LABORATORY SYLLABUS

**CHEMISTRY 6614: PRINCIPLES OF CHEMICAL INSTRUMENTATION**

**Spring 2014**

**Instructor Dr Jerry Fong Physical and Health Sciences Bldg room 305 (office) room 320 (lab)**

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

**Grading** Labs #1-3, 4b, 5-8, 9b 30 points each

 Lab 4a, 9a 15 pts each

 Practicum evaluation 50 pts

Final unknown 100 pts

Total 450 pts (45% of course grade)

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

About 60% of the lab grade for each report will depend on you getting the `right’ or near right answer. The other 40% will be determined by the evident care, intelligence and organization put into the lab write-up itself. The latter evaluation is essentially a qualitative judgement made by the instructor based on his experience as laboratory scientist over 3 decades. A **Sample Lab** based on a real experiment is attached for your guidance.

***Housekeeping:***

You are collectively responsible for keeping the lab space you use clean. If the lab is left in a wreck the instructor deduct significantly from the entire class’s lab reports for that period. 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.

# Guidelines

A) Follow the basic structure below: (see also: ***model lab report example)***

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 STM 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. Be careful to include units and define column and rows of tables where needed.

1. 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. The short version of that chapter is captured by the words of Dragnet’s Sergeant Joe Friday: “Just the facts Ma’am, just the facts.” I will return reports using poor 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. If he finds the lab left I disarray the entire class will be reduced ½ letter grade for 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.

**LAB SCHEDULE: PRINCIPLES OF CHEMICAL INSTRUMENTATION I Sprint 2014**

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

1 23 Jan Lab #1 Preparation of molar and standard addition 30 Jan

 Cu and Ni solutions

2 30 Jan Lab #2: UV-Vis Analysis of an Unknown 6 Feb

 Cu2+ + Ni2+ mixture

3 6 Feb Lab #3: AAS Standard Addition Analysis 13 Feb of an Unknown Cu2+ + Ni2+ Mixture

4 13 Feb Lab #4a FTIR band analysis 20 Feb

5 20 Feb Lab #4b Environmental Sleuthing 27 Feb

6 27 Feb Lab #5: IR/GC analysis of an unknown mixture 6 March

7 6 Mar Lab #6: HPLC analysis of standard mixture for 13 Mar

 Detection limits

8 13 Mar Lab #7: Introduction to MS: Analysis of single 27 March

Unknown fragmentation pattern (post Spring-break)

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**9 15 Mar-23 Mar Spring Break**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

10 27 Mar Make-up/Catch-up lab ***lab #7 due***

11 3 April Lab #8 GC/MS Drug Bust scenario: 10 April

12 10 April Lab #9: Glass Blowing  **pieces due 24 April**

13 17 April Lab#10a: Koehler Illumination 9a: by apt 4/17-4/23

 Lab #10b: chemical microscopy 9b: 24 April

14 24 April Practicum Oral Evaluation 15 min/student (scheduled)

 ( random assignment)

15-16 1 May, 8 May Final Unknown Due no later than Wed 14 May

 (Finals week)