INTRODUCTION TO CHEMICAL ANALYSIS I
(CHEM207)
Syllabus for Summer Semester
University of Louisville

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Lab Schedule: Group 1. Monday and Wednesday. 2 to 6 pm.
Group 2. Tuesday and Thursday. 2 to 6 pm.
Required Textbook: An Introduction to Chemical Analysis I

COURSE DESCRIPTION and OBJECTIVES:
Chem207 is an introductory course in analytical chemistry that is designed to introduce fundamental laboratory procedures from an analytical chemistry perspective and to loosely tie into principles taught in Chem 201/202. The Lab consists of a one-hour lecture and a three-hour laboratory per week. The lecture is presented by the course instructor. The purpose of the lecture is to introduce important concepts and techniques necessary for successful understanding and execution of experiments performed in the laboratory. **Therefore, lecture attendance is expected; and success in the course is unlikely without it.**
A schedule of laboratory experiments is included in the syllabus. You must read each experimental procedure **BEFORE** your lab session, and a set of pre-lab questions must be answered prior to beginning the experiment. Make sure you (1) know the purpose of the experiment, (2) understand the concepts and procedures to be conducted, and (3) are aware of any safety concerns and special waste disposal requirements. You must be familiar with and abide by all safety procedures posted in the lab room and detailed in the laboratory manual. Proper clothing and eye protection (approved safety glasses or goggles) are required at all times; **students will not be admitted to the lab if clothing and eye protection requirements are not met!**

EXPERIMENT TOPICS:
1. Determination of the density of water and statistical treatment of data.
In this experiment you will refresh your skills in pipeting and weighing and you will learn about the relevance of statistical treatment of data. You will perform two determinations of the density of water at room temperature; analyze the data obtained by all the students in your lab section by obtaining the mean, the average, and the standard deviation of the data set; and establish the accuracy of the determinations by comparing the class results to the true density values published in scientific literature.

2. Proper use of laboratory glassware and preparation of solutions
This experiment is designed as your first introduction to very accurate and precise analysis. You need to work with the highest precision of which you are capable. You are going to prepare 250

mL of 2.5 x 10-3 M potassium ferricyanide solution by weighing the correct amount of potassium ferricyanide and quantitatively transferring it to a 250 mL volumetric flask. Once the potassium ferricyanide is dissolved and the flask filled to the mark, you will accurately dilute this solution to 2.5 x 10-3 M.

3. Construction of calibration curves and preparation of standard solutions

This experiment involves the construction of a calibration curve. In addition, you will be required to prepare the needed "standard" solutions from a stock solution that is provided. In this experiment the analytical signal measured is absorbance (A). According to Beer's law, A is linearly related to the sample concentration, $A = \varepsilon\, b\, c$. Thus a graph of A vs c should yield a linear curve. Due to random and systematic errors, the experimental values do not follow exactly this relationship. Therefore, we need to estimate the best linear fit to our data using a statistical technique called regression analysis.

4. Acid-base titration – potassium hydrogen phthalate

In this experiment, the unknown will consist of a white, water-soluble powder which will be titrated with NaOH in order to determine the % KHP in it. The experiment consists of three principal steps. First, the NaOH solution to be used as titrant is obtained from the TA and diluted to approximately 0.1 M. Second, the exact concentration of the NaOH solution is determined by titrating it against a known amount of a pure KHP standard. Last, the just standardized NaOH solution is used to titrate the unknown sample.

TEXT:

Required - An Introduction to Chemical Analysis I

Recommended – General Chemistry: A Molecular Approach, 2nd Ed by Nivaldo Tro. Pearson Education ISBN: 0321809246 (Chem 201-202 textbook)

CALCULATOR:

A simple calculator is necessary for completion of the laboratory reports and the lecture exam. It must be capable of simple scientific functions including scientific notation, squares/square roots, logarithms, and inverse logarithms.

SAFETY:

- Safety is of most importance in any chemistry lab. It is required that each student should take the safety quiz and sign it before come to the first lab. **You will not be allowed to enter the lab if you did not take the safety quiz, which will result a score of zero for your first lab.**
- Always read each experiment's procedures before coming to lab, complete the Pre-Lab questions, and follow directions carefully. If you are unsure of any aspect of an experiment, **ask your Instructor!**
- Also, remember that **SHORTS**, **SHORT DRESSES**, and **SANDALS** are **NOT ACCEPTABLE** attire in the lab as they do not provide adequate leg and foot protection from accidental spills.

- **EYE PROTECTION MUST BE WORN IN THE LAB AT ALL TIMES.** Approved safety
- **Nothing is to be disposed of in the sink!** Follow your Instructor instructions on waste disposal for each experiment. **Most waste solutions should be disposed of in the waste containers provided and not down the sinks!**

GRADING:

Your grade will be based upon your performance on weekly experiments (including cleanliness). The lab report includes the pre-lab questions and the actual lab report, both of which can be found in the laboratory manual.

Item	Number	Points Each	Total Points
Lab Reports	4	100	400
		Grand Total	400

Final letter grades will be based on the point totals shown below:

Letter Grade	Total Points
A	400-320 (90-100%)
B	319-240 (80-90%)
C	239-260 (70-80%)
D	259-180 (60-70%)
F	< 179 (< 50%)

LAB POLICY:

- The pre-lab question sheet must be completed by each student and approved by the Instructor at the beginning of the lab before the student will be allowed to begin the scheduled experiment.
- **If you arrive more than 5 min late to lab**, you will not be allowed to perform your experiment and will receive a score of zero for that lab.
- After you finished your experiment, it is your responsibility to ask your Instructor to sign on your raw experiment data sheet. **Forgetting to ask for your Instructor's signature or forgetting to attach the Instructor-signed data sheet to your lab report will result a score of zero for that lab.**
- All students, regardless of whether continuing in the next course or not, MUST check out and replace any lost or broken glassware during the final week of the course. You will receive an 'EF' grade for this class if you do not complete checkout process during the schedule time.

LAB REPORT POLICY:

- Lab reports are due one day after the experiment is performed. Lab reports that are turned in late will receive a 10 points deduction per day. You will receive a score of zero if your lab report is turned in late more than a week after the experiment.
- **If you do not turn in a report at all, you will receive an automatic 'F' for the course**. Therefore, even if you are more than one week late, you still are required to turn the report in (as a zero) to receive a grade for the course.
- If a lab report has points deducted due to errors in calculations, a student is allowed to correct it and return it to the instructor. This must be done within one business day after the receiving the graded report from the instructor. The original lab report must be attached to the corrected report, or there will be no credit given for the corrections. The maximum possible grade for such a "re-calculated report" will be **85 points**.

CHEM 207 LECTURE AND LABORATORY SCHEDULE

SUMMER

Lecture: The week before the lab starts a lecture of all experiments is going to be given. And the day of the lab the lecture is going to be repeated.

Class	Lab-Experiment
1	1. - Determination of the density of water and Statistical treatment of data Statistical Analysis Molarity/Dilutions
2	2. Proper use of laboratory glassware and Preparation of solutions. Preparation of Stock and Dilute Solutions. Spectrophotometry Beer's Law
3	3. Construction of calibration curves and Preparation of standard solutions.
4	4. Acid-base titration – potassium hydrogen Phthalate

Lab reports due: Last Friday of class