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Chem 125-004: Chemistry, A Molecular Approach

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THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

CHEM 125: 004

Spring 2023 Course Syllabus

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found

at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. **Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.** If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

COURSE INFORMATION

Course Description: Chem 125

Number of Credits: 3

Corequisites: Math 110 or equivalent

Course-Section and Instructors

Course-Section	Meeting Times
Chem125: 004	Tuesday, Friday
Bharath Ananthanarayanan- Instructor	KUPF 202
	1:00 pm- 2:20pm

Office Hours: TBD

Webex meeting room: <https://njit.webex.com/meet/ba434>

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	Chemistry, A Molecular Approach
Author	Nivaldo J. Tro
Edition	Fifth
Publisher	Pearson
ISBN #	ISBN-13: 978-0134874371

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, April 3, 2023.

Learning Outcomes:

1. Learn measurement units and perform unit conversions systematically using dimensional analysis or multiplication by one
2. Explain atomic structure and determine average atomic mass.
3. Learn to use periodic table to predict charges on atoms.
4. Understand mole concept: convert mass into moles and vice versa
5. Write chemical formulas of compounds using the periodic table and name ions and simple compounds.
6. Calculate mass of molecules, and mass % of individual atoms in compounds
7. Calculate moles, molecular and empirical formula of a compound from basic principles using proper unit conversions
8. Balance chemical equations
9. Identify various types of chemical reactions and apply the concept of limiting reagent to calculate percentage yield of products in different reaction types.
10. Define solute, solvent and apply mole concept in aqueous solutions.
11. Determine oxidation states of elements in compounds
12. Describe acid-base, precipitation, and redox reactions in solution
13. Understand Kinetic model of gases and apply various gas laws in problem solving.
14. Apply first law of thermodynamics to chemical problems and calculate the energy changes in chemical reactions
15. Explain the quantum mechanical basis for the sub-structure of the atom
16. Write the electronic configuration for the elements in the periodic table and describe trends in periodic properties
17. Draw the Lewis dot structures for simple molecules and exceptions to octet rule
18. Discuss electronegativity and bond polarity
19. Use VSEPR to predict shapes of molecules and whether a molecule will have a dipole moment
20. Identify sigma and pi bonds and explain the hybridization of the molecules
21. Explain intermolecular force and the differences in bonding patterns between solids liquids and gases
22. Describe differences in basic crystalline shapes
23. Determine edge length and density of simple crystalline shapes.
24. Predict changes in freezing point, elevation in boiling point and osmotic pressure when a solute dissolves in a pure solvent

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	150
Class Participation (recitation + lecture)	150
Pre-Exam worksheets (virtual) 25 pts X 4 worksheets =	100
Common Exam I	100
Common Exam II	100
Common Exam III	100

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 through **iclicker** and **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

The two class periods are broken into Lecture and Recitation classes. If multiple sections are merged for 1 class that class is the Lecture and the single section class is the Recitation. If single sections meet twice a week, then the instructor either designates one class as Lecture and the other as Recitation or breaks each class into part Lecture and part Recitation

LECTURE (IN PERSON): 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. Instruction will be offered in person unless the University mandates virtual instruction, so attendance is required for all the classes. A laptop is required for all classes as instructors will administer online class quizzes. 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 and you are unable to attend class, you are required to inform the instructor, via email the **same day**. Failure to notify the instructor will result in loss of points for that day.

CLASS RECORDINGS: Class sessions may be recorded by the instructor. These recordings shall only be used as an educational resource and are not to be distributed or used outside of this class. Information on how to access recorded lectures will be made available by your instructor. Any recordings that contain identifiable information about students will not be used beyond this semester.

Class Recording Etiquette: Students are expected to respect their fellow students’ privacy and freedom to learn without disruption. Students are not allowed to capture or reproduce anyone’s name, image, or voice without permission. They must be polite and respectful in the online chat. Informal chat is okay, but typing is restricted to things that one would say out loud in front of the entire class. Students must always conduct themselves on their webcam video as they would in person in a classroom.

IClicker IN CLASSROOM: In order to gauge student comprehension, encourage participation, and track attendance we will use using iClicker Cloud. Each student must download the iClicker Student (formerly iClicker Reef) app to their mobile device or laptop and sign up for the 6 month license. Students must create an account in the application or, if they have an account already, simply sign in. **When creating your profile, please use your name and NJIT email as it appears on the class roster.** Instructors will be using this app to assign grades so having the correct name and email is vital to getting the points you earned! Once in the app, simply select the “add a class” button (top right, appears as a plus sign), search for New Jersey Institute of Technology, and select the course with the name your instructor provides.

RECITATION (IN PERSON): 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 in Canvas. 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.

COURSE LEARNING RESPONSIBILITY: COVID-19 pandemic has required that both instructors and students make

changes to their normal working protocols for courses. We will still have content and quizzes online. As a result, 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, learning in the current environment also places a significant amount of responsibility on you. Please utilize all the resources that are available to you to be successful in the courses. Examples include paying full attention in class, copying notes, accessing the tutoring center, going to instructor office hours for help.

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 its 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.

PRE-EXAM REVIEW QUIZ (25 PTS): A week before each exam, including the Final Exam there will be a timed Pre-Exam Review Quiz on Canvas. The purpose of this quiz is to give students problems that access the student's knowledge of core principles as well as their problem solving skills at a time when the student can still ask for help. These points will be counted as EXAM points!

Common Exams are held on Mondays during the common hour. They start at 4:30P in assigned rooms (TBD)

<i>Pre-exam Review Quiz 1</i>	<i>February 13 - 17</i>
Common Exam I	February 20
<i>Pre-exam Review Quiz 2</i>	<i>March 13 - 17</i>
Common Exam II	March 20
<i>Pre-exam Review Quiz 3</i>	<i>April 10 - 14</i>
Common Exam III	April 17
Reading Days	May 3 and 4
<i>Pre-Final Exam Review Quiz</i>	<i>TBD</i>
Final Exam Period	May 5 – 11

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 person unless University Policies dictate otherwise. Any virtual exam will use the RESPONDUS browser with Webcam (see below). **The in person final Exam will be a proctored ACS final exam.** If University policies dictate a virtual final exam it will be administered using the RESPONDUS browser with Webcam.

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

1. **No cell phones, tablets, other computers, iwatches,** or anything else which can access the internet besides the machine you are running Respondus on should be 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. If you believe there is an error, you have one week after scores are posted to discuss the error with your instructor during office hours.

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 last week in April (23 – 29)**

Using the Respondus LockDown Browser with a Webcam and Microphone 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 or exam. If a Canvas quiz or exam requires that LockDown Browser be used, you will not be able to take the assessment with a standard web browser. The LockDown Browser with a webcam (Respondus Monitor) will record you during an online exam.

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. If an emergency occurs state what has happened before doing anything else. If you leave the exam, you will need to speak with your instructor about rejoining the exam or getting another attempt.

The webcam can be built into your computer or it can be a separate unit that plugs in with a USB cable. In addition, you must have a working microphone to run the software. 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:

1. Time to listen to pre-recorded lectures (before the class) and review the textbook chapter
2. Prepare questions to ask the professor during class
3. Review material and come prepared to do the recitation problems
4. Time to do the online homework and textbook problems
5. 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. In addition, there will be limited tutoring available online as well

Hours of operation are between Monday – Friday 10:00 am - 6:00 pm, either virtually or in-person

Accommodation of Disabilities: Office of Accessibility Resources and Services, OARS (formerly known as Disability Support Services) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT. See <https://www.njit.edu/studentsuccess/node/5> to learn more about their services.

If you are in need of accommodations due to a documented disability please contact the Office of Accessibility Resources and Services at oars@njit.edu or contact Scott Janz, the Associate Director at 973-596-5417 or via email at scott.p.janz@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 is required to receive accommodations on assignments or exams. Eligible students requiring special conditions for exams must fill out an [OARS forms](#) stating the date and time of the exam. It is advisable for eligible students to fill out forms for the three common exams the first week of classes.

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/>

Mental Health and Well-being: NJIT is committed to the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Center for Counseling and Psychological Services (c-CAPS) at <https://www.njit.edu/counseling/> or by calling the c CAPS office at 973-596-3414. If you need support and information about options and resources, please also reach out to the Office of the Dean of Students at <https://www.njit.edu/dos/>

IMPORTANT DATES: (See <https://www.njit.edu/registrar/calendars>)

Spring 2023 Calendar

Month	date	Day	Event
January	16	Monday	Martin Luther King, Jr. Day
January	17	Tuesday	First Day of Classes
January	21	Saturday	Saturday Classes Begin
January	23	Monday	Last Day to Add/Drop a Class
January	23	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
January	24	Tuesday	W Grades Posted for Course Withdrawals
January	30	Monday	Last Day for 90% Refund, Full or Partial Withdrawal, No Refund for Partial Withdrawal after this date
February	13	Monday	Last Day for 50% Refund, Full Withdrawal
March	6	Monday	Last Day for 25% Refund, Full Withdrawal
March	13	Monday	Spring Recess Begins - No Classes Scheduled - University Open
March	18	Saturday	Spring Recess Ends
April	3	Monday	Last Day to Withdraw
April	7	Friday	Good Friday - No Classes Scheduled - University Closed
April	9	Sunday	Easter Sunday - No Classes Scheduled - University Closed
May	2	Tuesday	Friday Classes Meet
May	2	Tuesday	Last Day of Classes
May	3	Wednesday	Reading Day 1
May	4	Thursday	Reading Day 2
May	5	Friday	Final Exams Begin
May	11	Thursday	Final Exams End
May	13	Saturday	Final Grades Due
TBA			Commencement

Course Outline

Week	Outcomes	Topic	Homework
1	1	Chapter 1: Matter, Measurement and problem solving	Warm up Basic HW Chapter 1 homework
2	2,3,4	Chapter 2: Atoms and Elements	Chapter 2 homework
3	4,5,6,7	Chapter 3: Molecules and Compounds	Chapter 3 homework
4	8,9	Chapter 4: Chemical Reactions and Chemical Quantities	Chapter 4 Homework
		EXAM 1: Chapters 1-3 (Feb 20)	
5	10, 11, 12	Chapter 5: Introduction to Solutions and Aqueous Reactions	Chapter 5 Homework
6	13	Chapter 6: Gases	Chapter 6 Homework
7	14	Chapter 7: Thermochemistry	Chapter 7 Homework
8	15	Chapter 8: The Quantum Mechanical Model of the Atom	Chapter 8 Homework
9		SPRING BREAK	
		EXAM 2: Chapters 4-8 (Mar 20)	
10	16,17	Chapter 9: Periodic Properties of the Elements	Chapter 9 Homework
11	17, 18, 19	Chapter 10: Chemical Bonding I: The Lewis Model	Chapter 10 Homework
12	18, 19, 20	Chapter 11: Molecular shapes, Valence Bond Theory and Molecular Orbital Theory	Chapter 11 Homework
13	21	Chapter 12: Liquids, Solids and Intermolecular Forces	Chapter 12 Homework
		EXAM 3: Chapters 9 – 11 (April 17)	
14	22, 23	Chapter 13: Solids and Modern Materials	Chapter 13 Homework
15	24	Chapter 14: Solutions	Chapter 14 Homework
16*	1 - 20	FINAL EXAM Review	Review

*week 16 is also the last week of classes; only Monday and Friday classes will meet.