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Summer 2022

### CHEM 125-141: General Chemistry I

Jonathan Buchspies

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**Chemistry:**  
*Summer 2022 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 125 141

Number of Credits: 3

Prerequisites: NA

Course-Section and Instructors

Course-Section	Instructor
Chem 125 141:	Professor Buchspies

Office Hours: *by appointment*

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 December 28th, 2021. It will be strictly enforced.

### 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. Define solute, solvent and apply mole concept in aqueous solutions.
10. Identify various types of chemical reactions and apply the concept of limiting reagent to calculate percentage yield of products in different reaction types.
11. Understand Kinetic model of gases and apply various gas laws in problem solving.
12. Apply first law of thermodynamics to chemical problems and calculate the energy changes in chemical reactions
13. Explain the quantum mechanical basis for the sub-structure of the atom
14. Write the electronic configuration for the elements in the periodic table and describe trends in periodic properties
15. Draw the Lewis dot structures for simple molecules and exceptions to octet rule
16. Discuss electronegativity and bond polarity
17. Use VSEPR to predict shapes of molecules and whether a molecule will have a dipole moment
18. Identify sigma and pi bonds and explain the hybridization of the molecules
19. Explain intermolecular force and the differences in bonding patterns between solids liquids and gases
20. Describe differences in basic crystalline shapes
21. Determine edge length and density of simple crystalline shapes.
22. 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 (Basic HW: 60 + Regular HW 100) points	150
Class Participation (recitation + lecture)	200
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: A calculator is required for all lectures. If you are in class, but using a cell phone in any way, using a computer, or listening to music you will not get credit for that day's attendance.

In class worksheets: You are expected to come prepared to each class period by reviewing the textbook/slides in Canvas. During each class period, the instructor will ask questions and/or be given a worksheet to solve. The worksheets are collected at the end of the recitation and graded. Students who did not succeed in completing the worksheet during the recitation have one week time to complete the worksheets during office hours. Students who miss a class for a valid reason must still make up the worksheet to get credit.

**Exams:** There will be three exams held in class during the semester:

Common Exam I	TBA
Common Exam II	TBA
Final Exam Period	TBA

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

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**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.

## ADDITIONAL RESOURCES

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](mailto: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: <https://www5.njit.edu/registrar/summer-2022-academic-calendar/>

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## Course Outline

Topic	Homework
Chapter 1: Matter, Measurement and problem solving	Warm up Basic HW Basic HW: Sig Figs Basic HW: Dimensional Analysis Regular HW
Chapter 2: Atoms and Elements	Basic HW Regular HW
Chapter 3: Molecules and Compounds	Basic HW Basic Homework II: ***Using balanced equations*** Regular HW
Chapter 4: Chemical Reactions and Chemical Quantities	Basic HW Regular HW
Chapter 5: Introduction to solutions and Aqueous Reactions	Basic HW Regular HW
Chapter 6: Gases	Basic HW Regular HW
Chapter 7: Thermochemistry	Basic HW I Regular HW I Basic HW II Regular HW II

Chapter 8: The quantum mechanical model of the atom	Basic HW Regular HW
Chapter 9: Periodic Properties of the elements	Basic HW Regular HW I Regular HW II
Chapter 10: Chemical bonding I: The Lewis Model	Basic HW Regular HW
Chapter 11: Molecular shapes, Valence Bond Theory and Molecular Orbital Theory	Basic HW Regular HW
Chapter 12: Liquids, Solids, and Intermolecular Forces	Basic HW Regular HW
Chapter 13: Solids and Modern Materials	Basic HW Regular HW
Chapter 14: Solutions	Basic HW Regular HW
<b>FINAL EXAM Review</b>	Basic: Chapters 1-8 Basic Chapters 9-14 ACS reviews: 1-6