Revised Syllabus for Chem 222 – Fall 2002
Introduction to Analytical Chemistry

August 22, 2002

Instructor: Prof. R. P. Burns, office: 5405 SES (Office Hours: 1:30 – 2:30 PM)
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Course Information on the Internet:
This Document: www.chem.uic.edu/chem222/syllabus
Lab Schedule: www.chem.uic.edu/chem222/labschedule
Due Dates for Lab Reports: www.chem.uic.edu/chem222/labduedates
Other Information: www.chem.uic.edu/chem222/ToBeAnnounced

LECTURE: 12:00-1:05, TR B1 LC

COURSE MATERIALS
Laboratory: You are also required to purchase a BOUND laboratory notebook and splash goggles.

ABOUT THE COURSE: GOALS, COMPONENTS & GRADING
Goals. Chemistry 222 is an introduction to the principles and practices of analytical chemistry. Analytical chemistry is often called by the more descriptive name "quantitative analysis." The focus of this course is the separation and analysis of chemical substances. Analysis means both identifying chemical substances and determining their amounts. The laboratory portion of the course is balanced by an in-depth review of general chemistry principles (equilibrium and stoichiometry) as applied to the problem of separating and quantifying substances from mixtures and compounds. You are graded on the accuracy of your laboratory results. Many of the experimental methods used are very accurate: you will receive a good lab grade if you are able to achieve this accuracy in your results: you won’t get a good lab grade if your answers are not accurate.

Homework and Group Problems in Lecture. Homework will be regularly assigned in class, but will not be graded or collected. The exams will cover material from the lecture, homework, and laboratory work. Group problems will occasionally be given in lecture to allow you to practice problem solving. However, you will not be graded on your group problem solving.

Grading Policy. Your final grade in this class is a simple average using the following weights:

<table>
<thead>
<tr>
<th>50% lab reports</th>
<th>All lab reports are weighted equally.</th>
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<tbody>
<tr>
<td>50% quizzes &amp; exams</td>
<td>Several (10-15 min) quizzes will be given in lecture (10% of course grade). Quizzes will be announced at least 1 lecture in advance. There is one mid-term exam (15% of course grade) and a final hour exam (25% of course grade). Only pencils, pens, and calculators are allowed. All exams are closed book, but I will typically allow you one index card of notes for each exam. No notes are allowed for the quizzes. I reserve the right to reject the use of any hand-held computers, cell phones, and any other electronic devices during exams: see me if you have questions about your own device.</td>
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The following considerations are used in determining your grade:

1) There is no curve for this course. Your final letter grade is determined directly from your total score for the semester. I may relax this grading standard, but I will not make it more difficult than cited below!

   \[ \begin{align*}
   \geq 90 & \rightarrow A \\
   \geq 60 & \rightarrow D \\
   \geq 80 & \rightarrow B < 50 \\
   \geq 70 & \rightarrow C
   \end{align*} \]

2) Furthermore, to pass this course
   - You must get a weighted average of at least 50% on the exams and quizzes. Use this formula to calculate your weighted average:
   \[ 2 \times [0.10 \times \text{quiz average} + 0.15 \times \text{midterm exam} + 0.25 \times \text{final exam}] \geq 50. \]
   Most people who fail this course semester do so on the basis of their low exam grades.
   - You may not miss more than two labs. Missed labs will count as zeros.
   - You must hand in all lab reports for experiments completed, even if you could not analyze your data.
   - Missed quizzes, exams, and labs will be given zeros unless I excuse you personally. There are no makeup quizzes or exams. If you have a valid & verifiable excuse to miss the midterm exam, your final exam grade will be used to calculate your midterm grade.

3) Academic dishonesty will not be tolerated. A zero grade will be given for any part of the course in which academic dishonesty is involved.
TEACHING ASSISTANT (TA) RESPONSIBILITIES

1. Your TA will briefly describe the experimental and analysis details at the beginning of every lab period during which a new lab is begun. Each student must still read the manual and understand the experiment before coming to lab.
2. Each TA will set up one office hour per week, at a time that a majority of students in that section are free.
3. Your TA is available during their office hour or by appointment to help you with both lab reports and homework.

LABORATORY NOTES

The Lab Notebook. Scientists keep careful records of their experiments, including observations, data, and comments on what worked and what didn’t work. For this course, you must purchase and use a bound laboratory notebook (i.e., a composition book) and organize it in such a way that anyone could easily follow your progress through the assigned experiments. Your lab notebook must be recorded in blue or black ink and should contain:

1. A Table of Contents.
4. Corrections to items in your notebook must be made by drawing a single horizontal line through the items to be corrected.
5. Write on and number only the right facing page, keeping the back facing page blank for scratch work.
6. Use correct English grammar and spelling throughout.
7. Final analysis of your data and your final results, clearly written in blue or black ink.
8. You must prepare your lab notebook before you start each experiment as follows:
   a. Describe the experiment to be performed. You can write this description in your own words and/or use a Xerox copy of the description of the experiment. In addition, a flow chart for the experiment is required.
   b. Outline the calculations you will use to convert the experimental data to the answers required on the lab cover sheet provided by your TA.
   c. Your notebook will be checked by your TA before you start your experiment. If your notebook is not properly prepared, you may not start your experiment.
9. All plots, computer-generated material and Xerox copies should be neatly glued, taped, or stapled into the notebook. All fitting of data to straight lines must be done by linear least squares analysis. Numerical values for the slope and intercept must be given and errors in the slope and intercept as well as the correlation coefficient must be included.
10. Your final lab grade will include a grade for your lab notebook as well as for lab etiquette. Etiquette includes arriving on time for the lab session, proper use of the balance as well as other lab equipment, the development of good lab techniques, and finally leaving the lab space clean and ordered.

Your TA must sign your data pages on the day the data is recorded.

Lab Report Procedure. Do not hand in your lab notebook to the TA until the end of the term. Lab reports will have the following information in them:

1. Cover sheet with the final results and a statement of what you measured (i.e., Nicotine in unknown tobacco sample # _____) unknown number, average value of your determinations, and both absolute and relative standard deviations. YOU WILL RECEIVE A COVER SHEET FROM YOUR TA ON WHICH TO RECORD YOUR LAB RESULTS.
2. Xerox copy of the experiment description you placed in your notebook before the start of the experiment.
3. Xerox (or carbon) copies of the signed data pages you recorded in lab. Do not recopy these for neatness.
4. Analysis section showing at least example calculations, as well as graphs, etc.

Lab Report Due Dates. See the "lab due dates" sheet or the Internet for actual due dates. Revisions to the schedule will only be posted on the Internet. Hand in reports to your own TA during the lab session. If you cannot complete a lab, but have collected some data on it, then your TA should make a note to this effect on your lab report and you will receive some credit for your effort (~30%). Please note that your lab notebook must contain data for all assigned experiments.

Late Lab Reports. Reports handed in late will only be considered under very special circumstances and must be approved beforehand by Prof. Burns. You will be penalized 10% for each day a lab report is late. Reports later than one week will not be accepted (instead, you will receive a 0 grade).

Makeup Labs. You will not be permitted to makeup a missed lab later than one week past the due date. You may not work in laboratory sections other than your own: this is departmental policy and there will be no exceptions.
## Tentative Outline and Fixed Exam Schedule.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture: Chapter in Text (Tentative)</th>
<th>Lab (MW and TR) (Time for experiment may change)</th>
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</thead>
<tbody>
<tr>
<td><strong>1:</strong> 8/27</td>
<td>8/2</td>
<td><strong>Review 1 &amp; 2</strong>&lt;br&gt;3: Experimental Error</td>
</tr>
<tr>
<td><strong>2:</strong> 9/3</td>
<td>9/5</td>
<td><strong>4: Statistics</strong>&lt;br&gt;4: Statistics &amp; 5: Calib. Methods</td>
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<tr>
<td><strong>3:</strong> 9/10</td>
<td>9/12</td>
<td><strong>6: Chemical Equilibria</strong>&lt;br&gt;6: Chemical Equilibria</td>
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<tr>
<td><strong>4:</strong> 9/17</td>
<td>9/19</td>
<td><strong>7: Titrations</strong>&lt;br&gt;7: Titrations</td>
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<tr>
<td><strong>5:</strong> 9/24</td>
<td>9/26</td>
<td><strong>13: basics of EDTA Titrations</strong>&lt;br&gt;16: Redox Titrations</td>
</tr>
<tr>
<td><strong>6:</strong> 10/1</td>
<td>10/3</td>
<td><strong>16: Redox Titrations</strong>&lt;br&gt;15: basics of Ion Selective Electrodes</td>
</tr>
<tr>
<td><strong>7:</strong> 10/8</td>
<td>10/10</td>
<td><strong>19: Basics of Spectrophotometry</strong>&lt;br&gt;19: Basics of Spectrophotometry</td>
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<tr>
<td><strong>8:</strong> 10/15</td>
<td>10/17</td>
<td><strong>10: Monoprotic Acid-Base Eq.</strong>&lt;br&gt;10: Monoprotic Acid-Base Eq.</td>
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<tr>
<td><strong>9:</strong> 10/22</td>
<td>10/24</td>
<td>Review&lt;br&gt;Exam 1</td>
</tr>
<tr>
<td><strong>10:</strong> 10/29</td>
<td>10/31</td>
<td><strong>11: Polyprotic Acid-base Eq</strong>&lt;br&gt;11: Cont.</td>
</tr>
<tr>
<td><strong>11:</strong> 11/5</td>
<td>11/7</td>
<td><strong>12: Acid-Base Titrations</strong>&lt;br&gt;More on EDTA Titrations</td>
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<tr>
<td><strong>12:</strong> 11/12</td>
<td>11/14</td>
<td><strong>14: Electrochemistry</strong>&lt;br&gt;14: Electrochemistry</td>
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<tr>
<td><strong>13:</strong> 11/19</td>
<td>11/21</td>
<td><strong>15: Electrodes and Potentiometry</strong>&lt;br&gt;15: Electrodes and Potentiometry</td>
</tr>
<tr>
<td><strong>14:</strong> 11/26</td>
<td>11/28</td>
<td><strong>To be announced</strong>&lt;br&gt;Thanksgiving holiday, no classes</td>
</tr>
<tr>
<td><strong>15:</strong> 12/3</td>
<td>12/5</td>
<td><strong>To be announced</strong>&lt;br&gt;Review</td>
</tr>
<tr>
<td><strong>12/13</strong></td>
<td></td>
<td><strong>Final Exam, Friday, 10:30 – 12:30</strong></td>
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