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.

Student Consultation/Office Hours

I have an open door policy for meeting with you outside of class. If you ever walk by my door and it is open please feel free to stop to talk about any questions, comments, or concerns you have. The following times you can be guaranteed to find me in my office:

- Mondays from 12 - 1 pm in Caputo 214
- Tuesdays from 11 am - noon in Caputo 214
- Wednesdays from 2 - 3:30 pm in Caputo 214
- Fridays from 12 - 1:30 pm in Caputo 214

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

Lecture: MWF from 11 - 11:50 am in 102 Brossmann Hall

- Section 02B

  Recitation: Thursday from 1:10 - 2:00 in 211 Caputo Hall

  Laboratory: Thursday from 2:10 - 4:00 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 a physical copy 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 $15.
- 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.*

ADA Program (Office of Learning Services) Americans With Disability Act — Millersville University (if you have a disability that requires accommodations under the Americans with Disabilities Act, please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about the Millersville University Office of Learning Services-please contact the office at 717-871-5554)

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	10
Problem Sets	10
Regular Exams	40
Final Exam	20
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 (Lab 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 regularly assigned (typically twice a week) 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 and Fridays when assigned. These checks will consist of five questions on D2L. You will have up to three opportunities to take the skill checks and only your highest score will count towards your grade. The skill checks due Monday will be released Thursday. Skill checks due Friday will be released Tuesday. The lowest two skill checks will be dropped from the grade calculation.

Problem Sets

Ten problem sets will be given throughout the semester. Each problem set will consist of 5 graded problems. 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. The lowest problem set will be dropped from the grade calculation.

Regular Exams

Three 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. The dates of the exams are February 21, March 28, and May 2.

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, 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 May 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 the beginning of the next lab period 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 and presentations during the semester to D2L.

Late or Make-Up Problem Sets, Labs, and Exams will be allowed if special circumstances occur. Prior notification is expected unless it is an emergency situation. Some examples of special circumstances are below.

- Required religious observation
- Participation in a required Millersville University 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.

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.

  Come to office hours.

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

  Regularly attend Chemistry Peer Learning Hours

Chemistry Peer Learning

Chemistry Peer Learning Hours are dedicated times available for students to come together and work on chemistry! If you are looking for a place to work on your chemistry assignments or need some help with your chemistry classes, Peer Learning Hours are here for you. No need to sign-up. Stop by at any or all of the Peer Learning Hours. All Peer Learning Hours are staffed by a chemistry tutor to assist you if needed.

Chemistry Peer Learning Schedule is available here:
https://www.millersville.edu/chemistry/tutoring.php

Important Dates

Date	Event
1/28	Last Day to Add or Drop a Course Online
3/10-3/16	No Classes for Spring Break
4/4	Last Day to Withdraw from Course and Receive a 'W'
5/9	CHEM 112 Final Exam at 8:00 am

University Policies

- Academic Honesty Policy link Governance Manual (millersville.edu); for additional information please see the following: What is Academic Integrity? — Millersville University
- Attendance Policy link: Class Attendance Policy — Millersville University
- Inclusion Statement: Millersville University Inclusion Statement — Millersville University
- Land Acknowledgement: Land Acknowledgement — Millersville University
- Policy on Delays and Cancellations link Policy on Delays & Cancellations — Millersville University

- Preferred Name FAQs link Preferred Name FAQs — Millersville University
- Privacy Rights under FERPA link Annual Notification of Student Rights Under FERPA — Millersville University
- Student Conduct and Community Standards Handbook link studentcodeofconduct.pdf (millersville.edu)
- Title IX Reporting Requirements and the Faculty member: Millersville University is committed to maintaining a safe education environment for all students. In compliance with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. 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 sexual violence or any other abuse of a students who was, or is, a child (under 18 years of age) when the abuse allegedly occurred to the person. Information about Title IX, resources and reporting can be found at: What is Title IX — Millersville University

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
1/20	Chemical Kinetics	12.5 - 12.6, 12.1 - 12.2		Lab Introduction and Check-In
1/27	Chemical Kinetics	12.3 - 12.4, 12.7		Kinetics Part A
2/3	Entropy and Free Energy	16.1 - 16.3		Kinetics Part B
2/10	Entropy and Free Energy	16.4, 13.1		Qualitative Analysis I
2/17	Chemical Equilibrium	13.2 - 13.3	**Exam 1 on 2/21**	Qualitative Analysis I
2/24	Chemical Equilibrium	13.4		Le Chatelier's Principle
3/3	Acids and Bases	14.1 - 14.2		Equilibrium Constant using UV-Vis
3/10	**BREAK**			
3/17	Acids and Bases	14.3 - 14.7		Titration Curves and Ionization Constant
3/24	Solubility and Ion Equilibria	15.1	**Exam 2 on 3/28**	Qualitative Analysis II
3/31	Solubility and Ion Equilibria	15.2 - 15.3		Qualitative Analysis II
4/7	Electrochemistry	17.1 - 17.4		Penny's Worth of Chemistry
4/14	Electrochemistry	17.5 - 17.7		Electrolysis
4/21	Nuclear Chemistry	21.1 -21.6		Qualitative Analysis III
4/28	Representative Elements	18 and 19	**Exam 3 on 5/2**	Qualitative Analysis III and Check-Out
5/5	Final Exam		**Final on 5/9 at 8 am**	