

CHM 3105 – INTRO. TO CHEMICAL RESEARCH TECHNIQUES – Spring 2011 Syllabus

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- Pre/Corequisites:** One of the following: Chemistry 1032 (C072), 1042 (C082) or 1952 (H092) as well as one of the following: Chemistry 1034 (C074), 1044 (C084), or 1954 (H094). Math 1042 (0086). Co-Requisite: Chemistry 3103 (0215).
- Course Description:** Introduction to the application of instrumental analytical methods, with particular emphasis on equilibria and acid-base techniques. Written scientific reports will require a quantitative analysis of collected data, including statistics and error analyses.
- Attendance:** Attendance is mandatory. There will be NO make-up labs. Missing a lab will result in a zero for the experiment. You are expected to come to lab fully prepared – prelab written in notebook, amounts of reagents listed, calculator and safety glasses on hand. This is not your first lab course. We should not have to remind you about the basics, nor should we have to tolerate unprepared students. As such, those who come unprepared will be dismissed and receive a zero score for the day.
- Grading:** Each assignment or lab is worth 100 points: 15% Notebook, 15% Lab Technique, and 70% Lab Report. Course grades will be based on a standard curve of >95% A, >90% A-, >87% B+, etc. Lab reports are due at the start of the following period. Late reports will lose 10 points per day (even if it is 5 minutes late, you will lose 10 points).
- Lab Technique:** Your use of the proper laboratory techniques will be monitored for every experiment and will be reflected in your grade. The technique grade for the entire class will suffer if cleanliness of common areas is not maintained throughout the experiment.
- Notebook:** A record of every experiment performed in the lab must be kept in your laboratory notebook. The laboratory notebook will be signed by your instructor at the end of each lab session and a copy of the pertinent pages should be attached to your lab report. Specifics of the laboratory notebook will be explained on check-in day.
- Lab Report:** The outline is typical for reports in analytical chemistry, but the report's depth should be greater in this advanced course.

| Name | Title of Experiment |
|---|--------------------------------|
| Date of Experiment | Unknown Number (if applicable) |
| Date of Report | |
| <p>Purpose: One or two sentences stating purpose of experiment and how the purpose was accomplished <i>(Procedure: Usually the procedure is included in the report. However, in this course the procedure is placed in the laboratory notebook and is not repeated in the report.)</i></p> <p>Sample Calculations: This section consists of a single sample calculation for each process in the experiment. If replicate determinations of the same quantity are performed, only one sample calculation should appear for that determination. In the sample calculation all units and mole conversions are clearly shown. Calibrated glassware volumes are used whenever available. An extra significant figure is carried through intermediate calculations and the final result is rounded according to the usual rules.</p> <p>Data and Results: The necessary raw data and calculated results for each replicate determination are presented here in tabular form. A properly constructed data table has the following features:</p> <ol style="list-style-type: none"> 1) The table has a title 2) It contains all data necessary for to verify calculations 3) Data which is common to all measurements (e.g., concentration of NaOH) is presented only once. 4) Each column is labeled with the name of the variable and the units in parentheses 5) The average calculated result and pertinent statistical information are presented at the bottom <p>Conclusion: Here the results of the experiment are concisely summarized and the sources of random and systematic error are discussed. Any questions or discussions that are listed in the Experimental Write-up are to be address.</p> | |

Course Schedule:

| Week | | M | T | W | R | F | |
|-------|-----|----|----|----|----|----|--|
| 1 | Jan | 17 | 18 | 19 | 20 | 3 | 1 - Lecture, Homework and Check-in |
| 2 | | 24 | 25 | 26 | 27 | 10 | 2 - Statistics Computer Assignment |
| 3 | Feb | 31 | 1 | 2 | 3 | 17 | 3 - Preparing and Standardizing NaOH |
| 4 | | 7 | 8 | 9 | 10 | 24 | 4 - Preparing and Standardizing Acetic Acid |
| 5 | | 14 | 15 | 16 | 17 | 1 | 5 - Determination of unknown acid concentration |
| 6 | | 21 | 22 | 23 | 24 | 8 | 6 - Following Titrations with pH Electrode |
| 7 | Mar | 28 | 1 | 2 | 3 | 15 | 7 - Preparation and Behavior of Buffer Solutions |
| Break | | 7 | 8 | 9 | 10 | 22 | S P R I N G B R E A K |
| 8 | | 14 | 15 | 16 | 17 | 29 | 8 - Titration Calculations & Simulations |
| 9 | | 21 | 22 | 23 | 24 | 5 | 9 - Spectrophotometric Determination of Fe |
| 10 | | 28 | 29 | 30 | 31 | 12 | 10 - Spectrophotometric Determination of glucose |
| 11 | Apr | 4 | 5 | 6 | 7 | 19 | 11 - Determination of pKa of Bromothymol Blue |
| 12 | | 11 | 12 | 13 | 14 | 26 | 12 - GC analysis of hydrocarbons |
| 13 | | 18 | 19 | 20 | 21 | 3 | Lab Final |
| 14 | | 25 | 26 | 27 | 28 | 10 | Check Out |
| 15 | May | 2 | 3 | 4 | 5 | | |