CHEMISTRY 128 L – GENERAL CHEMISTRY LABORATORY II
Spring Semester 2009

Course Coordinator: Dr Graeme R. A. Wyllie email: wyllie@cord.edu

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Office Hours: In general, I have no set office hours, if you have questions, it is really just a matter of finding me, if I am not in my office or the Gen Chem lab, I'm frequently found in the department stockroom located next door to the Gen Chem lab. If you are having difficulty getting hold of me or want to set up a time to talk about the lab, either email (preferred) or phone to set up an appointment

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Course Web Site: http://www4.cord.edu/chemistry/wyllie/Chem128L/Chem128L.htm

This page contains links to all pertinent information relating to this course.

COURSE OBJECTIVES

- To introduce the concept of the scientific method and the investigation of practical chemistry problems in a systematic and scientific fashion.
- To encourage critical thinking in the chemistry laboratory including identifying, developing and instituting valid research hypotheses which allow investigation of practical chemistry problems in logical fashion leading to reliable data which can then yield verifiable conclusions.
- To further improve existing laboratory skills and develop new practical skills and abilities necessary for being a successful scientist
- To encourage you to work together in small research groups facilitating exchange of ideas, discussion of experiment design and data analysis and self-management in delegating specific tasks to members of the group. In addition, several projects will be carried out at a section and class level allowing investigation of more complex problems with each group forming a small valuable part of the bigger solution.
- To provide multiple opportunities for you to present data obtained from the experiments in both a written and oral format which will be both instructor and peer evaluated improving skills in both oral communication and writing concise reports.
- Ultimately the objective is to provide a research based experience in which the research groups are presented with the opportunity to carry out investigation of a problem starting from development of a research hypothesis, design and institution of experiments, analysis of data and presentation of conclusions. The data obtained will be form part of a library on this subject which can then be utilized by subsequent classes who will further develop investigation of these problems.

REQUIRED MATERIALS:

Lab Manual: The lab manual is available from the Chemistry Department, either from our office manager Julie Joyce-Smith or Dr Wyllie at the start of the semester. This contains details on the experiments, preparation and notes on other lab procedures such as recording data. This is a new manual, if you find any errors or problems or think something is not explained adequately, if you can let Dr Wyllie know, supplemental information may then be posted on the website and the manual revised for future use.

Lab Notebook: A laboratory notebook is absolutely required. It should be bound, not a spiral notebook, and have sequentially numbered pages. The Chemistry Club and the Chemistry Department sell correctly formatted notebooks which contain numbered pages, table of contents and spaces for recording dates and titles of all experiment write-ups. All laboratory records and observations must be recorded in pen directly into the notebook during lab, not transcribed into the laboratory notebook later from crib notes.
You can continue to use the same lab notebook as was used for 127L, in fact we will refer back to the previous experiments on several occasions.

Safety Glasses/Goggles: Instructor-approved, protective eyewear is a mandatory requirement for this course. You will be expected to bring them to every lab and wear them at all times in the laboratory. Failure to properly wear your glasses/goggles will result in deductions from your lab participation points (see below).

Calculator: It is highly recommended you bring a calculator with you to the lab.

GRADING:

The overall grade for the entire laboratory course is determined from the following formula:

Individual Lab Grades (Expts 1–7)	700 pts (100 per experiment)
Laboratory Final	300 pts
Research Project	1000 points
Total	**2000 points**

For the first half of the semester, weekly experiments are carried out as was the case with 127L. But whereas 127L was designed to introduce basic laboratory skills and tested understanding through regular quizzes, 128L focuses a great deal of the material to improving critical thinking and problem solving skills in order to build a well-rounded scientist. Relecting this, the plan is to move away in part from the entrance and exit quizzes format that was used in 127L. For the first half of the semester, the grade will be determined by either quizzes, a written formal report or oral presentation. Details are given in the manual and will be posted on the website as to how the next experiment will be evaluated. Each experiment is worth 100 points with a comprehensive lab final given just before spring break covering all experiments so keeping a good notebook remains essential. Grades for these experiments will either be on an individual or a group basis with details again given in advance of the experiment.

Several of the experiments are rigorous and time intensive and coming to lab fully prepared will help ensure that you will be able to complete the tasks during the three-hour period. Since time available for labs is constrained to three hours, the experiments must be completed in that time frame. If you are unable to complete the lab during the three hours due to lack of preparedness, late arrival to class, dropping or corrupting your equipment/experiment, this may impact your grade. Exceptions may include situations beyond the student's control that cause the lab to exceed the three-hour time limit (i.e. instrument failure or congestion).

The second half of the semester focuses on working on a Research project with other members of your team. The research project looks at levels of sulfa-drugs in water and will involve measuring

and attempts at reducing the levels of these contaminants. Each group will be responsible for developing a hypothesis for the reduction of the concentrations of these drugs, carrying out their proposed experiments in a methodical scientific and safe fashion and presenting the data both in written and oral form. This is described in the manual and more details of this will be given over the course of the semester including the grading breakdown.

ACADEMIC INTEGRITY: In keeping with Concordia's Integrity Policy, cheating in any form (including plagiarism, falsification, facilitating others' violations, and impeding) will not be tolerated. A detailed description of these violations is given in the booklet "Academic Integrity at Concordia College", in particular pp. 7-18. Be familiar with what constitutes each of these violations and the guidelines established for dealing with any form of dishonesty. At a minimum, any student who has been found to have violated academic integrity will receive no credit for the experiment/quiz/exam/assignment where cheating has occurred. A serious violation may constitute immediate failure of this course. In all cases, a report outlining the nature of the violation, and any consequences levied, will be sent to the Academic Dean. The severity of the punishment will reflect the seriousness of the offense.

ADDITIONAL POLICIES:

A separate sheet details the safety guidelines for the laboratory. This sheet is also included in the front of your lab manual and a copy is handed out in the first meeting which you must sign and return stating you have read and understand the safety guidelines. Failure to follow these guidelines will result in reduction of the course grade or dismissal from the course. Particular points are noted below:

All safety procedures either written in the experimental procedure or stated verbally by the instructor or TA must be adhered to. Unauthorized experiments or activities are not allowed. No food or drink is allowed in the lab.

Safety eyewear must be worn at all times in the lab

A first offense will result in a loss of 50% of the lab participation points.
A second offense will result in the loss of all lab participation points for that day.
A third offense will result in the complete loss of all lab points for that day.

The importance of keeping a good lab notebook cannot be overstated. All data should be written directly into your notebook following the guidelines provided. Writing numbers or calculations on pieces of paper, paper towels or the back of your hand is not permitted and will result in reduction of your grade for that experiment.

SCHEDULED LAB TIMES AND MISSED LABS

You should attend the same timeslot throughout the course of the semester. This is especially important since you will be working as part of the same group throughout the semester. If due to a change in circumstances, you are unable to continually attend that timeslot, contact Dr Wyllie to determine if it is possible to join a new lab section. Several sections are operating a maximum capacity and you are not always guaranteed your first choice of time slots. It is important you do this so grades for any labs completed can be transferred to your new instructor.

Labs end promptly three hours after their scheduled start time. No one is allowed to work in lab after the end of the lab period unless situations beyond control of the student caused the delay.

You must complete all labs in the course of the semester. If you know in advance you are going to miss a lab, contact Dr Wyllie as soon as possible to arrange a make up time. Because several labs are operating at maximum capacity, you cannot simply just turn up to any lab. When attending another section inform the instructor at the start of the lab of your presence and at the end, they will collect permission slip and any quizzes etc from that lab and pass them back to Dr Wyllie. Any missed lab must be made up within one week of the missed lab period or result in a zero.

However, due to reasons of illness, scheduling conflicts etc, sometimes you may have no choice but to miss a lab. To schedule a time to carry out the make-up lab, you should contact Dr Wyllie as soon as possible. If you know in advance you are missing a lab, let Dr Wyllie know the week before, if you miss the lab itself such as for illness, contact Dr Wyllie as soon as you can. Unless there are exceptional circumstances, labs must be made up the same week they are missed. The regular lab times are listed on the website and you should try to make up the lab in one of these, if these times do not work, include this information when you contact Dr Wyllie. It is also your responsibility to inform the other members of your research team you will not be there.

The procedure for making up a missed lab is given below, if this is not followed, you will not get the credit for the lab you make-up. You should email the following information to Dr Wyllie

Name: / **Experiment to be Made-up:**
Lab Section (Time / Instructor) **When you plan to make it up:**

Dr Wyllie will then email you a confirmation and you should attend the stated section for the make-up. This is left in the lab to be collected and distributed to your instructor by Dr Wyllie. If you do not have this form, you will not be credited for the lab. You cannot just turn up to any lab for making up an experiment, we have a very large class this year so we have to manage resources and lab space. In addition, it allows better tracking of lab make-ups so you can be sure your grade is being credited for the lab.

Evaluation and the new 128L Lab Course

This is the second year for the new and improved 128L and the second to institute the research project. The first year was a success so this is our chance to fine-tune the experiments, a course can be a continuously evolving entity and this allows us to make any adjustments to increase the experience for the students.

As a result, at several points you will be asked to fill in an online survey about the course, about your perspective on the experiments, how your skills in the lab are developing. We ask that all students in the course fill in the required surveys at the requested times and we ask that you are honest in your responses. While we may ask for information such as your major choice, we will not use this data in evaluating your grade, I will try to make things as anonymous as possible but that does require the student body to take responsibility for filling in the surveys. We are using an online survey as it aids in collating data and reduces the amount of paper expended in surveying the students. Details for the survey will be distributed in the lab each week, if possible, we will set aside time in lab for the surveys.

Assessment tools serve a number of purposes. Collecting data from our students allows us to evaluate the efficacy of the course and the student reaction to what is a radically different approach to freshman chemistry labs. Showing positive response from our student body in terms of what is gained from the course, student interest and other factors is necessary data when evaluating the course for entities outside Concordia. Funding agencies like the National Science Foundation evaluate courses and departments when granting funds and having data supporting the worthiness of a course is invaluable in supporting a request for funds. Gaining additional sources of funds allows additional instrumentation to be purchased and the modern scientist today should be familiar with both the traditional lab equipment (burettes, balances and the like) and the modern instrumentation (GC/MS, UV-Vis, IR, etc) but the latter category are extremely expensive and we often have to apply to outside agencies for their purchase. Supporting such an application with data surveying the student body on the courses taught is invaluable

In addition, I believe what we are doing in the 128L laboratory is innovative enough to merit sharing this course style colleagues from other schools. Presentation at academic conferences or publication in the scientific literature requires data from the students taking the course and I ask that all students taking the course fill in the required surveys to provide real data for these purposes.

One of the principle goals of the 128L course is to further develop each student as a Scientist in a practical environment and surveying the course allows us to chart how you, the students feel this progressing. If you have any additional thoughts or opinions on the course, feel free to talk to Dr Wyllie at any time.

Laboratory Schedule Spring 2009

Week #	Dates	Experiment
Week 1	Jan 5th - 8th	Introduction, Drawer Check-In, Forming a Hypothesis
Week 2	Jan 12th – 15th	Degradation of Vitamin C
Week 3	Jan 19th – 22nd	Determining Water Hardness, an EDTA titration
Week 4	Jan 26th – 29th	Saponification, **Written report on Vitamin C due**
Week 5	Feb 2nd - 5th	Solubility of Calcium Hydroxide
Week 6	Feb 9th - 12th	Determining the Rate of Dye Adsorption **Background on sulfadrug due, hypothesis approval**
Week 7	Feb 16th – 20th	Methylene Blue Reaction Order and Rate + Lab final!!! **Hypothesis Outline Due**
Week 8	Feb 23rd - 26th	*Spring Break Week - No Labs*
Week 9	March 2nd - 5th	Research Project Week #1 **Report on dye adsorption due**
Week 10	March 9th - 12th	Research Project Week #2
Week 11	March 16th - 19th	Research Project Week #3
Week 12	March 23rd - 26th	Research Project Week #4
Week 13	March 30th - April 2nd	Research Project Week #5
Week 14	April 6th - 9th	Research Project Week #6a (mon/tue only) [Data Analysis]
Week 15	April 13th - 16th	Research Project Week #6b (wed/thur only) [Data Analysis]
Week 16	April 20th – 23rd	Research Project Week #7 - Oral Presentations of Results **Research Project written report due**
Week 17	April 27th – 30th	Finals Week - No Laboratory

Dr Graeme R. A. Wyllie
December 20th 2008