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Chem 235-002: Physical Chemistry II

Mieke Peels

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Chemistry:
Spring 2023 Course
Syllabus
CHEM 235-002 (3 credits,
4 contact hours)

[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

Chem 235 Course Description: A continuation of CHEM 231. The topics include homogeneous and heterogeneous chemical equilibria, ionic equilibria, electrochemistry, kinetic theory of gases, transport phenomena, kinetics, and irreversible processes.

Chem 231 Prerequisites: CHEM 231 with a grade C or better.

Office Hours: TBA on Canvas

Instructor: Dr. Mieke Peels (they/them/theirs)
Contact information: mieke.peels@njit.edu or Canvas messaging

Required Textbook:

Title	Physical Chemistry
Author	Peter Atkins, Julio de Paula, and James Keeler
Edition	11 th
Publisher	Oxford University Press
ISBN #	ISBN: 9780198817895

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

Learning Outcomes: *By the end of this course, you should be able to do the following:*

- 1) Calculate chemical equilibria in simple reactions and predict impact of temperature and pressure.
- 2) Calculate activities of ions in solutions.
- 3) Calculate the transfer parameters (diffusion coefficient, viscosity, thermal and electrical conductivity).
- 4) Determine the Arrhenius parameters of a chemical reaction from the rate vs. temperature data.
- 5) Process data for reactions of simple orders.
- 6) Build up mechanisms of complex chemical reactions, construct corresponding systems of ODE, and use the steady-state approximation.
- 7) Estimate rate constants of elementary chemical reactions using the Simple Collision Theory and the Transition State Theory.

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	25%
Recitation Participation	5%
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 must be submitted as a single pdf through Canvas. 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. One recitation grade will be dropped at the end of the course.

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	Tuesday, February 14 Chapters 6 and 17A-B
Midterm Exam II	Tuesday, March 28 Chapters 17C-G
Final Exam Period	Friday, May 5 - Thursday, May 11 Cumulative

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

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 Scott Janz at spj6@njit.edu, Associate Director of the Office of Accessibility Resources & Services (OARS), Kupfrian Hall 201, to discuss your specific needs. A Letter of Accommodation Eligibility from the OARS 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/studentssuccess/disability-support-services/>

Important Dates See: Spring 2023 Academic Calendar, Registrar
<https://www.njit.edu/registrar/spring-2023-academic-calendar>

Date	Day	Event
January 16	M	Martin Luther King Jr Day
January 17	T	First Day of Classes
January 23	M	Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
January 24	T	W Grades Posted for Course Withdrawals
January 30	M	Last Day for 90% Refund, Full or Partial Withdrawal No Refund for Partial Withdrawal after this date
February 13	M	Last Day for 50% Refund, Full Withdrawal
March 6	M	Last Day for 25% Refund, Full Withdrawal

March 13	M	Spring Recess Begins
March 18	S	Spring Recess Ends
April 3	M	Last Day to Withdraw
April 7	F	Good Friday - No Classes Scheduled
April 9	Su	Easter Sunday - No Classes Scheduled
May 2	T	Last Day of Classes - Friday Classes Meet
May 3	W	Reading Day 1
May 4	Th	Reading Day 2
May 5	F	Final Exams Begin
May 11	Th	Final Exams End
May 13	Sa	Final Grades Due

Course Outline

Lecture	Date	Topic	Assignment
1	T 1/17	Syllabus, Topic 5 Review: Chemical potentials and activities	See Canvas for homework
2	Th 1/19	Focus 6A: The equilibrium constant	
3	T 1/24	Focus 6B: The response of equilibria to the conditions	T 1/24 Focus 6A
4	Th 1/26	Focus 6C: Electrochemical cells	
5	T 1/31	Focus 6D: Electrode potentials	T 1/31 Focus 6B, 6C
6	Th 2/2	Focus 17A: The rates of chemical reactions	
7	T 2/7	Focus 17B: Integrated rate laws	T 2/7 Focus 6D, 17A
8	Th 2/9	REVIEW	F 2/10 Focus 17B
9	T 2/14	Midterm Exam 1 (Chapters 6 and 17A-B)	
10	Th 2/16	Focus 17C: Reactions approaching equilibrium	
11	T 2/21	Focus 17D: Arrhenius equation	T 2/21 Exam 1 Corrections
12	Th 2/23	Focus 17E: Reaction mechanisms	
13	T 2/28	Focus 17E: Reaction mechanisms	T 2/28 Focus 17C, 17D
14	Th 3/2	Focus 17F: Examples of reaction mechanisms	
15	T 3/7	Focus 17F: Examples of reaction mechanisms	T 3/7 Focus 17E, 17F
16	Th 3/9	Focus 17G: Photochemistry	
SPRING RECESS: Monday, March 13 to Saturday, March 18			
17	T 3/21	Focus 17G: Photochemistry	
18	Th 3/23	REVIEW	F 3/24 Focus 17F, 17G
19	T 3/28	Midterm Exam 2 (Chapter 17C-G)	
20	Th 3/30	Focus 1B: The Kinetic Model	
LAST DAY TO WITHDRAW: Monday, April 3			
21	T 4/4	Focus 16A: Transport properties of a perfect gas	T 4/4 Exam 2 Corrections
22	Th 4/6	Focus 16B: Motion in liquids	
Good Friday: No Classes Friday, April 7			
23	T 4/11	Focus 16C: Diffusion	T 4/11 Focus 1B, 16A, 16B
24	Th 4/13	Focus 18A: Collision theory	
25	T 4/18	Focus 18A: Collision theory, Focus 18B: Diffusion-controlled reactions	T 4/18 Focus 16C, 18A
26	Th 4/20	Focus 18B: Diffusion-controlled reactions	
27	T 4/25	REVIEW**	T 4/25 Focus 18B
28	Th 4/27	REVIEW**	
29	T 5/2	Friday Classes Meet	
FINAL	TBD	All of the covered material	

**If we run out of class time, we may use one or both of the last two sessions to cover new material, and a review session will be held outside of class hours.

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

Updated by Dr. Peels -January, 2023
Department of Chemistry & Environmental Sciences (CES)
Course Syllabus, Fall 2020
