

Syllabus

I. General Information

Instructor:	Dr. Piotr Filipczak
Email:	pfilipczak@unm.edu
Phone Number:	505-925-8876
Office Number:	VAAS 132A
Office Hours (in-person):	Monday and Wednesday, 10:30 am to 12:00 am Tuesday and Thursday, 1:00 pm to 2:00 pm
Office Hours (online):	Tuesday and Thursday, 2:00 pm to 2:30 pm https://unm.zoom.us/j/99097010790 Meeting ID: 990 9701 0790
Course Section:	501
Meeting Room:	VAAS 131
Meeting Time:	Monday and Wednesday, 9:00 am to 10:15 am

II. Course Description

Prerequisite: CHEM 1215 and CHEM 1215L; ACT =>25 or SAT =>570 or MATH 1220 or MATH 1230 or MATH 1240 or MATH 1430 or MATH 1440 or MATH 1510 or MATH 1520 or MATH 2530.

This course is intended to serve as a continuation of general chemistry principles for students enrolled in science, engineering, and certain preprofessional programs. The course includes, but is not limited to a theoretical and quantitative coverage of solutions and their properties, kinetics, chemical equilibrium, acids and bases, entropy and free energy, electrochemistry, and nuclear chemistry. Additional topics may include (as time permits) organic, polymer, atmospheric, and biochemistry.

III. Resources

- "Chemistry, Atoms First" 2e from OpenStax (*textbook*).
- Canvas (*learning management system for communication, grades entry, resources navigation and selected assignments*).

IV. Student Learning Outcomes

1. Explain the intermolecular attractive forces that determine physical properties and phase transitions, and apply this knowledge to qualitatively evaluate these forces from structure and to predict the physical properties that result.

2. Calculate solution concentrations in various units, explain the effects of temperature, pressure and structure on solubility, and describe the colligative properties of solutions, and determine solution concentrations using colligative property values and vice versa.

3. Explain rates of reaction, rate laws, and half-life, determine the rate, rate law and rate constant of a reaction and calculate concentration as a function of time and vice versa, as well as explain the collision model of reaction dynamics and derive a rate law from a reaction mechanism, evaluating the consistency of a mechanism of a given rate law.

4. Describe the dynamic nature of chemical equilibrium and its relation to reaction rates, and apply Le Chatelier's Principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures as well as describe the equilibrium constant and use it to determine whether equilibrium has been established, and calculate equilibrium constants from equilibrium concentrations and vice versa.

5. Describe the different models of acids and base behavior and the molecular basis for acid strength, as well as apply equilibrium principles to aqueous solutions, including acid base and solubility reactions, and calculate pH and species concentrations in buffered and unbuffered solutions.

6. Explain titration curves and speciation diagrams, as well as calculate concentrations of reactants from the former and determine dominant species as a function of pH from the latter.

7. Explain and calculate the thermodynamic functions, enthalpy, entropy and Gibbs free energy, for a chemical system, and relate these functions to equilibrium constants and reaction spontaneity; balance redox equations, express them as two half reactions and evaluate the potential, free energy and equilibrium K for the reaction, as well as predict the spontaneous direction.

8. Construct a model of a galvanic or electrolytic cell; or describe organic reactions.

9. Describe bonding theories, such as valence and molecular orbital theory.

V. Course Requirements

This is a 16-week, face-to-face course with the following requirements:

Attendance: In-person participation is required in this course. Student who missed 15% of a class time (which stands for 5 meetings) may be dropped by the instructor with a W, F or D (depending on the stage of the course). Attendance will be taken verbally at the beginning of each class meeting. In case of being late for the attendance check, it is student's responsibility to check in with the instructor before leaving the class.

Technology & Computer Requirements:

- Dependable computer and Reliable internet connection
- Microsoft suite (PowerPoint, Word and Excell)
- Adobe Flash Player

VI. Students Evaluation Criteria

Type of Assignment:	Points per Assignment:	Total Points in this Category:	Contribution to the Final Grade:
Homework (8x)	20 pts	160 pts	20.0%
Quizzes (8x)	20 pts	160 pts	20.0%
Discussion (4x)	5 pts	20 pts	2.5%
Partial Exams (3x)	100 pts	300 pts	37.5%
Final Exam (1x)	160 pts	160 pts	20.0%
Total	NA	800 pts	100.00%

- **Homework:** Open-book assignments to be completed after class. One lowest score will be dropped from the final grade. In case of a missed deadline, students can make up one homework within one week from the original due date.
- **Quizzes:** Closed-book assignment to be completed in class. One lowest score will be dropped from the final grade. In case of a missed test, students can make up one quiz within one week from the original due date. To do so, such students must contact the instructor within 48 hours of missing the test to arrange the meeting.
- **Discussions:** Administrated once per month via Canvas. All four discussions count. Because this category requires no study, no late work will be accepted.
- **Partial Exams:** To be completed in class on days indicated in the course schedule. Students are allowed one page (11 x 8 inches, front and back) of hand-written notes. One lowest score will be dropped from the final grade. In case of a missed test, students can make up one exam within one week from the original due date. To do so, such students must contact the instructor within 48 hours of missing the test to arrange the meeting.

- **Final Exam:** To be completed in class during the final week of the course. Students are allowed one page (11 x 8 inches, front and back) of hand-written notes. Because this test is given in the last week of the semester, make up opportunity may not be possible. In case of an anticipated time conflict or an emergency, please contact the instructor at the earliest convenience.
- **Extra Credit:** Practice final exam, which will be administrated online via Canvas in the second last week of the course, is the only extra credit opportunity that will contribute up to 5% of student's final grade.

Grading scale:

- 100 or higher: A+
- 94-99.99: A
- 90-93.99: A-
- 87-89.99: B+
- 83-86.99: B
- 80-82.99: B-
- 77-79.99: C+
- 73-76.99: C
- 70-72.99: C-
- 60-69.99: D
- below 60: F

VII. Course Policies

Academic Integrity: All homework, quizzes and exams in this course must be completed by students as their original and individual work. No group work is allowed when it comes to completing these assignments. While taking quizzes and exams, only resources listed by the instructor (such as non-graphing calculator, scratch paper, periodic table etc.) are allowed. Use of any other resources such as (but not limited to) textbooks, smartphones and other electronics are forbidden. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. For more details on academic integrity violation examples, please see the UNM Academic Dishonesty Policy: <https://policy.unm.edu/regents-policies/section-4/4-8.html>.

Communication: Email is the best way to contact your instructor. My typical response time is less than 24 hours during the workweek and less than 48 hours during the weekend. A summary of the most important information about the course will be posted every Monday via Canvas course shell. Small changes to the original schedule and course design are possible and will be announced by the instructor in a timely manner via Canvas or UNM-associated email.

Accommodations: UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center at arcsrvs@unm.edu or 505-277-3506.

UAP 2720 and 2740. Our classroom and university should foster mutual respect, kindness, and support. If you have concerns about discrimination, harassment, or violence, please seek support and report incidents. Find confidential services at LoboRESPECT Advocacy Center, the Women's Resource Center, and the LGBTQ Resource Center. UNM prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). All instructors are "responsible employees" who must communicate reports of sexual harassment, sexual misconduct and sexual violence to Compliance, Ethics and Equal Opportunity. For more information, please see UAP 2720 and UAP 2740.

Credit-hour statement: This is a three-credit-hour course. Class meets for three 50-minute sessions/two 75-minute sessions of direct instruction for fifteen weeks during the Fall 2025 semester. Please plan for a minimum of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

Respectful Conduct Expectations: I am committed to building with you a positive classroom environment in which everyone can learn. I reserve the right to intervene and enforce standards of respectful behavior when classroom conduct is inconsistent with University expectations [and/or classroom community agreements]. Interventions and enforcement may include but are not limited to required meetings to discuss classroom expectations, written notification of expectations, and/or removal from a class meeting. Removal from a class meeting will result in an unexcused absence. [Insert number] or more unexcused absences may result in permanent removal and a drop from the course (see attendance policy). The University of New Mexico ensures freedom of academic inquiry, free expression and open debate, and a respectful campus through adherence to the following policies: D75: Classroom Conduct, Student Code of Conduct, University Policy 2240 – Respectful Campus, University Policy 2210 – Campus Violence.

Responsible Learning and Academic Honesty: Cheating and plagiarism (academic dishonesty) are often driven by lack of time, desperation, or lack of knowledge about how to identify a source. Communicate with me and ask for help, even at the last minute, rather than risking your academic career by committing academic dishonesty. Academic dishonesty involves claiming that work created by another source is your own original work. It is a Student Code of Conduct violation that can lead to a disciplinary procedure. When you use a resource in work submitted for this class, document how you used it and distinguish clearly between your original work and the material taken from the resource.

Thriving and Finding Support: Students are especially successful at UNM when they take advantage of support and get involved in campus and academic life. Your MyUNM login page provides direct links to wellbeing resources, including financial capability, mental health, food, jobs, and resource centers. MyUNM will help you identify academic resources like peer tutoring and opportunities like study abroad. You can contact academic advisors and resource advisors for information and guidance via Student Hub on MyUNM. I look forward to providing you with information about academic opportunities related to our class and to helping you find support resources.

VIII. Course Schedule

Week	Date	Topic	Assignments
1	1/19, 1/21	Liquids, Solids, and Intermolecular Forces	
2	1/26, 1/28	Liquids, Solids, and Intermolecular Forces, continue	H#1, Q#1
3	2/2, 2/4	Solutions	H#2, Q#2
4	2/9, 2/11	Solutions, continue	Exam #1
5	2/16, 2/18	Chemical Kinetics	
6	2/23, 2/25	Chemical Kinetics, continue	H#3, Q#3
7	3/2, 3/4	Chemical Equilibrium	H#4, Q#4
8	3/9, 3/11	Chemical Equilibrium, continue	Exam #2
9	3/16, 3/18	Spring Break	
10	3/23, 3/25	Acids and Bases	H#5, Q#5
11	3/30, 4/1	Acids and Bases, continue	H#6, Q#6
12	4/6, 4/8	Aqueous Ionic Equilibrium	Exam #3
13	4/13, 4/15	Free Energy and Thermodynamics	
14	4/20, 4/22	Electrochemistry	H#7, Q#7
15	4/27, 4/29	Radioactivity and Nuclear Chemistry	H#8, Q#8
16	5/4, 5/6	Course Review	H#9, Q#9, PFE, Exam #4
FINAL WEEK	Monday, 5/11 9:00-11:00 am	In-Class Final Exam	

Wk – Week of the Course, H – Homework, Q – Quiz, PFE – Practice Final Exam

Red – No Meeting