Syllabus

I. General Information

Instructor:	Dr. Piotr Filipczak
Email:	pfilipczak@unm.edu
Office Hours:	Tuesday and Thursday via Zoom, 10:00 am to 10:45 am
Course Section:	501
Meeting Time:	Asynchronous – resources and activities published via Blackboard and Mastering Chemistry on the weekly basis.

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, a Molecular Approach" by Nivaldo J. Tro, 5th edition, Pearson (*textbook*).
- Mastering Chemistry, Pearson (*online platform for homework and quizzes*).
- Blackboard (*learning management system for communication, online lectures, grades entry, resources navigation and exams*).

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 course is a 16-week course conducted online in the asynchronous mode with lectures, other learning resources, homework, quizzes and exams published by the instructor on the weekly basis. Online office hours which are voluntary (although encouraged) is the only synchronous activity in this class. The following course requirements are in place:

Attendance: Although this is an online course, participation is required and is measured by completion of online activities by the student. 25 assignments including 10 homework, 10 quizzes, 4 partial exams and 1 final exam are scheduled. Students who fail

to complete all assignments scheduled in two consecutive weeks of the course, or who failed to complete 15% of all assignments (which stands for 4 assignments overall despite of the category) will be dropped by the instructor with a W, F or D (depending on the stage of the course).

Performance: Students must collect at least 73% of the possible points in order to complete the course with a passing grade. In order to minimize the risk of receiving F or D grades, students who collected less than 50% of the possible points by March 14th (Spring break) may be dropped by the instructor with a W.

Respondus Lockdown Browser: All exams in this course will require Respondus Lockdown browser which is an electronic tool that prevents some forms of academic misconduct. Simply speaking, you will be recorded while taking exams, and this recording will be available to the instructor (and only instructor) via Blackboard. Additionally, all other browsers on your device will be disabled for the time of the exam. It is critical that you are equipped with the device that matches technical requirements for the use of Respondus (including but not limited to recording camera), otherwise you will not be able to successfully complete the course. UNM-Valencia library has a capacity to issue compatible devices to students after they request it ahead of the time. Instruction on how to install Respondus Lockdown browser together with all the specifications of compatible electronic devices are posted in the course content via Blackboard.

VI. Students Evaluation Criteria

Type of Assignment:	Points per Assignment:	Total Points in this Category:	Percentage of Overall Grade:
Homework (10x)	10 pts	100 pts	20
Quizzes (10x)	10 pts	100 pts	20
Partial Exams (4x)	40 pts	160 pts	32
Final Exam (1x)	140 pts	140 pts	28
Total	**NA**	**500 pts**	**100%**

Note: All evaluations will be executed online either via Backboard (*partial exams and the final exam*) or Mastering Chemistry (homework and quizzes). All assignments will be included into the final grade. However, student is eligible to makeup/redo one homework and one quiz.

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, lab reports 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 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, unauthorized internet websites, personal notes 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: Instructor will do his best to follow original schedule of this course. However, because of the element of unpredictability caused by ongoing COVID-19 pandemic, some modest changes to the course design such as exact number of assignments or others cannot be completely ruled out. Whenever the modification is applied, it will always be implemented to favor student's success in the course, and will be announced by the instructor as soon as possible. It is the student's responsibility, however, to pay attention to the instructor's communications, and in case of any confusion or conflict, communicate back ASAP. All information important to the course will be passed to students via Blackboard: either as announcement posted in the course content, or as an email sent to all students via Blackboard, or both. Thus, keep in mind to (i) log in to your Blackboard account REGULARLY (at least two times per week) and (ii) remember that all email correspondence will take place via student's @unm.edu address which is associated with your Blackboard account (correspondence via other email addresses is not allowed).

Students with Disabilities: If you have a documented disability, the Equal Access Services office will provide me with a letter outlining your accommodations. I will then discuss the accommodations with you to determine the best learning environment. If you feel that you need accommodations, but have not documented your disability, please contact Yolanda Pino, the coordinator for Equal Access Services at 925-8910 or pinoy@unm.edu.

Equal Opportunity and Non-Discrimination: In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education. This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html.

VIII. Course Schedule

Week	Date	Topic	Online Assignments
1	1/19-1/24	Ch 12: Liquids, Solids, and Intermolecular Forces	Hm #1, Qu#1
2	1/25-1/31	Ch 12: Liquids, Solids, and Intermolecular Forces, continue	Hm #2, Qu#2
3	2/1-2/7	Ch 14: Solutions	Hm #3, Qu#3
4	2/8-2/14	Ch 14: Solutions, continue	Exam #1
5	2/15-2/21	Ch 15: Chemical Kinetics	Hm #4, Qu#4
6	2/22-2/28	Ch 15: Chemical Kinetics, continue	Hm #5, Qu#5
7	3/1-3/8	Ch 16: Chemical Equilibrium	Hm #6, Qu#6
8	3/9-3/13	Ch 16: Chemical Equilibrium, continue	Exam #2
9	3/14-3/21	**Spring Break**	
10	3/22-3/28	Ch 17: Acids and Bases	Hm #7, Qu#7
11	3/29-4/5	Ch 17: Acids and Bases, continue	Hm #8, Qu#8
12	4/5-4/11	Ch 18: Aqueous Ionic Equilibrium	Exam #3
13	4/12-4/18	Ch 19: Free Energy and Thermodynamics	Hm #9, Qu#9
14	4/19-4/25	Ch 20: Electrochemistry	Hm #10, Qu#10
15	4/26-5/2	Ch 21: Radioactivity and Nuclear Chemistry	Exam #4
16	5/3-5/9	Course Review	
FINAL WEEK	**5/10-5/13**	**Online Final Exam via Blackboard**	

Hm – homework, Qu – quiz