NJIT New Jersey Institute of Technology

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

Chemistry:
Fall 2023 Course Syllabus
CHEM 231-001

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: The topics covered include the properties of ideal and non-ideal gases and liquids, solutions, thermochemistry, thermodynamics, the phase rule, and phase equilibria.

Number of Credits: 3

Prerequisites: (CHEM 122 or CHEM 126) and PHYS 111 and (MATH 211 or MATH 213 or MATH 309) with a grade C or better.

Course-Section and Instructors

Course-Section	Instructor
231-001	Dr. Mieke Peels

Office Hours: See Canvas

Required Textbook:

Title	Physical Chemistry Volume 1
Author	Atkins, de Paula, Keeler
Edition	12th
Publisher	Oxford University Press
ISBN #	9780198851301

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, November 13, 2023. It will be strictly enforced.

Learning Outcomes:

1. Calculate thermodynamic functions of chemical reactions (enthalpy, entropy, Gibbs energy, heat capacity) based on the tabulated data at the reference and other temperatures.
2. Sketch, interpret, and use phase diagrams for one-component systems.
3. Derive the basic thermodynamic relations and state the approximations and the applicability.
4. Calculate the thermodynamic functions of pure compounds and of components in mixtures.
5. Sketch the phase diagrams for liquid-gas, liquid-liquid, and liquid-solid equilibria for mixtures and be able to interpret them.
6. Calculate activities and activity coefficients of ions in solutions.
7. Calculate the state functions of ideal and real gases.

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.

Grading Policy: The final grade in this course will be determined as follows:

Homework	15%
Recitation	5%
Quizzes	10%
Midterm Exam I	20%
Midterm Exam II	20%
Final Exam	30%

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

A	90% and higher	**C**	70% to 74%
B+	85% to 89%	**D**	60% to 69%
B	80% to 84%	**F**	59% and lower
C+	75% to 79%		

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."

Homework Policy: Homework is an expectation of the course. The homework problems set by the instructor are to be handed in for grading and will be used in the determination of the final letter grade as described above. Homework will be accepted late at a penalty of 10% per day for up to five days after the due date. Late assignments will not be accepted after grades and comments are released.

Late Penalty Forgiveness Policy: For students who submit one and only one late homework assignment during the semester, I will remove the late penalty at the end of the course.

Recitations: Attendance at recitation is **mandatory**. During this time, problems will be worked through and uploaded to Canvas. Grades will be given for participation and completeness.

Quizzes: Quizzes will be given at the start of class, and they will be unannounced. The top five quiz grades will be kept and lower scores will be dropped. At least seven pop quizzes will be given over the course of the semester.

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

Midterm Exam I	Thursday, October 5
Midterm Exam II	Thursday, November 2
Final Exam Period	December 17 – December 23

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

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 so that appropriate steps can be taken to make up the grade.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday – Friday 10:00 am - 6:00 pm. For further information please click here.

Accommodation of Disabilities: **O**ffice of **A**ccessibility **R**esources and **S**ervices (***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: Fall 2023 Academic Calendar, Registrar
https://www.njit.edu/registrar/fall-2023-academic-calendar

Date	Day	Event
September 5	T	First Day of Classes
September 11	M	Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
September 12	T	W Grades Posted for Course Withdrawals
September 18	M	Last Day for 90% Refund, Full or Partial Withdrawal No Refund for Partial Withdrawal after this date
October 2	M	Last Day for 50% Refund, Full Withdrawal
October 23	M	Last Day for 25% Refund, Full Withdrawal
November 13	M	Last Day to Withdraw
November 21	T	Thursday Classes Meet
November 22	W	Friday Classes Meet
November 23	R	Thanksgiving Recess Begins
November 26	Su	Thanksgiving Recess Ends
December 13	W	Last Day of Classes
December 14	R	Reading Day 1
December 15	F	Reading Day 2
December 17	M	Final Exams Begin
December 23	Sa	Final Exams End
December 25	M	Final Grades Due

Course Outline

Lectur	Date	Topic	Assignment
1	T 9/5	Syllabus, Focus 1A: The perfect gas	See Canvas for HW
2	R 9/7	Focus 1C: Real gases	
3	T 9/12	Focus 1C: Real gases	
4	R 9/14	Focus 2A: Internal energy	
5	T 9/19	Focus 2B: Enthalpy	
6	R 9/21	Focus 2C: Thermochemistry	
7	T 9/26	Focus 2D: State functions and exact differentials	
8	R 9/28	Focus 2E: Adiabatic changes	
9	T 10/3	Midterm 1 Review	
10	R 10/5	**Midterm Exam 2 (Topics 1 and 2)**	
11	T 10/10	Focus 3A: Entropy, Focus 3B: Entropy changes accompanying specific processes	
12	R 10/12	Focus 3C: The measurement of entropy	
13	T 10/17	Focus 3D: Concentrating on the system	
14	R 10/19	Focus 3E: Combining the First and Second Laws	
15	T 10/24	Focus 4A: Phase diagrams of pure substances	
16	R 10/26	Focus 4B: Thermodynamic aspects of phase transitions	
17	T 10/31	Midterm 2 Review	
18	R 11/2	**Midterm Exam 2 (Topics 3 and 4)**	
19	T 11/7	Ideal Mixtures (Focus 5A/5B)	
20	R 11/9	Real Mixtures (Focus 5A/5B)	
21	T 11/14	Real Mixtures (Focus 5A/5B)	
22	R 11/16	Focus 5C: Phase diagrams of binary systems: liquids	
23	T 11/21 (**Thurs Classes Meet**)	Focus 5C: Phase diagrams of binary systems: liquids	
24	T 11/28	Focus 5D: Phase diagrams of binary systems: solids	
25	R 11/30	Focus 5E: Phase diagrams of ternary systems	
26	T 12/5	Focus 5F: Activities	
27	R 12/7	Final Exam Review	
28	T 12/12	Final Exam Review	

This syllabus may change based on material covered and other factors.