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CHEM 126-H02: General Chemistry II

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Chemistry:
Spring 2021 Course
Syllabus

[NJIT Academic Integrity Code](#): All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: Chem 126

Number of Credits: 3

Prerequisites: A C or higher in Math 110 or equivalent

Course-Section and Instructors

Course-Section	Instructor
Chem 126:	Dr. Bhavani Balasubramanian

Office Hours: Tuesday and Friday: 2:00- 3:00 pm

Webex meeting room: <https://njit.webex.com/meet/balasubr>

Webpage: The course website is available through Canvas, which can be accessed via canvas.njit.edu. Please email your instructor immediately if you cannot access the class site. All materials including lecture summaries, any PowerPoint slides, and other documents will be posted on the class site. Please check the site frequently for new materials and announcements. All grades for this course will be posted to Canvas on a regular basis. You are responsible for all updates posted to Canvas, and if you find any mistakes in content or grading, or you need help accessing these materials, please contact your instructor as soon as possible.

Required Textbook:

Title	Chemical principles
Author	Zumdahl and Decoste
Edition	8th
Publisher	Cengage
ISBN #	ISBN-13: 978-1305581982

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, April 5, 2021

Learning Outcomes:

1. Define Reaction Rate, relate reaction rate to stoichiometry and determine order of a reaction
2. Describe the factors affecting reaction rate
3. Use kinetic data to write reasonable reaction mechanisms and use *Steady State approximation for reaction intermediates, pseudo order reaction*
4. Explain equilibrium and equilibrium constants
5. Understand the concept of equilibrium constant and the reaction quotient, Q
6. Use equilibrium constant to determine the direction of reaction and product yield in the context of various chemical reactions
7. Use Le Chatelier's principle to determine direction of reaction
8. Understand different definitions of acids and bases
9. Explain the autoionization of water and the concept of pH to discuss acid/base strength
10. Define and perform calculations relating to acid and base dissociation constant
11. Explain the concept of buffer solution and their importance
12. Perform calculations to show the efficiency of buffer solutions
13. Interpret equilibrium constants K_{sp} and discuss solubility of sparingly soluble salts *and complex ions*
14. Interpret titration curves and calculate the pH of the solution during titration of strong and weak acids versus base
15. *Determine the pH of acidic, basic salts and salts where both ions are conjugates of weak acid or base*
16. Understand and explain energy transformations in chemical reactions
17. *Explain reversible and irreversible work*
18. Explain entropy, Gibbs free and the second and third law of thermodynamics.
19. Determine whether a reaction is spontaneous
20. Calculate thermodynamic parameters ΔG , ΔS , ΔH and relate the equilibrium constant to these parameters
21. Balance redox reaction and write oxidation and reduction half -reaction
22. Calculate the cell potential for a redox reaction in a galvanic cell
23. Relate cell potential to thermodynamic parameters and determine the direction of spontaneity
24. Use Faraday's law to determine the amount of material deposited during electroplating
25. Explain electrolysis and overvoltage
26. Differentiate between chemical reaction and nuclear reaction
27. Balance nuclear equations and describe the particle emitted during the process
28. Predict the type of emission from unstable nuclides
29. Use mass -energy relationship to calculate the energy released during nuclear processes
30. Distinguish between nuclear fission and fusion
31. Describe the applications of nuclear reactions in energy production
32. Name simple organic compounds and the basic functional groups
33. Write reactions of alkanes, alkenes and alkynes

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

In addition, obtaining course materials such as past exams or solutions to homework and/or class assignments from external sources constitutes as cheating. The official Student's Solutions Guide is exempt. Posting of course materials on external websites without the approval of the instructor violates intellectual property laws and hence strictly forbidden. Any student caught cheating on homework will be assessed a penalty of 20 points, in addition to a grade of zero for the given homework assignment.

Students are encouraged to seek help from their Instructors during office hours.

Grading Policy: The final grade in this course will be determined by a point total based on the following:

Homework + Class exams	250
Class Participation	100
Common Exam I	175
Common Exam II	175
Final Exam	300
Total points	1000

Your final letter grade in this course will be based on the following tentative curve:

A	>835	C	600-659
B+	775-834	D	550-599
B	710-774	F	< 550
C+	660-709		

You must maintain an average of 35%, which is 228 points in the common exams and finals to be considered for a grade of D or higher. You will receive an F even if you have adequate point total without this requirement.

ATTENDANCE POLICY: Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

LECTURE (CONVERGED OR SYNCHRONOUS ONLINE): A computer and scientific (non-graphing, non-programmable) calculator are required for all lectures. Students are expected to come to lecture after having reviewed the pre-recorded lecture notes available in Canvas. A laptop will be required for all classes even for in-person students. We will be doing a lot of problem -solving, so a paper notebook where you can do problems is highly recommended.

If your computer malfunctions or you are unable to attend class either in person or remotely, you are required to inform the instructor, via e-mail the **same day**. Failure to notify the instructor will result in loss of points for that day.

RECITATION (SECOND LECTURE PERIOD) CONVERGED: Each recitation, the students will be given problems to solve. You will be given adequate time to complete the problem and upload/submit your work. These problems are essential for helping you learn and are worth points. So please take the time to do the work neatly and upload/submit them in the space provided in CANVAS. Students who miss a recitation for a valid reason must still make up the work to get credit.

CONVERGED LEARNING RESPONSIBILITY: The shift to remote and converged teaching due to the COVID-19 pandemic has required that both instructors and students make changes to their normal working protocols for courses. Students are asked to practice extra care and attention in regard to academic honesty, with the understanding that all cases of plagiarism, cheating, multiple submission, and unauthorized collaboration are subject to penalty. Students may not collaborate on exams or assignments, directly or through virtual consultation, unless the instructor gives specific permission to do so. Posting an exam, assignment, or answers to them on an online forum (before, during, or after the due date), in addition to consulting posted materials, constitutes a violation of the university’s Honesty policy. Likewise, unauthorized use of live assistance websites, including seeking “expert” help for specific questions during an exam, can be construed as a violation of the honesty policy. All students should be familiar with the NJIT integrity code: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

In addition to adhering to the NJIT Integrity statement, converged learning also places a significant amount of responsibility on you. Please review the email sent by the registrar for detailed instructions on classroom assignment and dates when you will be on campus. This can be accessed via **Back2Classroom** app. More details can be found at: <https://back2classroom.njit.edu/getting-started-students>

HOMEWORK POLICY:

Homework is 100% online and accessed via CANVAS. The homework is to test your understanding of the material being taught. This homework will build on the classroom content and enhance your understanding of the material. This homework will also be good preparation for the common exams. It is important that you aim to get > 90% in all your homework to get the most benefit.

Each homework assignment has it due date. In addition, Canvas has a calendar with due dates. **ALL**

HOMEWORK MUST BE DONE ON TIME. There is no credit for late homework. DO NOT WAIT TO THE LAST MINUTE TO DO YOUR HOMEWORK. ONLINE SYSTEMS ARE NOT 100% RELIABLE. UNEXPECTED EVENTS, like Canvas being down, MAY OCCUR but they are not considered valid excuses for missing a due date. PLAN TO FINISH YOUR HOMEWORK AT LEAST ONE DAY BEFORE IT IS DUE.

EXAM REVIEW: Before each exam, a review packet will be distributed, and the student will have to submit

the work to the instructor. This will get tallied as homework points in the total score. You can get help from the instructor during office hours to get through this packet.

EXAMS: There will be two midterm (Common) exams held in class during the semester and one comprehensive final exam. The following exam periods are tentative and therefore possibly subject to change:

Common Exam I	February 22
Common Exam II	March 29
Reading Days	May 5 and 6
Final Exam Period	May 7 - 13

The final exam will test your knowledge of all the course material taught in the entire course.

ADMINISTRATION OF EXAMS:

The Common and Final Exams will be administered in the using the RESPONDUS browser with Webcam. **This browser is available in Canvas. Students must complete a proper environment check before starting the exam in the exam video by showing their calculator, blank scratch paper, their work surface, cell phone is placed away from work area, and a 360 degree view of their workspace to confirm no information is posted around the work area. Students may only use scientific (non-programmable, non-graphing) calculators on exams. The student will also be asked to show a photo-ID.**

During the exam, you have to adopt the following behaviors:

1. No cell phones anywhere near the exam-- any indication of cell phone presence (a ring tone, vibration, music, or a phone visible to the camera will result in a point penalty)
2. Not talking to anyone.
3. No covering of face (either with clothing or hand) unless the student is in a public space (like the library)
4. No moving out of frame.
5. No listening to music or having headphones/earbuds on.
6. No setting up the camera so that the camera's view is not completely on student and workspace.

To protect the test's integrity, anyone found to violate any of the rules (2-6) of an exam or have facial recognition for less than 50% of the exam time will be docked 10 points for each violation from their exam score.

We understand these are difficult times and it is natural to move around when taking an exam in the comfort of your home. We must remind you that this is a high stakes exam and must be treated as such. Please observe all exam rules as if you were taking the exam in person.

TEST GRADING ERROR. Test scores will be available in Canvas roughly 2 weeks after the test. If you wish to go over your exam, arrange to meet your instructor during office hours as these online exams may not be visible after submission. If you believe there is an error, you have one week after scores are posted to submit a test for regrading. You must describe the error via email to your professor for consideration.

ALL ERRORS NEED TO BE BROUGHT TO THE INSTRUCTOR'S ATTENTION WHEN THEY OCCUR. DO NOT WAIT UNTIL THE END OF THE SEMESTER

MAKEUP EXAM POLICY: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed. **One cumulative make-up examination** will be permitted at the end of the semester if there is an acceptable and substantial reason. A grade of zero will be given for a second missed examination independent of reason. ***Tentative date of the makeup exam is during the week of May 3rd***

Using Respondus LockDown Browser and a Webcam for Online Exams

Respondus LockDown Browser is a locked browser that prevents you from printing, copying, going to another URL, or accessing other applications during a quiz. If a Canvas quiz requires that LockDown Browser be used, you will

not be able to take the assessment or quiz with a standard web browser. You may be required to use LockDown Browser with a webcam (Respondus Monitor), which will record you during an online exam.

The webcam can be built into your computer or can be the type that plugs in with a USB cable. Watch this [short video](#) to get a basic understanding of LockDown Browser and the webcam feature. A student [Quick Start Guide \(PDF\)](#) is also available.

1. Download and install LockDown Browser from this link:
<http://www.respondus.com/lockdown/download.php?id=264548414>
2. Once your download has finished, locate the "LockDown Browser" shortcut on the desktop and double-click it. (For Mac users, launch "LockDown Browser" from the Applications folder.)
3. You will be brought to the Canvas or Moodle login page within the LockDown Browser. If you are in Moodle, click "Login with your UCID" to log in with your NJIT UCID and password and then click Login.
4. Under "My courses," click on the course in which you have to take the exam that requires the LockDown Browser.
5. After you enter the course, find the exam and click on it.
6. A confirmation prompt will appear. Click the "Start attempt" button. Once a quiz has been started with LockDown Browser, you cannot exit until the Submit all and finish button is clicked.
7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.

HOW TO SUCCEED IN THIS COURSE:

You are responsible for utilizing the resources provided like pre-recorded lectures to help yourself learn. You will benefit from the lecture and recitation only if you come prepared to class. Please plan to spend at least 6-9 hours each week outside the lecture/recitation period for this class.

All instructors will provide their availability for office hours where you can go for extra help. In addition, the Chemistry tutoring center will be a useful resource where you can get help from peers. On a weekly basis you need to plan for:

- a) Time to listen to pre-recorded lectures (before the class) and review the textbook chapter
- b) Prepare questions to ask the professor during class
- c) Review material and come prepared to do the recitation problems
- d) Time to do the online homework and textbook problems
- e) Work on the Review Packets

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Students can get help from peer tutors on a "walk-in" basis. There is no private tutoring available, however if the center is not too busy, you may be able to get more personal attention. In this peer tutoring model, tutors are taught to encourage interaction among students to promote learning.

Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

Accommodation of Disabilities: Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at **973-596-5417** or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentsuccess/disability-support-services/>

IMPORTANT DATES: (See: [Spring 2021 Academic Calendar](#))

Month	Day	Weekday	Event
January	18	Monday	Martin Luther King, Jr. Day
January	19	Tuesday	First Day of Classes
January	23	Saturday	Saturday Classes Begin
January	25	Monday	Last Day to Add/Drop a Class
January	25	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	26	Tuesday	W Grades Posted for Course Withdrawals
February	2	Tuesday	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
February	15	Monday	Last Day for 50% Refund, Full Withdrawal
March	8	Monday	Last Day for 25% Refund, Full Withdrawal
March	14	Sunday	Spring Recess Begins - No Classes Scheduled - University Open
March	21	Sunday	Spring Recess Ends
April	2	Friday	Good Friday - No Classes Scheduled - University Closed
April	5	Monday	Last Day to Withdraw
May	4	Tuesday	Friday Classes Meet
May	4	Tuesday	Last Day of Classes
May	5	Wednesday	Reading Day 1
May	6	Thursday	Reading Day 2
May	7	Friday	Final Exams Begin
May	13	Thursday	Final Exams End
May	15	Saturday	Final Grades Due
May	TBA		Commencement

Course Outline

This is a second part in a 2 course Chemistry sequence. This course builds on content from Chem 125. So, it is expected that the student will have reviewed Chapters 1-14 before starting this course. The chapter homework correspond to the chapters in the "Chemistry: A Molecular Approach" by Nivaldo Tro fifth edition. The corresponding Zumdahl Chapters are given in green.

Week	Outcomes	Topic	Homework
1	1,2	Chapter 15: Chemical Kinetics (Chapter 15 in Z & Z)	Warm up Basic HW Chapter 15 HW-part 1
2	1,2,3	Chapter 15: Chemical Kinetics (Chapter 15 in Z & Z)	Chapter 15 HW-part 2
3	4,5	Chapter 16: Chemical Equilibrium (Chapter 6 in Z & Z)	Chapter 16 HW- part 1
4	4,5,6,7	Chapter 16: Chemical Equilibrium (Chapter 6 in Z & Z)	Chapter 16 HW- part 2
		EXAM 1: Chapters 15 and 16 (Chapter 16 and 6 in Z & Z)	Feb 22
5	8, 9	Chapter 17: Acids and Bases (Chapter 7 in Z & Z)	Chapter 17 HW- part 1
6	8,9, 10	Chapter 17: Acids and Bases (Chapter 7 in Z & Z)	Chapter 17 HW - part 2
7	11, 12	Chapter 18: Aqueous Ionic Equilibrium (Chapter 8 in Z & Z)	Chapter 18 HW-part 1
8	13,14	Chapter 18: Aqueous Ionic Equilibrium (Chapter 8 in Z & Z)	Chapter 18 HW- part 2
9	15,16	Chapter 19: Free Energy and Thermodynamics (Chapter 10)	Chapter 19 HW - part 1
		EXAM 2: Chapters -17, 18 & part of 19	March 29
10	17,18	Chapter 19: Free Energy and Thermodynamics (Chapter 10)	Chapter 19 HW – part 2
11	19,20,21	Chapter 20: Electrochemistry (Chapter 11)	Chapter 20 HW – part 1
12	21, 22, 23	Chapter 20: Electrochemistry (Chapter 11)	Chapter 20 HW – part 2
13	18, 19,20	Chapter 21: Radioactivity and Nuclear Chem (Chapter 20)	Chapter 21 HW
14	21	Chapter 22: Organic Chemistry (Chapter 21)	Chapter 22 HW
15	1 - 21	FINAL EXAM Review	Basic: Chapters 1-8 Basic Chapters 9-12 ACS reviews: I and II