CHEM 112: Introductory Chemistry II

Dr. Dan Albert

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Contact Information

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The best way to reach me is via university email.

Office Hours

Office Hours are a great opportunity to get individualized support from me. The scheduled times for Office Hours are as follows:

- Monday Afternoons from 12 - 2 pm
- Tuesday Afternoons from 2:30 - 3:30 pm
- Thursday Mornings from 11 am - noon
- Friday Afternoons from 12 - 1 pm

If you cannot make it to office hours please feel free to set-up an alternative time to meet with me by corresponding via email.

Course Description

Continuation of CHEM 111. The interactions of matter and energy thermodynamics, kinetics and electrochemistry. Equilibria in aqueous systems theory and practice. Coordination chemistry and descriptive chemistry of the elements.

Prerequisites

CHEM 111 with a grade of C- or higher; C or higher for chemistry majors. *Proficiency in algebra is essential.*

Course Purpose

An understanding of chemical principles is crucial in a wide variety of natural science disciplines as we are made-up of and constantly interact with chemicals. We will work to understand natural phenomenon through the use of chemical principles. In a broader sense, students in this class will benefit from knowledge of chemistry in their everyday lives. Things we encounter everyday such as cleaning products, pharmaceuticals, art supplies, and batteries are chemistry in action! Our goal is understand how and why chemical transformations take place and how they are useful!
The problem solving techniques and approaches we use in this class are broadly applicable to thinking about many questions you will encounter in your life!

Course Learning Objectives

- Students will predict outcomes for chemical processes using kinetics, equilibrium, and thermodynamics.
- Students will demonstrate appropriate and safe laboratory practices.
- Students will assess scientific claims using data.
- Students will explain natural phenomena using chemical theories and models.

Meeting Times

- Section 02A

  Lecture: MWF from 11 - 11:50 am in Caputo 210

  Recitation: W from 2:00 - 2:50 pm in 258 Roddy Hall

  Laboratory: W from 3 - 4:50 pm in 332 Caputo Hall

- Section 02B

  Lecture: MWF from 11 - 11:50 am in Caputo 210

  Recitation: R from 1:10 - 2:00 pm in 211 Roddy Hall

  Laboratory: R from 2:10 - 4:00 pm in 332 Caputo Hall

Required Materials

- Textbook: *Chemistry 2e* by Flowers, Theopold, Langley, and Robinson; OpenStax, 2019. ISBN: 978-1-947172-61-6
  Good news: your textbook for this class is available for free online!

Your book is available in web view and PDF for free. You can also purchase on iBooks for $4.99 or get a print version, if you prefer, on Amazon.com for about $55.
You can use any of the formats. Web view is designed to work well on any device.
The textbook can be found at https://openstax.org/details/books/chemistry-2e

- Scientific Calculator: Your calculator for this course must be able to handle logarithms and exponents. This type of calculator can be found for around $10.
- Laboratory Notebook: Permanently bound notebook (No perforations or binders)
- Regular access to D2L (https://millersville.desire2learn.com/) and university email
- Safety Goggles: Available from Bookstore or Chemistry Supply Room: Caputo 330

Class Environment

I value a learning environment that is engaging, respectful, and helpful. I ask that you help maintain a learning environment that meets these goals for everyone in the class. Anyone whose behavior is disruptive of the learning environment for others in the class will be asked to leave.
My goal is for you to feel comfortable, appreciated, fairly treated, and encouraged to challenge yourself and obtain success. *Please come talk to me if there is anything I can do to help support you in achieving success.*

Title IX

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/socialeq/title-ix-sexual-misconduct/index.php

Grading

All grades in this course are assigned by the instructor of record. Your grade in this course will be calculated using the following components and weighting.

Category	% of Total
Skill Checks	15
Problem Sets	15
Regular Exams	40
Final Exam	10
Lab Assignments	20
Total	100

Your final grade will be determined by your overall percentage grade in the course using the grading scheme described above.

In order to pass CHEM 112 you must have a grade higher than an F in both the lecture/recitation (Skill Checks, Problem Sets, Regular Exams, and Final Exam) and laboratory assignments portions of the class. The cut-off percentages for each grade are given below. I reserve the right to lower grade cut-offs, but under no circumstances will the grade cut-offs be higher than those listed below.

Grade Cut-off (%)	Letter Grade
93	A
90	A-
87	B+
83	B
80	B-
77	C+
73	C
70	C-
67	D+
63	D
60	D-
0	F

Skill Checks

Skill Checks will be assigned weekly so that both you and I can see your progress in the course. Skill checks will need to be completed by 11:59 pm on Mondays. These checks will consist of ten questions on D2L (https://millersville.desire2learn.com/). You will have up to three opportunities to take the skill checks. Only your highest score will count towards your grade. Skill Checks will be released after class on Wednesdays.
Your lowest Skill Check Grade will be dropped.

Problem Sets

Ten problem sets will be given throughout the semester. Each problem set will consist of 5 graded problems and will be due at class on Wednesdays. Suggested problems for the course consist of the questions that have provided solutions at the end of each reading. I strongly suggest that you attempt the suggested problems *before* working on the graded problems. The graded problems are typically the most difficult problems and it is best to build towards solving them. Detailed solutions to the graded problems will be available after the graded problems are collected. Each problem set is equally weighted in the problem set category.
All problem sets and detailed solutions can be accessed via D2L (https://millersville.desire2learn.com/)
Your lowest problem set grade will be dropped.

Regular Exams

Four regular exams will be given during our regular lecture meeting times. Each exam will contain one or more of the following types of questions: multiple choice, short answer, and worked problems. All exams in this course are considered cumulative, but will focus on the material covered since the last exam. Each regular exam is equally weighted in the regular exam category.

If your percentage grade on the final exam is higher than your lowest percentage regular exam score, your percentage grade on the final will replace your lowest regular exam score. For example, if you earn a 60% on Exam 1, a 85% on Exam 2, a 95% on Exam 3, an 80 % on Exam 4, and an 80% on the Final Exam, your 60% on Exam 1 will be replaced and become an 80% (your percentage score on the Final Exam).

Final Exam

A two hour cumulative (CHEM 111 and CHEM 112) final exam will be given at the end of the semester. The exam will be the standard American Chemical Society Exam for Introductory Chemistry. The final exam will take place on Friday December 9th from 8:00 - 10:00 am.

Regular Labs

For every laboratory experiment each student must answer prelab questions, keep detailed records of the experiment, and complete calculations and answers to questions in their laboratory notebook. Each regular lab is equally weighted in the regular lab category.

Detailed information on keeping a laboratory notebook will be provided during our first laboratory.
Complete laboratory notebooks are due at your laboratory session the week after the experiment has been completed.

Attendance, Absences, and Make-Ups

Attendance at every lecture, recitation, and lab is expected. If you must miss a lecture or recitation, please see a fellow classmate for notes. I will post all handouts during the semester to D2L.
Late or Make-Up Problem Sets, Labs, and Exams will not be allowed except under special circumstances and prior notification is required unless it is an emergency situation. Some examples of special circumstances are below.

- Required religious observation
- Participation in a Millersville University athletic event
- Armed forces related training or drills
- Medical Illness/Emergency
- Death in the family
- If you feel that you have a special circumstance that is of similar importance to the items listed above, please come talk with me as soon as possible and I will work with you to try and find a solution

Academic Honesty

The Millersville University Academic Honesty Policy states that:
Students of the University are expected to be honest and forthright in their academic endeavors. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an examination, to allow another person to commit, or assist another in committing an act of academic dishonesty, corrupts the essential process by which knowledge is advanced.

The entire academic honesty policy can be found at http://www.millersville.edu/english/for-faculty/academic-integrity/index.php

All work that is turned in for a grade should be completed individually by the person whose name appears on the work. Students found to have violated the academic honesty policy will receive a score of zero on the assignment. Repeated instances of academic misconduct will be given the harshest punishment.

Suggestions for Course Success

My expectation is that you are working on CHEM 112 material for a minimum of 8 hours every week outside of class. This effort needs to be consistent throughout the semester to get the most out of this course.

- Work on chemistry a little bit every day.

  Set aside 60 to 90 minutes each day to work on chemistry outside of class.

- Read the textbook and work example problems before coming to class.
- Attend, participate, and take notes at all lectures and recitations.

  Ask questions during class. I love to get questions during class.

  Take notes to capture key points and ideas.

- Re-Read the textbook after class and fill-in your notes with additional details.
- Work at least five new problems a day.

  At a minimum you should be working all of the suggested problems.

  The way you work through a problem matters.

  Try to work problems by minimally looking at your notes or the textbook.

  Starting problems is the most difficult part. Give yourself five minutes.

  Solve problems from start to finish by yourself.

- Utilize helpful resources.

  Form study groups.

  Come to recitation with questions or post to discussion boards.

  Come to office hours.

  Stop by my office and ask questions. We can always find a time to meet.

  Use Peer Learning Hours

Important Dates

Date	Event
8/29	Last Day to Add or Drop a Course Online
9/5	No Classes for Labor Day
10/10 and 10/11	No Classes for Fall Break
10/28	Last Day to Withdraw from Course and Receive a 'W'
11/23 - 11/27	No Classes for Thanksgiving Break
12/9	CHEM 112 Final Exam from 8 - 10 am

Course Schedule

The instructor reserves the right to change this schedule as needed. Any changes will be communicated via an in-class announcement.

Week	**Topics**	**Reading**	**Exam Dates**	**Laboratory Exercises**
8/22	Chemical Equilibrium	13.1 - 13.2		Equilibrium Constant Determination
8/29	Chemical Equilibrium	13.3 - 13.4		Equilibrium Constant Determination
9/5	Chemical Equilibrium	13.4		Le Chatelier's Principle
9/12	Acids and Bases	14.1 - 14.2	**Exam 1 on 9/16**	Titration Curves and Ionization Constant
9/19	Acids and Bases	14.3 - 14.6		Weak Acids, Bases, and Salts
9/26	Acids and Bases	14.7, 15.1		Buffers
10/3	Solubility and Ion Equilibria	15.2 - 15.3		Qualitative Analysis Expt. 1
10/10	Entropy and Free Energy	16.1 - 16.2	**Exam 2 on 10/14**	Qualitative Analysis Expt. 1
10/17	Entropy and Free Energy	16.3 - 16.4		Qualitative Analysis Expt. 3
10/24	Electrochemistry	17.1 - 17.4		Penny's Worth of Chemistry
10/31	Electrochemistry	17.5 - 17.7	**Exam 3 on 11/4**	Voltaic Cells
11/7	Chemical Kinetics	12.5 - 12.6, 12.1 - 12.2		Qualitative Analysis Expt. 3
11/14	Chemical Kinetics	12.3 - 12.4, 12.7		Rate Law Crystal Violet
11/21	Nuclear Chemistry	21		No Lab
11/28	Representative Elements	18 and 19	**Exam 4 on 12/2**	Kinetics of Iodine Clock
12/5	Final Exam		**Final Exam on 12/9 at 8:00 am**	