

Spring 2019

CHEM 126-H02: General Chemistry II

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Chemistry:
Spring 2019 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 126

Number of Credits: 3

Prerequisites: A C or higher in Math 110 or equivalent

Course-Section and Instructors

| Course-Section | Instructor |
|----------------|------------|
| Chem 126: | |

Office Hours:

Required Textbook:

| | |
|-----------|-------------------------|
| Title | Chemical principles |
| Author | Zumdahl and Decoste |
| Edition | 8th |
| Publisher | Cengage |
| ISBN # | ISBN-13: 978-1305581982 |

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, April 8, 2019. It will be strictly enforced.

Learning Outcomes:

1. Define Reaction Rate, relate reaction rate to stoichiometry and determine order of a reaction
2. Describe the factors affecting reaction rate
3. Use kinetic data to write reasonable reaction mechanisms and use *Steady State approximation for reaction intermediates*
4. Explain equilibrium and equilibrium constants
5. Understand the concept of equilibrium constant and the reaction quotient, Q
6. Use equilibrium constant to determine the direction of reaction and product yield in the context of various chemical reactions
7. Use Le Chatelier's principle to determine direction of reaction
8. Understand different definitions of acids and bases
9. Explain the autoionization of water and the concept of pH to discuss acid/base strength
10. Define and perform calculations relating to acid and base dissociation constant
11. Explain the concept of buffer solution and their importance
12. Perform calculations to show the efficiency of buffer solutions
13. Interpret equilibrium constants K_{sp} and discuss solubility of sparingly soluble salts *and complex ions*
14. Interpret titration curves and calculate the pH of the solution during titration of strong and weak acids versus base
15. *Determine the pH of acidic, basic salts and salts where both ions are conjugates of weak acid or base*
16. Understand and explain energy transformations in chemical reactions
17. *Explain reversible and irreversible work*
18. Explain entropy, Gibbs free and the second and third law of thermodynamics.
19. Determine whether a reaction is spontaneous
20. Calculate thermodynamic parameters ΔG , ΔS , ΔH and relate the equilibrium constant to these parameters
21. Balance redox reaction and write oxidation and reduction half -reaction
22. Calculate the cell potential for a redox reaction in a galvanic cell
23. Relate cell potential to thermodynamic parameters and determine the direction of spontaneity
24. Use Faraday's law to determine the amount of material deposited during electroplating
25. Explain electrolysis and overvoltage
26. Differentiate between chemical reaction and nuclear reaction
27. Balance nuclear equations and describe the particle emitted during the process
28. Predict the type of emission from unstable nuclides
29. Use mass -energy relationship to calculate the energy released during nuclear processes
30. Distinguish between nuclear fission and fusion
31. Describe the applications of nuclear reaction s in energy production
32. Name simple organic compounds and the basic functional groups
33. Write reactions of alkanes, alkenes and alkynes

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 (85) + Honors HW (85)) points | 230 |
| Supplement Exams + Project | 120 |
| Common Exam I | 125 |
| Common Exam II | 125 |
| Common Exam III | 125 |
| Final Exam | 275 |
| 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: An I-clicker and calculator are required for all lectures. If your iclicker malfunctions, you are required to inform the instructor, either in person or via e-mail the **same day**. Failure to notify the instructor will result in loss of points for that day. 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. If you are cheating (having a second I-clicker) you and the person for whom you are cheating will get 0 for the entire semester. There are ways to check! So, be honest.

In class worksheets: You are expected to come prepared to each class period by reviewing the textbook/slides in moodle. 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.

Homework Policy: There are two types of homework: Basic and Regular.

Basic Homework, worth 60 points: It is recommended that you do the basic HW for the chapter before coming to the lecture. This homework is intended as a preparation for your participation in class. Getting > 70% in the basic homework before the lecture, will ensure you have the foundation necessary to understand what is being taught in class.

Regular homework, worth 100 points: This 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.

All homework is very important. However, it is important that you aim to get > 90% in the basic and >70% in the regular HW to help you pass this class.

Each homework assignment has its due date. In addition, Moodle 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 AND UNEXPECTED EVENTS MAY OCCUR. IN GENERAL, THERE IS NO LATE HOMEWORK AND MOODLE BEING DOWN IS NOT A VALID EXCUSE. PLAN TO FINISH YOUR HOMEWORK AT LEAST ONE DAY BEFORE IT IS DUE.

Exams: There will be three 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:

| | |
|-------------------|--|
| Common Exam I | Monday 4:30 - 5:45pm - 2/18/19 |
| Common Exam II | Monday 4:30 - 5:45pm - 4/1/19 |
| Common Exam III | Monday 4:30 - 5:45pm - 4/29/19 |
| Final Exam Period | May 10 th to 16 th |

Supplement Exams: The supplement exams are unique to the Honors class and test the students on the outcomes listed under “general outcomes”. The goal is to help the students learn to synthesize multiple concepts and recognize familiar concepts in complex problems. *Tentative dates: March 4th and April 17th*

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

TEST GRADING ERROR. Tests are returned in recitations following the test. If you believe there is an error, you have until the Thursday following the test to submit a test for regrading. You must write a very brief description of the problem on the back of the test. (The answer key is provided in Moodle in the TEST INFORMATION book. You should always learn from your mistakes and go over the answer key.)

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 May 3rd at 7.00 am.**

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. 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.

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. 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/studentssuccess/disability-support-services/>

Important Dates (See: [Fall 2018 Academic Calendar, Registrar](#))

| Month | Date | Day | Ev |
|----------|------------------------------------|------------|--|
| January | 21 | Monday | Martin Luther King, Jr. Day |
| January | 22 | Tuesday | First Day of Classes |
| February | 2 | Saturday | W Grades Posted for Course Withdrawal |
| March | 17-24 | Sunday | Spring Recess Begins |
| April | 8 | Monday | Last Day to Withdraw |
| April | 19 | Friday | Good Friday - University Closed |
| May | 7 | Tuesday | Last day of classes: Friday Classes Meet |
| May | 8 th -9 th | Wed- Thurs | Reading Days |
| May | 10 th -16 th | Friday | Final Exams Period |

Course Outline

This is a second part in a 2 course Chemistry sequence. This course builds on content from Chem 125. So, it is expected that the student will have reviewed Chapters 1-14 before starting this course.

| Week | Outcomes | Topic | Homework |
|-------------------------------------|--------------|---|--|
| 1 | 1,2 | Chapter 14: Chemical Kinetics Chapter 15 in Zumdahl & DeCoste | Warm up Basic HW Basic HW: Review of graphing Chapter 14 Basic HW I Chapter 14 Regular HW I |
| 2 | 1,2,3 | Chapter 14: Chemical Kinetics Chapter 15 in Zumdahl & DeCoste | Basic HW: Unit Conversions Chapter 14 Basic HW II Chapter 14 Regular HW II |
| 3 | 4,5 | Chapter 15: Chemical Equilibrium Chapter 6 in Zumdahl & DeCoste | Basic HW Review: Balancing Eq Chapter 15 Basic HW I Chapter 15 Regular HW I |
| EXAM 1: Chapters 14-15 | | | |
| 4 | 4,5,6,7 | Chapter 15: Chemical Equilibrium Chapter 6 in Zumdahl & DeCoste | Chapter 15 Basic HW II Chapter 15 Regular HW II |
| 5 | 8, 9 | Chapter 16: Acids and Bases Chapter 7 in Zumdahl & DeCoste | Chapter 16 Basic HW I Chapter 16 Regular HW I |
| 6 | 8,9, 10 | Chapter 16: Acids and Bases Chapter 7 in Zumdahl & DeCoste | Chapter 16 Basic HW II Chapter 16 Regular HW II |
| EXAM 2: Chapters -15 -16, 17 | | | |
| 7 | 11, 12,13,14 | Chapter 17: Aqueous Ionic Equilibrium Chapter 8 in Zumdahl & DeCoste | Chapter 17 Basic HW I Chapter 17 Regular HW I |
| 8 | 15,16 | Chapter 18: Free Energy and Thermodynamics Chapter 9 in Zumdahl & DeCoste | Chapter 18 Basic HW I: Review of Thermochemistry Chapter 18 Regular HW |
| 9 | 17,18 | Chapter 18: Free Energy and Thermodynamics Chapter 10 in Zumdahl & DeCoste | Chapter 18 Basic HW II Chapter 18 Regular HW II |
| 10 | 19,20,21 | Chapter 19: Electrochemistry Chapter 11 in Zumdahl & DeCoste | Chapter 19 Warm up-Oxidation States Chapter 19 Basic HW I Chapter 19 Regular HW I |
| EXAM 3: Chapters 18-19 | | | |

| | | | |
|----|------------|---|---|
| 11 | 21, 22, 23 | Chapter 19: Electrochemistry Chapter 11 in Zumdahl & DeCoste | Chapter 19 Basic HW II Chapter 19 Regular HW II |
| 12 | 18, 19,20 | Chapter 20: Radioactivity and Nuclear Chemistry | Chapter 20 Basic HW I Chapter 20 Regular HW I |
| 13 | 21 | Chapter 21: organic Chemistry | Chapter 21 Regular HW |
| 14 | 1 - 21 | FINAL EXAM Review | Basic: Chapters 1-8 Basic Chapters 9-12 ACS reviews: I and II |

