software: Mathcad (14 or 15) will be used in this course. Further

information about accessing Mathcad will be provided separately.

Problem Sets: You will receive problem sets at between one and two week intervals throughout the semester. They must be turned in on time except when special permission is obtained. The teaching assistants will grade your solutions, and solution sets will be supplied after the problem sets are turned in. You may work with other students on the problems, but you must hand in and take responsibility for your own solutions. The problem set grades are counted in the final semester grade. More importantly the exams will be closely related to the problem work that has been assigned, so a firm grasp of the problem sets will be the highly important for doing well on the exams. It is required that students will use Mathcad software to complete problems assigned.

Laboratories: Detailed information about the laboratory portion of the course will be found in the laboratory manual or will be provided to students by their teaching assistant.

Examinations: There will be two mid-term examinations and a final examination. The two mid-terms will be given during regularly scheduled lab periods on dates to be given later and will last 2-3 hours

Conflicts: If a religious observance conflicts with any scheduled activity, please notify me. We will schedule a makeup or otherwise accommodate you.

<i>Grading:</i>	Two mid-terms (150 points each)	300 points
	Final exam	300
	Problem sets	100
	Laboratory	300
	TOTAL	1000 points

You must complete the laboratory satisfactorily to pass the course. Letter grades for the cut-offs for various final semester letter grades will be made at the end of the semester, but in no case will the final letter grades be in a different order than the above numerical totals. There are no predetermined numbers of any particular grades. The teaching staff will, to the best of their ability, assign letter grades that fairly and accurately correspond to each student's performance in the class.

Chemistry 329 (Woods) Preliminary Laboratory Schedule

Week	Date (TR sections)	631-Colosi	632-Kain	633-Kaiser	634-Wheeler	635-Bonfert
1	20-Jan	Check-in/Weighing	Check-in/Weighing	Check-in/Weighing	Check-in/Weighing	Check-in/Weighing
	22-Jan	MathCAD Introduction*	MathCAD Introduction*	Volumetric Calibration	Volumetric Calibration	Volumetric Calibration
2	27-Jan	Volumetric Calibration	Volumetric Calibration	MathCAD Introduction*	MathCAD Introduction*	Standardization of HCl
	29-Jan	Standardization of HCl	Standardization of HCl	Standardization of HCl	Standardization of HCl	MathCAD Introduction*
3	3-Feb	Standardization of NaOH	Standardization of NaOH	Standardization of NaOH	Standardization of NaOH	Standardization of NaOH
	5-Feb	Determination of % KHP in a Mixture	Determination of % KHP in a Mixture	Determination of % KHP in a Mixture	Determination of % KHP in a Mixture	Determination of % KHP in a Mixture
4	10-Feb	Spec. Determination of Fe	Spec. Determination of Fe	Spec. Determination of Fe	Spec. Determination of Fe	Spec. Determination of Fe
	12-Feb	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>
5	17-Feb	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>
	19-Feb	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>	<i>Project 1--Ag Electrode</i>
6	24-Feb	Finish labs	Finish labs	Finish labs	Finish labs	Finish labs
	26-Feb	Finish labs	Finish labs	Finish labs	Finish labs	Finish labs
7	3-Mar	Adventures with Buffers	Adventures with Buffers	Adventures with Buffers	Adventures with Buffers	Adventures with Buffers
	5-Mar	A Study of Bromocresol Green	A Study of Bromocresol Green	A Study of Bromocresol Green	A Study of Bromocresol Green	A Study of Bromocresol Green
8	10-Mar	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>
	12-Mar	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>
9	17-Mar	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>	<i>Project 2--Acid Salt Titration</i>
	19-Mar	Gas Chromatography	TA PICK	TA PICK	TA PICK	High Pressure Liquid Chromatography
10	24-Mar	High Pressure Liquid Chromatography	Gas Chromatography	Chemical Oxygen Demand	Fluoride Ion Electrode	Chemical Oxygen Demand
	26-Mar	TA PICK	High Pressure Liquid Chromatography	Gas Chromatography	Chemical Oxygen Demand	Fluoride Ion Electrode
--	31-Mar 2-Apr	Spring Break				
11	7-Apr	Chemical Oxygen Demand	Fluoride Ion Electrode	High Pressure Liquid Chromatography	Gas Chromatography	TA PICK
	9-Apr	Fluoride Ion Electrode	Chemical Oxygen Demand	Fluoride Ion Electrode	High Pressure Liquid Chromatography	Gas Chromatography
12	14-Apr	Finish labs	Finish labs	Finish labs	Finish labs	Finish labs
	16-Apr	Finish labs	Finish labs	Finish labs	Finish labs	Finish labs
13	21-Apr	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>
	23-Apr	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>
14	28-Apr	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>
	30-Apr	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>	<i>Project 3--Potentiometric Titration</i>
15	5-May	Finish labs/Check out	Finish labs/Check out	Finish labs/Check out	Finish labs/Check out	Finish labs/Check out
	7-May	No Lab	No Lab	No Lab	No Lab	No Lab