ANALYTICAL CHEMISTRY II -- CHEM 425 Spring 2007
TENTATIVE LECTURE SCHEDULE

INSTRUCTOR: Dr. Petr Vanýsek; Office, Faraday West 418
Meeting place for all sections: Faraday West 201 at 8:00-9:15 Tuesdays and Thursdays

OFFICE HOURS: 9:30 – 10:30 Tuesdays and Thursdays. Other times by appointment only. I will help you with your problems, but when you come to see me, have your questions and problems already at least partially prepared. Bring your class notes along; I will want to see what you write down. Do not expect the instructor to give you your own private make-up class. When coming to the office hours, be prepared to share the office or the time with other students.

Laboratory sections (all meet in Faraday West 304)

A	Wednesday	17:00-20:50	Mike Zickus
B	Thursday	13:00-16:20	Courtney Cherok
C	Wednesday	13:00-16:20	Kaho Kwok/Kellen Hunter
D	Friday	13:00-16:20	Adam Dill

TEXTBOOK: D. A. Skoog, F. J. Holler and T. A. Nieman: Principles of Instrumental Analysis, Fifth Ed. Harcourt Brace College Publishers, Orlando, FL 1998. ISBN: 0-03-002078-6 (Note: As of December 2006 the 6th edition of the book is available. You can use either edition, however, any assigned problems will be those from 5th edition.

DATE dd.mm.yy	TOPIC	CHAPTER
16.01.07	Introduction	
18.01.07	class cancelled	
23.01.07	Electronics, signals and noise	2-5
25.01.07	Electronics, signals and noise	2-5
30.01.07	Radiation, spectrometer components	6-7
1.02.07	Radiation, spectrometer components	6-7
6.02.07	Atomic spectrometry	8-10
8.02.07	Atomic spectrometry	8-10
13.02.07	Atomic spectrometry	8-10
15.02.07	Molecular spectrometry	13-18
20.02.07	Molecular spectrometry	13-18
22.02.07	Test I	
27.02.07	*Molecular spectrometry	13-18

1.03.07	*Molecular spectrometry	13-18
6.03.07	Mass spectrometry	11 & 20
8.3.07	Mass spectrometry	11 & 20
13.3.07	Spring break	
15.3.07	Spring break	
20.3.07	Mass spectrometry	11 & 20
22.3.07	X-ray spectrometry and surface characterization	12 & 21
27.3.07	Test II	
29.3.07	*X-ray spectrometry and surface characterization	12 & 21
3.4.07	Electrochemistry	22-25
5.4.07	Electrochemistry	22-25
10.4.07	Electrochemistry	22-25
12.4.07	Electrochemistry	22-25
17.4.07	Electrochemistry	22-25
19.4.07	Electrochemistry	22-25
24.4.07	Test III	
26.4.07	Electrochemistry	22-25
1.5.07	Electrochemistry	22-25
3.5.07	Electrochemistry	22-25

* Feb. 25-Mar. 1 is PITTCON and March 26-29 is ACS meeting, both in Chicago. Watch for an in-class announcement, as I may need to cancel a lecture to attend.

Schedule of tests (all in FW 201):

22 February	Test I	100 points
27 March	Test II	100 points
24 April	Test III	100 points
8 May	*Final 8:00 – 9:50	200 points

(*official; if agreement can be reached, then May 3rd is proposed.)

GRADING:

Tests: 500 points

Laboratory: 280 points, as described in the laboratory handout (12 labs, each 20 points + 40 points for laboratory notebook).

Total of 780 points is possible. Percent average (earned points divided by 7.8) will be used for determining the final grade. The following is a tentative scale: 85% A, 75% B, 65% C, 55% D, less than 55% F. Note however, that you have to complete all the laboratory assignments to get a passing grade.

ACADEMIC INTEGRITY: In general, cheating means presenting or using work that was not done entirely by you and, in the case of in-class examination, it includes also presenting or using your work that was written outside the classroom. You may not talk or pass notes to each other on any subject. Having other materials than those allowed for the work within your reach during test or sharing calculators is cheating as well. During tests you must put away any devices that would allow you to communicate with others or access databases. Be very careful not to use work of somebody else (lab mate, previous years' reports, web downloaded material) for the laboratory report. Violation of these rules will result in zero on your work.

Other issues:

- No smoking in the building, no food or drink in the class or the laboratory.
- TAPING/RECORDING OF THE LECTURE: You are encouraged to take good notes, reflecting your interpretation and understanding of the lecture. However, you are not permitted to make verbatim recording or transcription of the lecture.
- ATTENDANCE: The material in the lectures is essential for understaning the subject. Although there is no formal eforcement of attendance, due to the size of the class your absence will be clearly apparent to me. Be prepared to explain and justify your absence to me.
- CELL PHONES AND THE LIKE: Cell phones are great technology and it is great to have one with you for emergency. (Campus police: 815-753-1212). However, please, turn off your phones and other noise-making devices as a courtesy to others, and do not distract yourself by reading and sending text messages.

Additional syllabus material and class updated information can be found on the web: http://www.vanysek.com/electrochem/2007_spring.htm

TENTATIVE LABORATORY EXPERIMENTS

	EXPERIMENT	Dates to be determined, but starting Jan. 24
1.	Introduction to operational amplifiers	
2.	Flame atomic absorption of cadmium	
3.	UV-VIS spectrophotometry	24 Jan.
4.	Fluorescence spectrometry	
5.	Infrared spectrometry	
6.	Redox titration	
7.	Ion selective electrodes	
8.	Amperometric titration	
9.	Cyclic voltammetry	
10.	Rotated disk electrode	
11.	Electrochemical impedance	
12.	Demonstrations: Matrix assisted laser desorption ionization mass spectrometry Inductively coupled plasma atomic emission spectrometry Inductively coupled plasma mass spectrometry	

Material needed: Your textbook, handouts, bound a page-numbered laboratory notebook. The TA will specify protective gear and any other safety related matters. Necessary handouts will be available in class before the laboratory. They will be also available on the web: http://www.vanysek.com/electrochem/2007_spring.htm
For writing the laboratory reports consult the specific handout.
The experiment is completed by submitting a laboratory report to the teaching assistant. Laboratory reports are due on Thursday at 5:00 P.M. the week following the week during which the laboratory work is supposed to be finished. The experiment, which would be due during the spring break, is due one week later. No exceptions! Note though, that groups may be assigned to two separate experiments on a particular day another experiment, different from the scheduled experiment may be performed on a particular day. This will of course change the lab numbers which will be due, but not the due date. There is a late penalty of two points for each day the report is late.
Each laboratory report is worth 20 points. You have to finish all the 12 laboratories to pass. The quality of your laboratory notebook and timely note taking is worth 40 points. From these points the teaching assistants may subtract demerit points for safety violations, tardiness, sloppiness and other breach of common sense and good manners. There is 280 points total in the labs.

FORMAT FOR LABORATORY REPORTS

(Note that additional requirements and due-dates will be specified by the teaching assistants). Word processed reports are required. The format should be a maximum of 4 pages, according to the following section. Standard font (10 or 12 pitch, 12 is preferred) and single spacing should be used. The page format limit cannot be achieved by judicious adjustment of font sizes and margins.

Section I **NAME**. Give your name, date(s) the experiment was performed and the date submitted, course number (CHEM425), section (day of the week), full name of the TA

in charge, name of partners, if you were split into groups.

Section II **TITLE**. Experiment title and number (from the syllabus), identification number of the unknown and what concentration was determined for the unknown (with units and standard deviation).

Section III **OBJECTIVE**. Give a brief statement of the problem or experiment. State the parameter(s) to be determined.

Section IV **METHOD**. Describe the method to be used and the basic principle of the method. Write in your words a brief synopsis of the experiment, following the handout, but omit procedural details unless there is a difference from those given.

Section V **CALCULATIONS**. Write all the calculations in a neat way here. Write first a general formula, using formal variables. Define the variables. Only then show a numerical calculation. (If particular tricky equation is used you may insert it by hand. However, learning how to do it on a word processor is a skill that will take you long way).

Section VI **DATA**. Set the table conveniently to record all obtained data.

Section VII **RESULTS & ERROR**. Write the results from section V here. Remember to identify the unknown sample by its number or letter.

Section VIII **GRAPHS, DISCUSSIONS, QUESTIONS, PROBLEMS**. Report what you have learned, provide interpretation of the results. Compare with literature values of expected values. Point out accuracy and precision, possible sources of error, unusual aspects encountered and their possible effects on results, advantages and disadvantages (or limitations) of the technique, ideas for further work. Include here also answers to specific questions and exercises posed in the instructions that accompanied the assignment. This is where a graph imported into the wordprocessor should fit.

From the report itself, the significance as well as the eventual use of the data should be clear to a knowledgeable reader who has not read the experimental procedure. A good two-step test is: 1) Do the plots and tables stand alone? Are all the units and their symbols included (use **SI units**) and do the titles clearly state the data contained? As an example, scan an issue of *Analytical Chemistry*. 2) Does the text adequately explain the data and point out important values? Is the language correct?

Adherence to the above requirements as well as neatness and legibility of the work will be graded in addition to the correct value of unknown and sound discussion of results. Some of common errors include omission of units, reporting in wrong units (Do not forget any dilution you may have done. Typically, if an unknown is issued in a volumetric flask, report concentration when diluted to the mark.), omission of standard deviation (Make enough experiments to be able to calculate it!), too few or too many (usually) significant figures and careless graphs.

Printed 23 January 2007