Fall 2018

CHEM 122 - Fundamentals of Chemical Principles II

Duane Butherus

Follow this and additional works at: https://digitalcommons.njit.edu/chem-syllabi

Recommended Citation
https://digitalcommons.njit.edu/chem-syllabi/20

This Syllabus is brought to you for free and open access by the NJIT Syllabi at Digital Commons @ NJIT. It has been accepted for inclusion in Chemistry and Environmental Science Syllabi by an authorized administrator of Digital Commons @ NJIT. For more information, please contact digitalcommons@njit.edu.
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 122 - All Sections

Number of Credits: 3

Corequisites: Math 110 or equivalent

Course-Section and Instructors

<table>
<thead>
<tr>
<th>Course-Section</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 122- All sections</td>
<td>Duane Butherus</td>
</tr>
</tbody>
</table>

Office Hours: M 2:00-4:00 PM, W, Th 1:30-2:30 PM, F 12:00-1:30 PM
Office: T-351

Required Textbook:

<table>
<thead>
<tr>
<th>Title</th>
<th>Chemistry, 10th Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authors</td>
<td>Steven S. Zumdahl</td>
</tr>
<tr>
<td>Edition</td>
<td>10th</td>
</tr>
<tr>
<td>Publisher</td>
<td>Cengage</td>
</tr>
</tbody>
</table>

University-wide Withdrawal Date: The last day to withdraw with a W is Monday, November 12, 2018. 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
4. Explain equilibrium and equilibrium constants
5. Interpret equilibrium constants to explain strong weak acids,
6. Use equilibrium constant to determine the direction of reaction and product yield in the context of various chemical reactions
7. Interpret titration curves and calculate the pH of the solution during titration of strong and weak acids versus base
8. Interpret and be able to predict solubility of sparingly soluble salts
9. Explain entropy, Gibbs free and the second and third law of thermodynamics.
10. Determine whether a reaction is spontaneous
11. Calculate thermodynamic parameters ΔG, ΔS, ΔH and relate the equilibrium constant to these parameters
12. Balance redox reaction and write oxidation and reduction half-reaction
13. Calculate the cell potential for a redox reaction in a galvanic cell
14. Interpret cell potential to thermodynamic parameters and determine the direction of spontaneity
15. Use Faraday’s law to determine the amount of material deposited during electroplating
16. Explain electrolysis and overvoltage
17. Differentiate between chemical reaction and nuclear reaction
18. Balance nuclear equations and describe the particle emitted during the process
19. Predict the type of emission from unstable nuclides
20. Use mass-energy relationship to calculate the energy released during nuclear processes
21. Distinguish between nuclear fission and fusion
22. Describe the applications of nuclear reactions in energy production
23. Name simple organic compounds and the basic functional groups
24. 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.

Grading Policy: The final grade in this course will be determined by a point total based on the following:

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>260</td>
</tr>
<tr>
<td>Class Participation (recitation + lecture)</td>
<td>190</td>
</tr>
<tr>
<td>Common Exam I</td>
<td>100</td>
</tr>
<tr>
<td>Common Exam II</td>
<td>100</td>
</tr>
<tr>
<td>Common Exam III</td>
<td>100</td>
</tr>
<tr>
<td>Final Exam</td>
<td>250</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;835</td>
</tr>
<tr>
<td>B+</td>
<td>775-834</td>
</tr>
<tr>
<td>B</td>
<td>710-774</td>
</tr>
<tr>
<td>C</td>
<td>660-709</td>
</tr>
<tr>
<td>C+</td>
<td>600-659</td>
</tr>
</tbody>
</table>

You must maintain an average of 35%, which is 193 points in the common exams and finals to pass the course. 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.

Recitation: Students are expected to come to recitation after having reviewed the class lecture notes. Each recitation, the students will 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 recitation 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 100 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 160 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 absolutely 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 it 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. LATE HOMEWORK WILL ONLY BE ACCEPTED BY SUBMISSION OF A VALID EXCUSAL FROM THE DEAN OF STUDENTS.

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:

<table>
<thead>
<tr>
<th>Common Exam I</th>
<th>Monday 4:30 - 5:45pm - 10/1/18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Exam II</td>
<td>Monday 4:30 - 5:45pm - 10/22/18</td>
</tr>
<tr>
<td>Common Exam III</td>
<td>Monday 4:30 - 5:45pm - 11/12/18</td>
</tr>
<tr>
<td>Final Exam Period</td>
<td>December 15 - 21, 2018</td>
</tr>
</tbody>
</table>

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

TEST GRAudging ERROR. Tests are returned in recitations following the test. If you believe there is an error, you have 24 HOURS 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 make-up examination will be permitted if there is an acceptable and substantial reason. A grade of zero will be given for a second missed examination independent of reason.

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.

<table>
<thead>
<tr>
<th>Week</th>
<th>Outcomes</th>
<th>Topic</th>
<th>Homework</th>
</tr>
</thead>
</table>
| 1 | 1 | Ch 12: Chemical Kinetics | Warm up Basic HW  
Basic HW I  Review of Graphing  
Basic HW II  Kinetics I  
Regular HW Kinetics I |
| 2 | 2,3,4 | Ch 12: Chemical Kinetics  
Ch 13: Chemical Equilibrium | Basic HW Kinetics II  
Basic HW Review Mult. by One  
Regular HW Kinetics II |
| 3 | 4,5 | Ch 13: Chemical Equilibrium | Basic Homework: Review Balanced Eq  
Basic Homework: Equilibrium I  
Regular Homework: Equilibrium I |
| 4 | 6,7 | Ch 14: Acids and Bases | Basic Homework: Equilibrium II  
Regular Homework: Equilibrium II  
Basic HW I: Reaction Stoichiometry |
| 5 | 9, 10 | Ch 14: Acids and Bases | Basic Homework: Acids and Bases I  
Regular Homework: Acids and Bases I |
| 6 | 9, 11 | Ch 15: Acid-Base Equilibria | Regular Homework: Acids and Bases II  
Regular HW: Regular Homework: Buffers |
| 7 | 8 | Ch 16: Solubility and Complex Ion Equilibria | Regular Homework: Titrations  
Regular Homework: Solubility |
| 8 | 9,10 | Ch 17: Spontaneity, Entropy, and Free Energy | Basic Homework: Thermodynamics Review  
Regular Homework: Thermodynamics I  
Basic Homework: Thermodynamics II |
| 9 | 11,12 | Ch 17: Spontaneity, Entropy, and Free Energy  
Ch 18  Electrochemistry | Regular Homework: Thermodynamics II  
Warm Up Basic Homework: Oxidation states  
Basic Homework: Electrochemistry |
| 10 | 13,14 | Ch 18  Electrochemistry | Regular Homework: Electrochemistry I  
Basic Homework: Electrochemistry II  
Regular Homework: Electrochemistry II |
| 11 | 15 | Ch 18  Electrochemistry |  
| 12 | 16,17,18,  
19,20 | Ch 19: The Nucleus: A Chemist's View | Basic Homework: Nuclear Chemistry  
Regular Homework: Nuclear Chemistry |
| 13 | 23,24 | Ch 22: Organic and Biological Molecules | Regular Homework: Organic Chemistry |
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:


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

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 4, 2018</td>
<td>T</td>
<td>First Day of Classes</td>
</tr>
<tr>
<td>September 10, 2018</td>
<td>M</td>
<td>Last Day to Add/Drop Classes</td>
</tr>
<tr>
<td>November 12, 2018</td>
<td>M</td>
<td>Last Day to Withdraw</td>
</tr>
<tr>
<td>November 20, 2018</td>
<td>T</td>
<td>Thursday Classes Meet</td>
</tr>
<tr>
<td>November 21, 2018</td>
<td>W</td>
<td>Friday Classes Meet</td>
</tr>
<tr>
<td>November 22 - 25, 2018</td>
<td>R - Su</td>
<td>Thanksgiving Break - University Closed</td>
</tr>
<tr>
<td>December 12, 2018</td>
<td>W</td>
<td>Last Day of Classes</td>
</tr>
<tr>
<td>December 14, 2018</td>
<td>F</td>
<td>Reading Day</td>
</tr>
<tr>
<td>December 15 - 21, 2018</td>
<td>F - R</td>
<td>Final Exam Period</td>
</tr>
</tbody>
</table>

Course Outline