

**HOSTOS COMMUNITY COLLEGE
PHYSICAL SCIENCES UNIT
CHE 220 GENERAL CHEMISTRY II**

1. **Credits:** *4 credits, 3-hr lecture/1-hr recitation workshop/3 hr laboratory*
2. **Prerequisites:** CHE 210 (General Chemistry I)
3. **Corequisite:** none

4. **Course Description:** The student will work on laws, concepts and techniques of chemistry including chemical kinetics, ionic equilibria in aqueous solution, thermodynamics, electrochemistry, nuclear chemistry, classes of organic and biochemical compounds. This course is intended for students preparing for careers in the sciences and engineering.

5. **Course Objectives:**
The student will :
 - Know the principles of chemical kinetics and reaction mechanisms, chemical equilibrium, thermodynamics, electrochemistry, nuclear chemistry.
 - Recognize organic compounds in particular aliphatic and aromatic hydrocarbons and study of the principal functional groups.
 - Know about macromolecules with emphasis in enzymes and proteins.
 - Manipulate basic laboratory equipment and perform procedures related to Chemical Kinetics, Ionic Reactions, Chemical Analysis, etc.

Required Text: TEXTBOOK:

Chemistry, A molecular Approach, 2011, 2th Ed., Nivaldo Tro, Pearson Prentice Hall
ISBN 10: 0-321-65178-2

LABORATORY MANUAL: Chemistry, The Central Science, 10th Ed.,
J.Nelson&K.Kemp, Prentice Hall, 2006, ISBN: 0131464795

RECOMMENDED: Student Study Guide by TRO

Laboratory Manual: CHEMISTRY, The Central Science, Tenth Ed., J. Nelson
and Kemp, Prentice Hall, ISBN: 0-13-146488-4

	<u>Day</u>	<u>Time</u>	<u>Room</u>
Lecture:	T,TH	11:00 – 12:15 pm	A437
Recitation			
Laboratory			

PROFESSOR:

TELEPHONE:

OFFICE HOURS:

ROOM:

MAIL:

COURSE OUTLINE

N.B.: Homework problems in **bold** involve graphing. These will prepare the student for data analysis in the laboratory course. They should be collected and corrected.

DATE	CHAPTER	SECTIONS	HOMEWORK PROBLEMS
	<i>13 Chemical Kinetics</i>	<i>1 reaction rate</i> <i>2 rate law</i> <i>3 reaction order, half-life</i> <i>4 activation energy, temperature dependence of rate constants</i> <i>5 reaction mechanisms</i>	<i>1-8,, 64, 84</i> <i>9-20, 21, 22, 80, 87</i> <i>23-26, 27-30, 67,</i> <i>68, 74, 86</i> <i>31-34, 35, 37, 38-39, 41</i> <i>43-48, 51-52, 75</i>
	<i>13 Chemical Kinetics</i>	<i>6 catalysis</i> <i>Review of Chapter 13</i>	<i>55, 57, 60, 61 ,83, 96, 102</i>
	*****	<u><i>EXAM 1 - (CHAPTER 13)</i></u>	*****
	<i>14 Chemical Equilibrium</i>	<i>1 equilibrium constant concept</i> <i>2 equilibrium constant expressions</i> <i>3 kinetics and equilibrium</i> <i>4 using equilibrium constants</i> <i>5 factors affecting equilibrium</i> <i>Review of Chapter 14</i>	<i>1, 4</i> <i>5-7, 9-12, 13-16, 18-21, 23-24, 28-29, 32, 64</i> <i>33, 35-36</i> <i>37-38, 39-41, 44, 68, 74-77</i> <i>49- 52, 54-60, 62, 66</i>
	<i>15 Acids and Bases</i>	<i>1 Brønsted acids and bases</i> <i>2 acid-base properties of water</i> <i>3 pH</i>	<i>1-8</i> <i>9-11</i> <i>12-14, 16, 17, 19,</i>

			20, 22-26
	*****	<u>EXAM 2 - (CHAPTER 14)</u>	*****
	<i>15 Acids and Bases</i>	<i>4 strength of acids and bases</i> <i>5-6 weak acids and bases; their ionization constants</i> <i>7 ionization constants of weak acids and conjugate bases</i> <i>8 diprotic and polyprotic acids</i> <i>9 structure and acid strength</i> <i>10 acid-base properties of salts</i> <i>11 acidic and basic oxides</i>	<i>27-30, 31-36</i> <i>39-42, 43-50, 51-56</i> <i>57-58</i> <i>59-60, 62, 64</i> <i>65-66, 67-68</i> <i>71-74, 76-81</i> <i>83-84, 86</i>
	<i>15 Acids and Bases</i>	<i>12 Lewis acids and bases</i>	<i>89, 91-93</i>
	<i>16 Acid-Base Equilibria and Solubility Equilibria</i>	<i>1-2 solution equilibria; common ion effect</i> <i>3 buffer solutions</i> <i>4 acid-base titrations</i> <i>5 acid-base indicators</i> <i>6 solubility equilibria</i> <i>7 fractional precipitation</i> <i>8 common ion effect & Solubility</i> <i>9 pH and solubility</i> <i>10-11 complex ion equilibria & solubility; qualitative analysis</i>	<i>1-4, 5-6</i> <i>7-8, 9-11, 13-14, 16-18, 20</i> <i>21, 22, 23-24, 26-28, 30, 32, 86</i> <i>33-34, 36</i> <i>39-44, 45-50, 52-53</i> <i>56</i> <i>57-58, 60</i> <i>64, 66, 68, 69-70, 72-74, 76 77-78</i>

		<i>Review of Chapter 15</i> <i>Review of Chapter 16</i>	
	<u>EXAM 3- (CHAPTERS 15,16)</u>
<i>1</i>	<i>18 Entropy, Free Energy and Equilibrium</i>	<i>1-3 laws of thermodynamics, spontaneous processes, and entropy</i> <i>4 2nd law of thermodynamics</i> <i>5 Gibbs free energy</i> <i>6 ΔG and equilibria</i> <i>Review of Chapter 18 (sections 1-6)</i>	<i>1-5 ,43</i> <i>7-8, 9-14</i> <i>15, 17-20, 38, 42</i> <i>21-22, 24-27, 30, 48</i>
	*****	<u>EXAM 4- (CHAPTER 18)</u>	*****
	<i>19 Electrochemistry</i>	<i>1 redox reactions</i> <i>2-3 electrochemical cells and standard EMFs</i>	<i>1,2</i> <i>3-10, 11-12, 15-18</i>
	<i>19 Electrochemistry</i>	<i>4 spontaneity of redox reactions</i> <i>5 concentration and cell EMF</i> <i>8 electrolysis</i> <i>6-7 batteries; corrosion</i>	<i>19-20, 21-26, 82</i> <i>27-28, 30-32, 34, 73</i> <i>43, 45-46,48, 51-53, 56-57</i> <i>35, 36, 41</i>

	<i>23 Nuclear Chemistry</i>	<i>1 nuclear reactions</i> <i>2 nuclear stability</i> <i>3 natural radioactivity</i> <i>4 nuclear transmutation</i> <i>5-6 nuclear fission and fusion</i> <i>7 uses of isotopes</i>	<i>1-4, 5-6, 57</i> <i>7, 10, 11, 13, 14,</i> <i>17, 19</i> <i>22, 24, 26</i> <i>31, 32, 34, 36</i> <i>37-40, 43, 55</i> <i>48, 50</i>
	<i>24 Organic Chemistry</i>	<i>1 classes of org. compounds</i> <i>2 aliphatic hydrocarbons</i> <i>3 aromatic hydrocarbons</i> <i>4 functional groups</i>	<i>1-2</i> <i>3-10, 11, 13-19,</i> <i>21-28</i> <i>29, 32</i> <i>33-34, 35, 38-42</i>
		<i>Review of Chapters 19</i> <i>(sections 1-8) and 23</i> <i>(sections 1-7)</i>	
	*****	<u><i>EXAM 5 (CHAPTERS 19 and 23)</i></u>	*****
	<i>25 Synthetic and Natural Organic Polymers</i>	<i>1-2 polymer properties and synthetic organic polymers</i> <i>3 proteins</i> <i>4 nucleic acids</i>	<i>1-4, 7-10, 33</i> <i>13-18, 19-22, 29,</i> <i>32, 34-35, 38</i> <i>24, 26, 30</i>
		<i>REVIEW OF COURSE</i>	
		Final Exam	

SCHEDULE OF EXPERIMENTS

WEEK	EXPERIMENT	EXPT #	PAGE
1	Drawer assignment Discussion of Safety Rules for Laboratory Sessions Attendance and Grading Policies Directions for Writing a Laboratory Report Identification of an Unknown Cation (to be concluded in the next lab period)	HAND	OUT
2	Identification of an Unknown Cation (continued from previous week)	HAND	OUT
3	Rates of Chemical Reactions I: A Clock Reaction	29	331
4	Quiz 1 The Chemistry of Oxygen: Basic and Acidic Oxides and the Periodic Table	18	189
5	Titration of Acids and Bases (procedure <u>A only</u> : Standardization of NaOH)	20	215
6	Titration of Acids and Bases (procedure <u>A only</u> : Standardization of NaOH)	20	215
7	Determination of the Dissociation Constant of a Weak Acid	25	275
8	Quiz 2 Hydrolysis of Salts and pH of Buffer Solutions (Part A only)	24	257

9	Determination of the Solubility-Product Constant of a Sparingly Soluble Salt	27	307
10	Oxidation-Reduction Titrations I: Determination of Oxalates	37	465
11	Quiz 3 Determination of Orthophosphate in Water	34	433
12	Preparation of Aspirin and Oil of Wintergreen	41	501
13	Quiz 4 Molecular Geometry: Experience with Models	40	489
14	Alcohols and Phenols Quiz 5	HAND	OUT
15	Cleaning of Glassware and Check Out FINAL LAB EXAM		

Laboratory Reports: These should follow the required format.

Lab reports are due at the beginning of the following laboratory period.

Grading Policy:

Lecture	70%
5 partial exams (lowest grade dropped)	40 %
Final Cumulative exam	20%
Participation/Assignments	10%
Laboratory	30%
Laboratory Reports	15%
5 Laboratory Quizzes	05%
Final Laboratory Exam	10%

Policy Grade:

The college uses the following grades:

A, A⁻ for excellent work

B⁺, B, for good work

B⁻, C⁺, C for fair work

D, for poor work

F, for failure

I, for incomplete

WU, for unfinished incomplete, equivalent to F
 W, for withdrawn

The grade of Incomplete (I) is given in regular courses upon request of the student for personal emergencies that are verifiable. The faculty member has the responsibility to provide Inc grade only to those students **who are passing the course**. The student has the responsibility to take the initiative in completing the work, and is expected to make up the incomplete during the first semester in residence after receiving the grade of Incomplete. If the student does not make up the incomplete during the following semester after receiving it, **an F grade may be given by the faculty member without further consultation with the student**. If after the end of the first semester the Inc remains on the record it will be designated as an F and will be computed in the student's GPA.

A	93-100
A ⁻	90-92
B ⁺	87-89
B	83-86
B ⁻	80-82
C ⁺	77-79
C	70-76
D	60-69
F	Failure

There is no R grade in this course.

Participation:

Your participation in class is an important part of the final grade. This grade is based primarily on your participation in class discussions, in team projects and your attendance. For each class you miss, you will lose participation points. If you miss 25% or more of the term, you will be failed.

Academic policies:

Hostos Community College has an evaluation system based on the honesty and integrity of the academic work of an identified student or students. Faculty, students and staff have the responsibility to uphold the standards of the community and to take action when others violate them. Faculty members have an obligation to educate students to the standards of academic integrity, and to report violations of these standards to the appropriate authorities of the college. If a community member is proved with academic dishonesty, the college will impose sanctions. The three most common forms of academic dishonesty are cheating, plagiarism, and bribery. It must be understood that any student who knowingly aids in plagiarism or other cheating, e.g., allowing another student to copy a paper or examination question, is as guilty as the cheating student.

Cheating:

In the collegiate setting, cheating is defined as the purposeful misrepresentation of another's work as one's own. Faculty and students alike are responsible for upholding the integrity of this institution by not participating either directly or indirectly in act of cheating and by discouraging others from doing so.

Plagiarism:

Plagiarism is a form of cheating which occurs when persons, even if unintentionally, fail to acknowledge appropriately the sources for the ideas, language, concepts, inventions, etc. referred to in their own work. Thus, any attempt to claim another's intellectual or artistic work as one's own constitutes an act of plagiarism.

Bribery:

In the collegiate setting, bribery involves the offering, promising, or giving of items of value, such as money or gifts, to a person in a position of authority, such as a teacher, administrator, or staff member, so as to influence his/her judgment or conduct in favor of the student. The offering of sexual favors in exchange for a grade, test score, or other academic favor, shall be considered attempted bribery. The matter of sexual favors, either requested or offered, in exchange for a grade, test score or other academic favor shall also be handled as per the Sexual Harassment procedures of the College.