Fall 2024

Chem 121-003: General Chemistry

Gregory Edens

NJIT New Jersey Institute of Technology

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

CHEM 121
Fall 2024 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 to achieve. 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 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*

Generative AI: *This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.*

In the event of a shift to remote and converged teaching, both instructors and students must 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 must properly cite and attribute all sources used for papers and assignments. 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.

COURSE INFORMATION

Course Description: Chem 121 – Fundamentals of Chemical Principles I. Introduces the basic concepts of chemistry, including chemical reactions and bonding, electronic and molecular structure, gases, and thermochemistry.
Number of Credits: 3
Corequisites: Math 108 or equivalent
Course-Section and Instructors

Course-Section	Meeting Times	Instructor
Chem121: 001	*TF 4:00 PM– 5:20 PM*	Dr. Gregory Edens
Chem121: 003	*WF 10:00 AM – 11:20 AM*	Dr. Gregory Edens
Chem121: 101	*T 6:00 PM – 8:50 PM*	Dr. Gregory Edens

Office Hours: *hours* or by appointment; *include "in person" or "virtual"*
Zoom meeting room: **https://njit.zoom.com/meet/** *name*

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
	Author	Zumdahl, Zumdahl, and DeCoste
	Edition	Tenth
	Publisher	Cengage
	ISBN #	ISBN-13: 978-1-305-95740-4
Auxiliary Text (free):	**Openstax**	https://openstax.org/details/books/chemistry-

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, November 11, 2024.

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 140 points + 30 points class Participation + 5 points syllabus quiz)	175
Pre Exam Quizzes with Respondus (3 x 25pts)	75
Exam I	100
Exam II	100
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 236 points in the common exams, quizzes, 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 to both lecture and recitation classes will be recorded through Aktiv and is **mandatory**. Each class is a learning experience that cannot be replicated through simply "getting the notes."

Do not go in and out of the classroom; this distracts others and you are missing material. You will be marked absent. Do not be watching, listening, or interacting with your phone; your mind is not focused on learning the material and it is a distraction to others; you may be asked to leave. Over the ear headphones should be removed, as should one or both earbuds (wired or wireless), with the exception of special needs with written consent from OARS.

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 lecture notes available in Canvas &/or the relevant textbook section(s). Instruction will be offered *in person* unless the University mandates virtual instruction so assume *in person attendance is required* for all the classes. A laptop/tablet/phone with internet capability is required for all classes as instructors will take attendance using Aktiv polling (see below). A lot of problem -solving is done during class, so a notebook where you can do problems by hand is highly recommended.

If your technology malfunctions and you are unable to participate in Aktiv polling send email to your instructor explaining the problem the **same day** to receive participation points. Please include your name, the course number

and section on your email. Failure to notify the instructor properly or in a timely manner will result in loss of participation points for that day.

Aktiv Learning IN CLASSROOM: In order to gauge student comprehension, encourage participation, and track attendance we will use using Aktiv Learning. Each student must download the Aktiv Learning *app* to their mobile device or laptop and sign up for the class to access homework, and activity problem. The instruction for how to sign up for the class is on canvas with the class code:

Statement on Artificial Intelligence

This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.

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.

RECITATION (SECOND LECTURE PERIOD) IN PERSON: For recitation, the students will be given a worksheet to solve. You will be given adequate time to complete the worksheets and upload your work and enter your answers in Canvas. These worksheets are essential for helping you learn and are worth points. So please take the time to do the work neatly and upload them in the space provided in CANVAS. Students who miss a recitation for a valid reason must still make up the worksheet 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 Aktiv. 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. To maximize your ability to learn through the homework each assignment allows multiple attempts. 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, as shown on Aktiv. Homework will be assigned on Tuesdays and due the Wednesday of the following week. **ALL HOMEWORK MUST BE DONE ON TIME. Once the due date has passed the assignment is locked and there is no way to access the homework questions. There is no credit for late homework.** Also, it is advisable to take screenshots of your completed assignment so you can use them to study for the exam. 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.

Worksheets have their own due dates and must be turned in on time for points. Worksheets will be distributed in class on the second day of the week – recitation – or the second half of a 3-hour class. Worksheets are due by 11:59PM the *day after* they were assigned in class. You will work on worksheets in small groups and will be assigned points as a group (5 points). You must be present in class and actively working in the group to be included in the grade. *These points cannot be made up if you miss class.* Each student is responsible to understand the worksheet solutions. If you understand the answer, teach your group members; if you don't understand it, ask your group members for explanation. Copying answers is self-defeating for this formative assessment. Submitted work will be graded for correctness. There will be a Canvas Quiz associated with each worksheet (5 points). Canvas Quiz will be due two days after you were assigned worksheet in class. Your advantage starts here, you are more likely to earn points if you have understood the worksheet.

PRE-EXAM QUIZ: There will be three take home quizzes worth 25 exam points each prior to each common exam. The quiz will run under the RESPONDUS lockdown browser and webcam (see below) and it is to be *taken outside of class time*. Once open, the entire quiz must be completed in one sitting, and you only have one attempt. You will be able to go back and forth between questions during the quiz but once you leave the RESPONDUS environment you will not be able to get back in. If you leave the RESPONDUS environment due to an emergency or your connection is severed due to internet instability, try to state what is happening while you are still in the Respondus environment then after getting out of Respondus notify your instructor as soon as possible. If you are unable to take it due to an emergency, please contact the Dean of Students. **Pre-Exam quizzes count towards your overall exam points. Pre-Exam quizzes must be completed in the allotted time frame on Canvas. There will be no extensions for the quiz. If the quiz is missed and a Dean's note is provided, there will a cumulative make-up pre-exam quiz at the end of the semester.**

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

Common Exams are held on Mondays during the common hour. They start at 4:30P in assigned rooms (TBD). Plan to be in your seats by 4:15PM

Exam I	**10/14**
Exam II	**11/11**
Exam III	**12/02**
Final Exam	**TBD**

The final exam will be a cumulative exam on chapters 1-11.

ADMINISTRATION OF EXAMS: The Common and Final Exams will be administered in person unless University Policies dictate otherwise. The virtual pre-exam quizzes will use 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 and ensure cell phone is placed away from work area and is inaccessible during the course of the exam. Students may only use scientific (non-programmable, non-graphing) calculators on exams and #2 pencil. The student will also be asked to show a photo-ID**. **No cell phones**, **tablets**, **other computers**, **smartwatches**, or anything else which can access the internet should be anywhere near the exam-- any indication of cell phone, headphones or smart device presence (a ring tone, vibration, music, or a visible phone) will result in a point penalty or a zero on the exam. Talking to anyone during the exam is not permitted.

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, headphones, smartwatches**, 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 or a zero on the exam.
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 or be given a zero.

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.

Using the 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 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.

The webcam can be built into your computer or it can be a separate unit 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 by looking through the slides or watching the videos provided by your instructor. 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 (buy a textbook, read a chapter ahead)
b) Prepare questions to ask the professor during class (notebook, "slide #" in left margin, questions, insights)
c) Review material and come prepared to do the recitation problems (bring calculator to class, it is more efficient than your phone, it is made for calculating, this gives practice using it for exams).

d) Time to do the online Aktiv homework and textbook problems (do end-of-chapter problems and check your work against the back of the book)
e) Work on the Practice Problems (Aktiv) and/or Review Packet
f) You should be willing to accept helpful suggestions from the instructor and classmates during in-class work toward making progress in problem solving, not being "stuck". Those who do so gain understanding and improve their grades. Be willing to be coached. Don't be afraid of looking stupid by asking questions.

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. Note: the Tutoring Center is not open during the first week of classes.

Accommodation of Disabilities: **O**ffice of **A**ccessibility **R**esources and **S**ervices, **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 973-596-5417 or via email oars@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 two common exams the first week of classes

Please request all exams that must be administered by OARS by the end of the first week of class. If accommodations are not requested in a timely manner, your request will be denied.
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 Fall 2024 Academic Calendar)

September	2	Monday	Labor Day. University Closed
September	3	Tuesday	First Day of Classes
Sept	9	Monday	Last Day to Add/Drop a Class
Sept	9	Monday	Last Day for 100% Refund, Full or Partial Withdrawal
Sept	10	Tuesday	W Grades Posted for Course Withdrawals
Sept	16	Monday	Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date
Sept	30	Monday	Last Day for 50% Refund, Full Withdrawal

Oct	21	Monday	Last Day for 25% Refund, Full Withdrawal
Nov	11	Monday	Last Day to Withdraw from Classes
Nov	26	Tuesday	Thursday Classes Meet
Nov	27	Wednesday	Friday Classes Meet
Nov	28	Thursday	Thanksgiving Recess Begins. No Classes
Dec	1	Sunday	Thanksgiving Recess Ends
Dec	11	Wednesday	Last Day of Classes
Dec	12	Thursday	Reading Day 1
Dec	13	Friday	Reading Day 2
Dec	14	Saturday	Saturday Classes Meet
Dec	15	Sunday	Final Exams Begin
Dec	21	Saturday	Final Exams End
Dec	23	Monday	Final Grades Due

(Continued next page)

Course Outline

Week	Outcomes	Topic	Homework
1	1	Chapter 1: Chemical Foundations	Math skills assessment Chapter 1 homework
2	2,3,4	Chapter 2: Atoms, Molecules and Ions	Chapter 2 homework
3,4	4,5,6,7,8	Chapter 3: Stoichiometry	Chapter 3 homework
		EXAM 1: Chapters 1-3 (Monday October 14th)	
5,6	8,9,10, 11, 12	Chapter 4: Types of Chemical Reactions and Solution Stoichiometry	Chapter 4 Homework
7	13	Chapter 5: Gases	Chapter 5 Homework
8	14	Chapter 6: Thermochemistry	Chapter 6 Homework
		EXAM 2: Chapters 5-6 (Monday November 11th)	
9,10	15,16	Chapter 7: Atomic Structure and Periodicity	Chapter 7 Homework
11	17, 18, 19	Chapter 8: Bonding: General Concepts	Chapter 8 Homework
12	18, 19, 20	Chapter 9: Covalent Bonding: Orbitals	Chapter 9 Homework
		EXAM 3: Chapters 7 – 9 (Monday December 2nd)	
13	21, 22, 23	Chapter 10: Liquids and Solids	Chapter 10 Homework
14	24	Chapter 11: Properties of Solutions	Chapter 11 Homework