LABORATORY SYLLABUS

**CHEMISTRY 6614: PRINCIPLES OF CHEMICAL INSTRUMENTATION**

**Spring 2018**

**Instructor Dr Jerry Fong Physical and Health Sciences Bldg room 305 (office) room 321 (lab)**

**587-3692 (e-mail: FONGJD@alfredstate.edu)**

**U-Tube team production (50 lecture pts)**

**Each team will be assigned** **an instrument for which they will produce a short U-Tube clip demonstrating how to use the assigned instrument.**

**Grading** Labs #1-3, 4b, 5,8, 10b =50 points each

Lab ##6,7,9, 10a,10b =20 points each

Practicum evaluation 50 pts

Final unknown 100 pts

Total Lab points 600 pts (🡪 40% of course)

**Lab Documents: All labs and related documents are found under Labs at the course website:** [**https://web.alfredstate.edu/fongjd/ChemInstr.htm**](https://web.alfredstate.edu/fongjd/ChemInstr.htm)

**Lab Notebooks & Data Collection**

Everything goes into your lab book. There will be no other site or source of reportage. Hence, all spectra, graphs and other raw data must be annotated and attached within the confines of the lab book. Follow the basic protocols already established in Chem Principles or General Chem lab. This means you are required to number, date and sign each page, although no requirement for a countersignature will be necessary.

***Evaluation of Labs:***

You will be given a week to complete each lab write-up. Notebooks are to be submitted at **the end** of specified lab periods (Thursday) and will be returned no later than the following Monday, unless otherwise announced. I will NOT accept late labs. In the real world, lateness gets you fired. Here, it earns you a zero.

A rubric accompanies each lab. About 50% of the lab grade for each report will depend on you getting the `right’ or near right answer. The other 50% will be determined by the evident care, intelligence and organization put into the lab write-up itself. A **Sample Lab** based on a real experiment is found at the course website under ‘Labs’ for your guidance. A complete graded lab book by a former student is also available .

# Guidelines for Lab Report

A) Follow the basic structure below:

1. ***Purpose***
2. ***Methods & Procedures***
3. ***Data & Observations***
4. ***Calculations***
5. ***Conclusions & Results***

***Note that the each lab handout also provides guidance on the details of what to put in. FOLLOW THE DIRECTIONS.***

***The idea here is to emulate the ASTM Handbook’s philosophy of spelling out the details and assuming the analyst has to the wit to figure out what’s going on.***

B) In writing up each of these sections, assume that the reader will have to reproduce your work entirely from what you have written, with no other explanations or help from external sources.

C) Write up the majority of your lab book while in the laboratory actually doing the work. The key to good lab work is not in the mechanical `doing of the lab, but in the insight, contemplation and organization underlying the `doing’. Writing and reflecting in your notebook as you are carrying out your experiments trains you to contemplate, organize and most importantly, THINK about what you are doing. You should really only write up your ***Calculations*** & ***Conclusions*** outside of the lab. It should also be noted that the instructor detests step-by-step procedural text. Your method should be clear enough in paragraph form to allow anyone to figure out a sensible procedure without having to follow a list. Most importantly, LABEL every section and table with appropriate AND DETAILED HEADINGS and section TITLES. An untitled section or table is worthless. Include units and define column and rows of tables where needed.

Use clear English ! The instructor equates quality of writing with quality of thinking . Use complete sentences to express your meaning succinctly and clearly. If you are unsure what is meant by `clear’ and `succinct’ borrow, buy or steal a copy of Strunk and White’s “Elements of Style” and commit chapter 5 to your permanent memory. I will return reports using abysmal English without comment and without grade. You will have 1 day to fix the English or receive a **0** for that lab.

**Lab Protocol**

1. The instructor **detests** disorder in the laboratory. The entire class will be reduced ½ letter grade for the lab if it is left a mess. If an instrument is found inoperable without report, the entire class will lose that week’s lab. If you plan to be a professional laboratory scientist, you all need to act like one in the lab.
2. Report any and all problems involving chemical spills, instrument failures or breakage to the instructor.
3. If you wish to spend extra time in the lab, you must arrange it with the instructor. **You are strongly urged to do so whenever you can. There is no substitute for time, patience and immersion when learning how to work effectively in a chemical lab.** Also, since only 1 or 2 copies of each instrument are available, you may need to come in when the instruments are free, which might be outside of the scheduled lab time,

**4)** Frivolous, un-sanctioned and irresponsible behavior within the lab will be grounds for permanent ejection from the class.

**Specialists**

Each student will be randomly assigned one of 6 major instrumental methods covered during the course. He/she will be charged with becoming especially expert on that method, e.g. a specialist. The instructor will spend one-on-one instruction time with these students well before their individual method is to be covered in class so that they have prior exposure to the method before it is covered in class. Specialists will be required to do the reading and focus on their assigned method well in advance of its presentation in class, and, will serve as teaching assistants when their particular instrument occurs in the rotation. In particular, they will be charged with introducing the method to their lab class. Since each instrument will have several specialist you will need to collaborate on the presentation. Failure to participate will result in a loss of 50 points.

**LAB SCHEDULE: PRINCIPLES OF CHEMICAL INSTRUMENTATION I Spring 2018**

**Week Date Lab/Topic (subject to change) Lab Notebook Due Date**

82 1 Feb Lab #1 Preparation of molar and standard addition 8 Feb

Cu and Ni solutions

3 8 Feb Lab #2: UV-Vis Analysis of an Unknown 15 Feb

Cu2+ + Ni2+ mixture

4 15 Feb Lab #3: AAS Standard Addition Analysis 22 Feb of an Unknown Cu2+ + Ni2+ Mixture

5 22 Feb Lab #4a FTIR band analysis 1 Mar

6 1 Mar Lab #4b Environmental Sleuthing 8 Mar

7 8 Mar Lab #5: IR/GC analysis of an unknown mixture 22 Mar (post break)

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**8 10 Mar-18 Mar Spring Break**

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9 22 Mar Lab #6: HPLC analysis of standard mixture for 29 Mar

Detection limits (dry demo lab)

10 29 Mar Lab #7: Introduction to MS: Analysis of single 5 April

Unknown fragmentation pattern

11 5 April Lab #8 GC/MS Drug Bust scenario: 12 April

12 12 April Lab #9: Glass Blowing  **pieces due 19 April**

13 19 April Lab#10a: Koehler Illumination 10a: by appt 4/20-4/27

Lab #10b: chemical microscopy 10b: 26 April

14 26 April Practicum Oral Evaluation 10 min/student (scheduled)

( random assignment)

26 April Final Unknown Assignment Due No later than time of

Chem 6614 Final

(Answer only + oral)