

Dr. Rajaseelan  
CAPUTO-213; Ext. 7985 Course Syllabus & Class Schedule  
Office Hours: M,T: 11am -12:50pm; W: 11-11:50 am  
[edward.rajaseelan@millersville.edu](mailto:edward.rajaseelan@millersville.edu)

CHEM 112

Spring 2024

## INTRODUCTION

Chemistry 112 is a continuation of Chemistry 111. It is much more problem oriented than CHEM 111. Diligent and responsible attention to the course requirements and regular completion of all assignments are essential to get a passing grade in the course.

Get into good study habits early by keeping up with the reading assignment and homework. It is best to allocate a certain number of problems each day to keep up with the homework. The practice gained by doing the problems will be most beneficial for the exams and quizzes. KEEP UP WITH THE MATERIAL IN THE COURSE ON A DAY-BY-DAY BASIS, RATHER THAN PUT IT OFF UNTIL JUST BEFORE THE EXAM. Please take advantage of my availability during my office hours or by appointment.

## COURSE MATERIALS REQUIRED

1. Chemistry by Flowers, Theopold, Langley and Robinson; OpenStax, 2019, The book is available in web view and PDF for free. You may purchase a hard copy on Amazon for US\$ 50.  
<https://openstax.org/details/books/chemistry-2e>
2. A calculator that has log, ln,  $10^x$ , and  $e^x$  functions
3. I will send the pdf files of the experiments
4. Lab Notebook: Must be bound (no ring binders) approximate size 7.5 x 9.5", quadrille **ruled**. Carefully follow the instructions for the laboratory notebook on pages 8 through 10 of the laboratory manual.
5. Lab Safety Goggles: Available in the bookstore or in the chemistry lab prep room. You must wear goggles whenever you are in laboratory, even if just visiting.

**Problems will be assigned in class.**

## COURSE SCHEDULE

<u>Chapter</u>	<u>Topics</u>
12	Chemical Kinetics
13	Chemical Equilibrium
EXAM I	Chapters 12, 13.
14	Acid-Bases Equilibria/Buffers/Acid-base Titrations.
EXAM II	Chapter 14
15	Solubility and Complex Ion Equilibria
16	Thermodynamics (Spontaneity, Entropy, and Free Energy)
EXAM III	Chapters 15 & 16
18	Electrochemistry
19	Nuclear Reactions
20	The representative elements
EXAM IV	Material covered since Exam III
FINAL EXAM	COMPREHENSIVE WEDNESDAY, MAY 1, 8-10 am

## GRADING SYSTEM

4 Mid-term Exams	400 pts
Quizzes	200 pts
Final Exam	200 pts
Laboratory	<u>200</u> pts[9 Prelab-45;6 lab reports-84;3 unknowns-60;notebook-11]

**Total Points**                      **1000 pts**

<u>Letter Grade</u>	<u>Percentage</u>
A	90 - 100%
A-	87 - 90%
B+	84 - 87%
B	80 - 84%.
B-	77 - 80%
C+	74 - 77%
C	70 - 74%
C-	67 - 70%
D+	64 - 67%
D	60 - 64%
D-	57 - 60%
F	below 57%

**\* You need to obtain 360/600 in the midterm and quizzes  
AND must have completed all the labs to pass the course**

### **Tentative Lab Schedule:**

**January 16** – laboratory safety. Check into lockers.

**January 23** - Lab 1: Kinetics Part A. (Exp. 15)

**January 30** – Kinetics Part B. (Expt.15)

**February 6** – Lab-2: Le Chatelier's Principle in Equilibrium (Expt.14)

**February 13** – Lab 3: Equilibrium Constant using UV-VIS (hand out)

**February 20** – Lab 4: Qualitative analysis, Unknown I. (33 -35).

**February 27** – Qualitative analysis, Unknown I continued (Exp. 33-35)

**March 5** – University holiday. No labs this week.

**March 12** –Lab 5: Titration Curve and  $K_a$  of a weak acid (Expt.19)

**March 19** – Lab 6: Qualitative analysis, Unknown II (Expt.36-37)

**March 26** – Qualitative analysis, Unknown II, continued (Expt.36-37)

**April 2** – Lab 7: Penny's worth of chemistry (Exp. 28)

**April 9** – Lab 8: Electrolysis (Exp. 24)

**April 16** – Lab 9: Qualitative analysis, Unknown III (Exp. 38)

**April 23** – Complete Qualitative analysis, Unknown III and Checkout

### **COURSE POLICIES**

1. There will be lecture quizzes given every Wednesday during class time.
2. Please see the lab syllabus/policies/grading in the syllabus.
3. All students will take the examinations and quizzes as schedule. Other than health problems (**that require a written, signed excuse from a doctor**), excused absences will only be considered **before** the scheduled exam. There will be no make-up quizzes. Percentage from the final exam will be used for excused quiz absences.
4. Plagiarism and copying are expressly prohibited. It will result in a zero grade for the assignment or a failing grade for the course.
5. **Class attendance is required.** It should be recognized that missing more than one to two days of a chemistry course is most unwise due to the pace of the course and the amount of material covered. It is the student's responsibility to learn the material covered in class.

## **LAB POLICIES**

### **I. LABORATORY NOTEBOOK**

Permanently bound notebook (spiral or ring binders are not acceptable). Bound notebooks are available in the campus bookstore, on-line, or at retail stores.

### **II. SUPPLEMENTAL MATERIAL**

Handouts will be posted on your CHEM 111 lecture D2L course. You must print them out and read them before lab. Calculator with root function, logs, and antilogs will be useful for lab exercises. *Required:* Safety goggles and close-toed shoes.

### **III. LAB OBJECTIVES**

- 1) To provide the student with an empirical insight into the principles of chemistry.
- 2) To develop an ability in the student to learn and work with a team of peers.
- 3) To develop in the student an appreciation for safety and environmental sensitivity.
- 4) To illustrate, in a laboratory setting, the fundamental laws of chemistry.

### **IV. INSTRUCTIONS FOR LABORATORY EXERCISES**

Please arrive on time, as you will not be given extra time to finish the experiment beyond the designated time. Read about the experiment before coming to lab. It is unsafe and inefficient to read the handout, for the first time, as you are performing the laboratory experiment. ***All pre-lab worksheets are due at the beginning of class*** and are worth five points each. If the experiment performed is a continuation from the previous week, there will be no pre-lab worksheet. The pre-lab worksheets can be found in the Lab Manual. No pre-lab worksheet is due during the first week of classes. It is expected that all students will complete all laboratory exercises, and all labs will count toward the final lab grade as described below.

### **V. RECORD-KEEPING IN THE LABORATORY**

To properly apply the scientific method, you must record all laboratory observations in a bound notebook in great and graphic detail. The notebook should have a table of contents at the beginning, containing the experiment title, the page on which each experiment begins, and the date(s) during which the experiment was performed. The pages should be numbered, and no pages should ever be removed from the notebook. At the beginning of a new experiment, write a few sentences in the notebook about the purpose of the experiment, the method used, and any partners with whom you will work.

Mistakes are indicated by a single line drawn through them, never by obliterating them beyond recognition, since experimenters often decide later that what was thought to be a mistake was not really a mistake. Observations and data should be recorded directly into the notebook *as you are performing the experiment*. Do not write on paper towels or scrap paper and transfer to the notebook later. This would defeat the purpose of the notebook as a primary source of data. Organize your notebook beforehand when possible by labeling and leaving blanks for experimental parameters that must be recorded, and by making tables for data ahead of time. If you are unsure whether a piece of information should go into the notebook, write it in there. You cannot have too much information. If you have misgivings about the accuracy or precision of the data, or if something went wrong during the experiment, write that in the notebook as well. Later, you will not remember which data you trust and which you do not. Explanatory notes, units, and labels are always important, as is legibility.

## **VI. ATTENDANCE**

Attendance is necessary in all lab meetings. If you cannot attend lab, due to serious illness or other emergency, you must contact me before the class period begins.

*Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.*

*Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at <http://www.millersville.edu/socialq/title-ix-sexual-misconduct/index.php>.*