Chemistry 4240
Analysis Lab
Spring 2012

Instructor: Dr. Kim Weaver
Office: Science Building Room 216
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Class Schedule: WF 2:00-4:50 p.m. Room 224
Office Hours: Monday Tuesday and Wednesday 10:20a.m.-12:00 p.m. Consultation is also available by appointment. You may also drop by my office at anytime. If I have time, I will be glad to help.

Catalog Course Description: CHEM 4240- Principles and practices of analytical lab work including quality assurance, gravimetric, volumetric, and instrumental techniques, raw data conversion, and proper reporting techniques. Six hours lab per week

Prerequisites: CHEM 4230 or permission of the instructor.

Required Text: SUU Chemistry 4240 Laboratory Manual, Kim Weaver 2012 edition
Hard bound laboratory notebook

Course Objective:

General:
1) To become acquainted with classical analytical methods and compare these methods to instrumental methods. 2) To better understand the principles behind instrumental and classical methods.

Specific:

1) Be able to run the following instrumentation:
    a. UV visible spectrophotometer,
    b. Hitachi 1200 R NMR,
    c. Dionex DX 120 ion chromatograph,
    d. Gas chromatograph instrumentation.
    e. Varian Gemini 200 MHz NMR,
    f. Perkin Elmer Spectrum 100 FTIR,
    g. Waters HPLC
    .
2) Be able to accurately perform a titration analysis.
3) Be able to practically apply Beer's Law.
4) Be able to use Analytical Chemistry to solve a real life problem.
5) To be able to communicate the results of your analysis effectively.

Grading Policy: You will be graded on participation, correct results and proper completion of laboratory reports and a laboratory final. Your grade will depend upon the following:

Lab reports
Laboratory Notebook
Accurate analysis of unknowns
Special Assignment
Lab Cleanup/Maintenance
NMR Analysis
Laboratory Final/Scholarship Day Presentation

Final grades will be assigned as follows:

Percentage	Grade
91.5-100	A
88.5-91.5	A-
85.0-88.5	B+
81.5-85.0	B
78.5-81.5	B-
75.0-78.5	C+
71.5-75.0	C
65-71.5	C-
60-65	D+
<60	F

Details

A) Reports

a. Laboratory participation will be a requirement for each laboratory experiment. Sometimes this will be based solely on instructor observation; at other times worksheets will always be required. Participation is worth 10 points per lab when full reports are not required.

b. When laboratory experiments require correct analysis, you will be graded for correct analysis. Correct analysis will be graded as follows.
   Within 5%: 6 points
   Within 10%: 5 points
   Within 20%: 4 points
   Within 30%: 3 points
   Within 40%: 2 points
   Within 50%: 1 point
   The total analysis point score will be prorated to 51 points.

c. Full Laboratory reports will usually be worth 25 points each. (Excluding accuracy points) Laboratory reports are to be typed or

printed on the computer. The format of each laboratory report SHALL be as follows:

I. Introduction: Present the principle of the measurement or the reason for the analysis. (One paragraph)-4 points.
II. Experimental Section: List reagents, glassware and instruments used. In one to two paragraphs explain what you did. -5 points.
III. Results: Tables and graphs should be included in this section. You must have narration with reference to the tables and graphs. (Calibration curves would go into this section)-10 points.
IV. Conclusions. Compare your results. Explain your results-5 points
V. References-1 point. Unless, the instructor tells you, you need to find an outside source for the lab and reference it.

Summary Laboratory Reports will be worth 10 points and be graded on clarity and conciseness.

B) Note book after each experiment: Your notebook must be signed. At the end of the semester, you will turn in your note book and receive 5 points for each signed experiment. **At the top of each notebook page will be the date that the work is performed, and the title of the experiment and the experiment number. All pages should also be numbered sequentially. For each experiment, you must write "page #of ##" on the top each page as well.** With each day of experimentation, you should also write the objective of the day. At the bottom of each page will be the signature of the student and the signature/initials and date signed of the instructor. If the page(s) is not signed, you will only receive 3 points for the work. If the page(s) are signed late you will only receive 4 points. If the format is not followed you will lose another point. If what you write is not clear and complete, you will lose another one to two points.

C) Analysis points

When laboratory experiments require correct analysis, you will be graded for correct analysis. Correct analysis will be graded as follows.

Within 5%: 6 points
Within 10%: 5 points
Within 20%: 4 points
Within 30%: 3 points
Within 40%: 2 points
Within 50%: 1 point

D) A Special Assignment. The class will be expected to use the techniques and instrumentation discussed in this class to solve a real world analytical problem. Each group will be given a special assignment. Although limited

time will be scheduled to work on the lab, it is to your advantage start working on the problem as soon as possible. A more thorough description of requirements will be given separately. The report will be worth 150 points. The points will be assigned as follows:

Quality Controls used	15 points
Earnest effort	20 points
Demonstration of skill with your technology	25 points
Report (Is it concise, Clear and are conclusions proper?)	60 points
Results (Quality of work)	30 points

E) Final: The laboratory final will be worth 100 points. Topics covered on the final will cover principles taught in Chemistry 4230 and 3220 and reinforced in the laboratory classes. I.E. UV spectroscopy is reinforced in the lab, therefore, the spectroscopy principles taught in 4230 would be tested in the final. The final will be held **April 25, 2:00 p.m.**

NMR Analysis: Each student in analysis lab will be trained to use the NMR spectrometer and will be expected to analyze samples for the Organic Chemistry Class. This preparation begins the first day in class when you will be trained how to use the instrument. Then in the next week you will have to NMR Assignments. Tentatively, each student will be expected to analyze 15 samples throughout the semester. Each student will earn 75 points for their work. You are allowed to skip any two labs with prior approval of instructor to complete this task. Not skipping labs is not a substitute for not completing the NMR analysis. These samples must be returned to the Organic lab classes within one week of the organic lab experiment.

F) Lab Clean up/ Maintenance: The students in analysis lab will be required to maintain equipment that they use. This includes cleaning the balances after EVERY lab and helping clean up after every lab. Each group will be required to perform these duties on a rotating basis. A clean up sheet found in your not book must recorded and signed by the instructor. At the end of the semester, these clean up sheets must be handed in. Groups/individuals that don't perform adequately, will have their grade lowered 1/3 of a grade (or more if really severe) at the end of the semester.

Safety goggles: OSHA-approved safety goggles, *not* safety glasses, are *required* for all "wet labs" (i.e., all labs involving more than just pencil, paper, and calculator). You must provide your own safety goggles; they are not supplied for you. Goggles labeled "Z87" are acceptable.

"Always, when hazardous chemicals are used or handled, when glassware is used or handled, all persons present, whether or not they are doing the handling or the using,

must wear eye protection. Ordinary spectacles do not provide protection from chemical splashes; even spectacles with so-called hardened lenses do not provide this kind of protection. Similarly, contact lenses alone are not considered to offer sufficient protection when used without safety goggles. Only safety goggles (also known as chemical splash goggles) as described below [*sic*] and marked with the code "Z87" provide the kind of protection that is needed. The Z87 code refers to a voluntary standard promulgated by the American National Standards Institute called ANSI Z87." (*Chemical Safety for Teachers and Their Supervisors*, published by the American Chemical Society, 2001, pages 5-6.)

The chemical stockroom has a very limited supply of safety goggles for those who forget, however, a charge of $0.50 per use will be enforced, and the student will be responsible for cleaning them both before and after use. Anyone without eye protection will be asked to leave the lab and will receive a zero for the day's lab.

Lab supplies: A lab drawer stocked with glassware and supplies will be checked out to you and your lab partner on the first day of lab. You are responsible for maintaining this glassware throughout the course, and returning it in good condition at the end of the semester. As your lab fee covers only chemicals and general lab maintenance, you will be charged for any losses or breakages you incur. All fees must be paid before you can receive a grade in this class!

Special Policy Statements:

Americans with Disabilities Act: Students with medical, psychological, learning or other disabilities desiring academic adjustments, accommodations or auxiliary aids will need to contact the Southern Utah University Coordinator of Services for Students with Disabilities (SSD), in Room 206F of the Sharwan Smith Center or phone (435) 865-8022. SSD determines eligibility for and authorizes the provision of services.

Honesty Policy: Academic dishonesty will not be tolerated and will be prosecuted to the fullest extent.

Academic Dishonesty includes but is not limited to cheating, fabrication, plagiarism or facilitating dishonesty. Except for cases of major offenses, responding to academic dishonesty is the responsibility of the instructor of the course in which the dishonesty occurs. If a student is guilty of academic dishonesty, the consequences may range from admonition or formal reprimand to dismissal from the class and may include a failing grade for the assignment, exam or course. Other penalties for severe infractions will be dealt with, based on Southern Utah University's Policies and Procedures - 11.2. Student's rights and responsibilities are also detailed in the student handbook

Statement of Risk: As with any activity there is inherent risk associated with travel to and participation in the special activities described in this syllabus and each student should be willing to accept and acknowledge such risk while participating. In addition as

you are required to get environmental samples which will require travel. Remember, travel entails risk.

Emergency Management Statement:
In case of emergency, the University's Emergency Notification System (ENS) will be activated. Students are encouraged to maintain updated contact information using the link on the homepage of the mySUU portal. In addition, students are encouraged to familiarize themselves with the Emergency Response Protocols posted in each classroom. Detailed information about the University's emergency management plan can be found at http://www.suu.edu/ad/facilities/emergency-procedures.html

Late assignments/make up work: You are expected to hand in the required report seven days after the experiment is finished. For every week that a report is late, seven points will be subtracted from a full report and five points for a simple report. When warranted, experiments may be performed at another time with approval of the instructor:

Attendance Policy: *Attendance is required, if you miss a lab or expect to miss a lab because of a proper excuse, you may make-up the lab with special assignments given by the instructor.*

Disclaimer:
Information contained in this syllabus, other than grading, late assignments, makeup work, and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.