UNIVERSITY OF DETROIT MERCY
Department of Chemistry and Biochemistry
CHEMISTRY 111: Chemistry Laboratory II
Term II, Winter 2004

Instructor:	Dr. Katherine Lanigan	**Office**:	C215b (inside C215c)
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Office Hours:	Mon., Wed., Thur. 12:00 – 1:30 p.m. or by appointment		
Lab:	Section 01 & 02 2:00 - 5:00 p.m. M, W		Rm. C209 and C202
	Section 03 & 04 2:00 - 5:00 p.m. T, Th		
	All Sections 8:00 - 8:50 a.m. M		

Notebook: Chemistry Laboratory Notebook, required, purchase at bookstore
Computer Usage: Some labs will require the use of a spreadsheet program, such as Excel®.

Course Description:

Chemistry 111 is the second of two general chemistry laboratory courses for science and engineering majors. This course will provide students with hands-on experience using classical quantitative analysis techniques. These include titrimetry, gravimetry, spectrophotometry, and chromatography.

Prerequisites: CHM 110: Chemistry Laboratory I **Co-requisites:** CHM 108: General Chemistry II

Course Objectives:

The overall course objective is to develop the student's analytical laboratory skills. Emphasis is placed upon *careful*, *accurate* work!! In addition, students will be expected to become proficient in properly maintaining a laboratory notebook and writing experimental details in report form. Successful completion of this course should result in a student who is capable of functioning at a laboratory bench. Pre-lab lectures, demonstrations, bench work, graded notebooks, reports and a final quiz will meet these objectives.

The course grade will be based on:

1)	6 unknown determinations - 100 point each*, drop lowest	500	60.6 %
2)	A 100-point quiz the last day of class	100	12.1 %
3)	3 Report grades (25 points each) Labs 2, 6, 8	75	9.1 %
4)	3 Notebook grades, (25 points each) chosen at random	75	9.1 %
5)	2 Homework Assignments (25 points each) Labs 1, 4	50	6.1 %
6)	Lab safety, work, notebook recording, and efficiency grade	25	3.0 %
		825 total	

*No credit will be given unless accompanied by complete Report (if required above) and Notebook. Reports, Notebook, and Unknown grades will be penalized 10 % per weekday late.

Blackboard - Used to communicate grades, announcements, etc.

Got to: http://Knowledge.udmercy.edu, then CREATE ACCOUNT, then ENROLL in CHM 111.

Grading Scale based on percentages:

A 100 - 92.5	B+ 89.9 - 87.5	C+ 79.9 - 77.5	D+ 69.9 - 67.5
A- 92.4 - 90.0	B 87.4 - 82.5	C 77.4 - 72.5	D 67.4 - 60.0
	B- 82.4 - 80.0	C- 72.4 - 70.0	F 59.9 -

Lab safety, notebook recording, and efficiency grade

This grade is based on your work in the lab during the semester. You will be graded based on the answers to the following questions:

Do you work safely?

- Do you wear your safety glasses without being reminded?
- Do you put glassware and equipment away, dispose of chemicals properly, close drawers, and keep your area clean of trash?

Do you properly use your notebook?

- Do you write directly into your notebook at all times?

Do you work efficiently?

- Do you spend lab time on your experiment (or on the cell phone or out of the lab)?
- Do you use your time wisely so that you can finish before 5:00 p.m?
- Do you complete all components of the lab?

Attendance Policy:

Attendance at every lab is mandatory. If a student misses a lab period in which a lab report is due, it will be considered late and assessed a penalty (see report description). No make-up labs will be allowed. No extra time will be given to students with unexcused absences. If you miss a lab period in which you are working with a partner, you will not complete the lab with the partner.

Class Cancellation Policy:

If a class is missed due to weather or instructor's absence, anything planned for that lab period will occur during the next class session.

Important University Dates

Jan. 19	Monday	Martin Luther King, Jr. Holiday (NO CLASS)
Mar. 1 - 5	M – F	Spring Break (NO CLASS)
Mar. 26	Friday	Last day to WITHDRAW from class
Apr. 12	Monday	Quiz
Apr. 9	Friday	Easter Recess (NO CLASS)
Apr. 19 – 24	M - F	Final Exam Week

Academic Integrity:

Everything submitted for grading is expected to be a student's own work. THIS INCLUDES LAB WITH PARTNERS. While you collect data with a lab partner, reports, notebooks, tables, graphs, calculations, results must be your own. Any material that appears to be a photo-copy or re-print of your partners will be scored zero points. You are directed to the College Engineering and Science Student Handbook for more details on this matter.

Cellular phone/pager policy
These units should be turned off prior to coming to class and usage of a cell phone, for calls other than emergencies, during class in prohibited.

Check - In:
During the first day of lab, each student will be required to "check-in" lab equipment and glassware. Each student will use one or two drawers and share a cupboard at their bench. At the end of the semester, students will "check-out" their drawers.

Safety glasses with side shields or goggles must be worn at all times while in the laboratory - NO EXCEPTIONS!! There is absolutely no smoking, eating, or drinking allowed in the laboratory.

Keeping the lab clean:
Every student will be required to keep their lab bench and common areas clean every week. Common areas are the sink areas, hoods, weighing room and balances**.** Students must clean and put away their lab equipment every day unless notified. If proper clean-up is not done, points will be deducted from your total score. **Each person will be assigned 2 days for common area clean up. This will be worth 4 bonus points if done completely.**

	Tentative Experiment List:	**Unknown**
1.	Quantitative Analysis of $CaCO_3$ in TUMS© Antacid	% w/w $CaCO_3$
2.	Acid-Base Titrations and Statistical Analysis of Different Indicators	Molarity HCl
3.	Acid/Base Titration of Tris sample	% w/w Tris
4.	Determination of Nickel with DMG, an Organic Precipitating Agent	% w/w Ni
5.	Spectrophotometric Analysis of Food dyes in Beverages	Molarity Food dye
6.	Potentiometric Titration of an Acid/Base Reaction	% w/w KHP
7.	Complexation Titration of Calcium with EDTA	% w/w CaO
8.	Spectrophotometric Analysis of Iron	% w/w Fe

Course Goals – in Detail

1) Learn to think critically

- To apply what you've learned to problems for which you have not been given the answers.
- To judge the quality of an experimental technique, result, or statement.

2) To learn common quantitative chemical techniques

Use of glassware – volumetric and non-volumetric, cleanliness
Use of balances – analytical and non-analytical
Quantitative transfer
Preparation of solutions – accurate and inaccurate
Volumetric analysis through titration – standardization and analyte analysis
Indicators – chemical and electrode
Gravimetric analysis
Dilution

Spectrophotometric analysis
Chromatography
Accurate and precise experimental method
Calculations
Statistical analysis of data
Graphing data

3) To learn common chemical reactions
Acid/Base, Indicators, Complexation, Chelation, Ion Exchange, etc.

4) To learn how to work in a chemistry laboratory
How to keep a notebook
Efficiency and time management
Recognizing the importance of analytical methods and each step in a procedure
Waste disposal, cleanliness

Expectations

1) For each lab you are expected to:

- read the lab procedure before the lab
- carry out the experiment fully
- refer to notes taken during lecture
- refer to course handouts for details (ex. how to prepare a notebook)

2) You are expected to apply what you've learned. This applies to:

- handout questions
- Reports
- future lab techniques
- future lab calculations

3) You must use your own data recorded in your notebook in all calculations. Calculations done on the board are examples only.

4) You may ask questions about the lab, if the lab procedure is not clear to you and you have read the handout.

5) You are expected to work efficiently. You must complete the lab and calculations due for each day by the close of the lab period at 5:00 p.m.

NOTEBOOK AND REPORT GUIDELINES

THE LABORATORY NOTEBOOK

1) Every student must have a bound Laboratory Notebook purchased from the bookstore. This is the most important item for this class.
2) Data must be recorded in ink (not red) and nothing should be erased. Draw a single line through any mistakes.
3) The student will be turning in the **yellow copy** of experimental notes **daily** at the end of class.
4) Neatness, accuracy, correct significant figures, and correct formulas are components of which the notebook grade will be assessed.

The **NOTEBOOK** must include the following **7** components**:**
The bolded components must have a section title as shown below. (-1 for each one missing)

Due Every Lab Period that data is taken:

1. Title - as shown on handout on the first page of the experiment, abbreviated on the following pages
2. Date - each page should be dated accordingly
3. **Statement of Purpose**
   - for that day - in a complete sentence, "The purpose of today's portion of the experiment is to…"
4. **Notes**
   - Procedural changes
   - Important Notes
   - Cautions
   - Waste disposal
   - Unknown number and / or sample name
   - if notes are the same as the previous day, write, "See notes previous day"
5. **Raw Data Tables**
   - include weights, volumes, etc.
   - include observations and other procedure information
6. **Calculations** - for weight percent, molarity, mean, standard deviation, etc.
   - Calculations should be done in the notebook just below the corresponding raw data table
7. **Results Data Table – to summarize the results of a set of calculations**
   - Table containing calculated result from each trial, the mean, and the standard deviation
   - Table must be labeled with the unknown number

****Any component missing from the data will be graded as zero.**
****All data taken during the laboratory period is recorded in the notebook**. **No pages will be skipped, even if they are blank.**
****Any data used in the calculation section, but not found in the raw data section, will be considered**

erroneous. Results from these calculations will be considered erroneous and will be graded as if no results were reported.

THE LABORATORY REPORT

The Report must be typed. Handwritten reports will not be accepted. Organization, paragraph format, and communication of what the student has learned from each experiment are the characteristics that will be assessed in the report grade. **Lab reports (and handouts) are due at 2:05 pm on the due date.** No late reports or handouts will be accepted.

The **REPORT** must include the following **components:**
The bolded components must have a section title as shown below (-1 for each one missing)

Student Name: _____ Unknown # or sample name: _____
Date: _____ Result: mean ± standard deviation of unknown

Title of Experiment

Statement of Purpose

The overall purpose of this experiment was to ……

Introduction

- paragraph (at least five sentences) describing:
  - the techniques used
  - the chemistry involved with the experiment
  - pertinent chemical reaction (s)
  - NOT A DETAILED DESCRIPTION OF PROCEDURE

Results

- Results Data Table 1, 2, etc., Graphs, Spectra
- labeled in detail, units, unknown or type of sample

Discussion

paragraph form (at least five sentences). This should contain:

- introductory statement
- discussion of observations
- problems encountered or not encountered
- errors possible in experimental method
- answers to any questions posed
- discussion about the results that were obtained
- concluding statement about the overall lab

Name_____

Rubric for Lab Notebook **Lab # ___7___**

	Possible	Problems	Points Scored
Title - on each page	1		
Dates - on each page	1		
Purpose - on the first page of each lab period	1		
Procedural changes, Important Notes	1		
Raw Data Tables - properly labeled, neat Observations	7		
Calculations – easy to read, enough detail to find errors	7		
Results Data Tables – with unknown # or sample name labeled, complete, correct significant figures	7		
		Grade out of 25 points:	

Rubric for Lab Report

	Possible	Problems	Points Scored
Unknown result (mean and standard deviation) - top of page	2		
Unknown Number or sample name	1		
Title	1		
Statement of Purpose	1		
Introduction paragraph- written well, general description, not restatement of procedure	5		
Results Data Tables and Figures, labeled and complete	5		
Discussion – well written, interesting, summary of findings, assessment of known and unknown errors	10		
		Grade out of 25 points:	NONE

Unknown Grade - 100 possible points, based on accuracy _____