General Chemistry 2: Spring 2015

Goal of the course: This is the second semester of a 2-semester general chemistry sequence that you began in Chem 102 last semester. In Chem 104 we will cover the topics of kinetics, equilibrium, acids and bases, buffers, complex ions, thermodynamics, electrochemistry and nuclear chemistry. Chem 104 is a demanding course (more so than Chem 102) and to achieve success in this course you will need to organize large quantities of information in coherent ways so that you are able to recall and apply your knowledge. In addition you will have to learn to organize your time efficiently. And the mathematics is more demanding than in Chem 102!

This semester general chemistry is run using a flipped classroom model. In this model you will watch videos and complete online homework at home and then come to class to complete workshop assignments (during your recitation section) and participate in peer-learning activities using an iClicker (during lecture every Friday). On Tuesdays during lecture we will stream the class videos for the week. This class is an optional component of the course.

You should plan to spend ***at least* 10-15 hours per week** watching videos, doing your online homework, engaging with your classmates and learning the material. It is your responsibility to prepare yourself for every topic before you come to class to engage in the workshop or iClicker activities. You must keep up with the material – it is unlikely that you will be able to catch up if you fall behind.

Text: For the purposes of this course you can use ANY General Chemistry textbook. We will not be working through a textbook in a chapter-by-chapter fashion; rather we will cover 18 chemistry topics and use the textbook as a reference. If you feel the need to buy a recommended textbook Chemistry, 8th Ed., Zumdahl and Zumdahl is available in the bookstore. In addition you should print the Lets Practice Video PDF for every topic on a weekly basis and use it while you watch the course videos.

Web Site: As part of this course we will continue to use the GenChem platform. This platform will be ready for account registration on January 26rd. You should log on to GenChem as soon as you can and register your account so that you can become familiar with the look and feel of the web interface.

To claim your GenChem account:

1. Log on to GenChem **on or after January 26rd.**
2. Click *Register* and complete the registration process by entering your ***blackboard ID number***, a ***working email address*** and a password that you create. It is very important that you use the same email address to claim your GenChem account and register both your iClicker and your Sapling homework account. This email address must be one that you check regularly as we will use it to communicate with you via the GenChem platform.

To find your Hunter College Blackboard ID number:

1. Log on to http://www.hunter.cuny.edu/it/blackboard
2. Click on CUNY Blackboard 9.1 and log into your account.
3. Click on the "Personal Information" tab on the top left side of the screen in the "Tools" panel.
4. Click on the "Edit personal Information" tab.
5. Here you will find your username followed by a 20-digit number. This 20-digit number is your Hunter College blackboard number.

The GenChem platform will be used in lieu of CUNY Blackboard and has been designed specifically for our course. This is where you will find ALL course documents including the Learning Goal Analysis (LGA), videos, PDF documents of the videos, links to online Sapling homework and workshop assignments. Extra exam practice materials will be made available 7 days before each exam.

Email: Please make sure that you use the same email address to claim your GenChem account and register both your iClicker and your Sapling homework account. This should be an email address that you check frequently as we will be using email through the GenChem platform to communicate with the class. If you do not check your email regularly it is possible that you will miss important information - which is likely to have a negative impact your grade.

Grading policy: Every component of this course earns you points towards your final grade, but to earn your points you must complete each component by its **due date**. Please see the GenChem platform for more information on due dates. The points for the week (for workshop, iClicker and homework assignment) will be uploaded to the GenChem platform by 11:59 pm of the following Wednesday.

To earn full credit in this course you must accumulate 1400 points. 400 points come from your TOPIC grade and 1000 points come from your EXAM grades. The points you earn will be normalized to 100, rounded off to two decimal places and then assigned a letter grade according to the Hunter College retention standards, which be found here: http://catalog.hunter.cuny.edu/content.php?catoid=18&navoid=3149

TOPIC	LGA[1]	Videos	Workshop[2]	i-Clicker[2]	Homework[2,3]	TOPIC TOTAL[4]	In-Class Exams[5]	Final Exam[5]
Topic 1	1	1	0	0	5	7		
Topic 2	1	1	10	0	5	17		
Topic 3	1	1	0	11	5	18	Exam 1	
Topic 4	1	1	10	0	5	17	(200 pts)	
Topic 5	1	1	0	11	5	18		
Topic 6	2	2	10	11	10	35		
Topic 7	2	2	10	11	10	35		
Topic 8	2	2	0	0	5	9		
Topic 9	2	2	10	11	10	35	Exam 2	400 pts
Topic 10	2	2	0	0	10	14	(200 pts)	
Topic 11	2	2	10	11	10	35		
Topic 12	2	2	10	11	10	35		
Topic 13	2	2	10	**11**	10	35		
Topic 14	2	2	0	0	5	9		
Topic 15	2	2	10	11	10	35	Exam 3	
Topic 16	2	2	10	11	10	35	(200 pts)	
Topic 17	2	2	10	11	10	35		
Topic 18	2	2	0	0	10	14		
TOTALS	**31**	**31**	**110**	**121**	**145**	**438**	**600**	**400**
Total Topic Grade Required = 400 out of a total of 438 possible points							**Total Exam Grade = 1000**	
Total number of points to be earned in the course: 400 + 1000 = 1400								

1. The points for an LGA and videos is an all or nothing score. 1 or 2 points (as indicated) are earned for completion of an assignment by the deadline and zero points are earned for an incomplete assignment.
2. The points for each workshop, iClicker and homework assignment are scaled to the totals indicated.
3. The total score for each topic is computed by summing the topic components. There are 438 total TOPIC points, but only the first **400 points count**. Think of the extra 38 points as extra points that you can accumulate and use if you miss an assignment. You cannot earn more than 400 TOPIC points. These extra points cannot be applied to your exam score.
4. If you miss an in-class exam the final exam will count for 600 points instead of 400 points. There are NO make-up exams.

Exams: There will be three equally weighted in-class exams (200 points each for a total of 600 points, see schedule below). There will also be a Comprehensive Final Exam (400 points, ACS test) given during

finals week. If your final exam grade is higher than your lowest in-class exam grade your final grade will count for 600 points and your lowest in-class exam grade will be dropped.

For your exams you will be required to bring a pencil and a calculator to class. All other materials (e.g. periodic table and/or other necessary information such as a formula sheet) will be provided for you. Exams must be taken during the designated class period. *NO MAKE-UP EXAMS will be given*. If you miss one in-class exam you will earn a grade of zero for that exam. This grade will then be dropped as your lowest in-class exam grade and your final exam grade will automatically be counted for 600 points. If you miss more than one in-class exam you will receive a grade of ZERO for the second missed exam.

Detailed Course Outline: Please see the GenChem platform for a detailed course schedule that includes all your assignments and exam dates as well as a video table of contents to help you organize your time effectively.

Exam schedule for Tu/Fr Section 01

- EXAM 1: **Friday, March 6th.**
  This exam is a Chem 104 placement exam. If you fail this exam you should consider withdrawing from the course. The last day to withdraw from the course is Thursday April 16th. This is before our 2nd exam so you cannot wait until then to make this decision.
- EXAM 2: **Friday, April 17th**
  This exam is more difficult than exam 1. If you failed exam 1 and you also fail this exam you should begin considering the credit/no credit option as it is now too late to withdraw from the course.
- EXAM 3: **Friday, May 15th.**
  This is your last and most difficult in-class exam. In general, student grades drop by 10% from exam 2 to exam 3 so make sure you put in enough time to prepare for this exam.
- Final Exam: **Tentatively scheduled for Monday, May 18th, 9:00 – 11:00 am.**
  You will not have much time to review for the Final, so study in advance.

Exams schedule for Sa Section 02 (same content as Section 01 exam not same exam questions!)

- EXAM 1: **Saturday, March 7th.**
- EXAM 2: **Saturday, April 18th**
- EXAM 3: **Saturday, May 16th.**
- Final Exam: **Tentatively scheduled for Saturday, May 23rd, 9:00 – 11:00 am.**

Required Learning Goal Analysis (LGA): Before you begin a new topic you will be required to complete a Learning Goal Analysis in the GenChem platform. This analysis asks you to read each learning goal for that topic and assess how comfortable you feel with the content presented. There is no wrong answer to an LGA question. The goal is to help you begin accurately self-assessing your own content understanding and focus your attention on the learning goals to drive your learning. These learning goals serve as both an outline for the course and a tool to help you prepare for your exams.

Required Recitation Workshops: In addition to completing the videos and LGA assignments, you are responsible for submitting a weekly recitation assignment called a workshop. Workshops are to be completed in groups of 3 or 4 students and must be submitted to your recitation instructor. You may submit your workshop in person during your assigned recitation period or electronically (using the GenChem website) no later than 5:00 pm every Sunday.

There are 11 required workshop assignments this semester. Each workshop is worth 10 points. You must attend the recitation section that you registered for every week in order to earn these points. If you miss a workshop you do not earn the points for that workshop. Remember that there are 38 extra points built into your topic grade so if you miss a workshop you can use 10 of these extra points to make up the loss. Please see the Workshop Grading Policy on GenChem for more information.

During exam weeks recitation sections will be classed as "OPEN SECTION". This means that there will be no workshop due that week and recitation attendance is optional. During "OPEN SECTION" recitation you may attend ANY workshop to ask questions or get individual help from one of the TA's as you prepare for your upcoming exam.

If there is no class on a day that you would regularly have attended a workshop, you will need to attend another workshop session for that week to get help with the material. Please see the Recitation Schedule on GenChem for information about available recitation sections.

Required iClicker: As part of this course we will be making use of a personal response device called an iClicker. You will use the iClicker to respond to in-class questions during lecture every Friday (or Saturday). This will serve a dual purpose: 1) Your responses will provide me with real-time feedback about student understanding of course content and 2) Your participation will help you practice the material and grow as a chemistry student.

There will be 10 required iClicker sessions, each worth a total of 11 points. You earn 1 point for attending a session and then 1 point for every question that you answer correctly during the session. Some sessions will have only 10 questions and some will have more than 10 questions. The maximum number of points you can earn per session is 11 so only 10 correct responses will be counted for each session. If your iClicker malfunctions or when you forget it at home you will not earn the points for that session. Please do NOT ask for points if you fail to have a functioning iClicker. Once again, remember that there are 38 extra points built into your topic grade so if you do not earn the points for an iClicker session you can use 11 of these extra points to make up the loss.

iClickers can be purchased at the Hunter College Bookstore or online at: http://www.iclicker.com/ If you continue as a chemistry student you will use this iClicker again during both organic chemistry and biochemistry. If you already own an iClicker from a previous course it can be used again for this course. Once you have purchased your iClicker you will need to register it. *To register your iClicker:*

1. Log on to http://www.iclicker.com/dnn/Support/RegisterYouriclicker/tabid/174/Default.aspx
2. Complete the registration questions. **Note:** You must register using your full last and first name and your Hunter College Blackboard ID number. Your blackboard number will be used to link your iClicker responses to our online student roster.

Required Homework: This semester again we will be using an on-line homework system called Sapling. You will be required to complete and submit homework by the required deadlines. These deadlines will be strictly enforced so you should aim to have the work done at least a day before the deadline. These homework assignments will count for a total of 145 points towards your final grade.

While links to your homework will be provided in the GenChem platform, you will need to buy an access code through the Sapling Website ($32 for 1 semester) and register for our course in order to access and complete your Sapling assignments. If you have already taken Chem 102 and you bought a 2-semester access code you will not need to pay again. You can simply register for the new course. **Sapling will be available on January 25nd**. *To register for Sapling:*

1. Log on to https://www.saplinglearning.com/

2. Click on the orange "create account" tab and follow the online instructions to create a user profile (choose a username and password) Please make sure that you use the same email address to claim your GenChem account and register for your Sapling homework account.
3. Select **CUNY, Hunter College** as your school
4. Select **CUNY Hunter - Chem 104 Spring 15** as your course.
5. Follow the online instructions to purchase an Access Code.

Academic Dishonesty: Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The college is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

Students who are caught cheating on an exam in this course will automatically obtain a grade of ZERO for that exam and will be reported for Academic Dishonesty. This grade of ZERO cannot be used as your lowest exam score to be dropped in the course.

Week	*Content covered*
1	<u>Topic 1: Chemical Equilibrium</u> Visualizing Equilibrium law of mass action The equilibrium constant, K Equilibrium expressions (K calculations)
2	<u>Topic 2: Predicting chemical change</u> The reaction quotient Q K vs Q LeChatliers principle (Concentration, temp, pressure or volume, catalyst and noble gas) <u>Topic 3: Acids and bases</u> What are acids and bases (Arrhenius, Bronsted) Conjugate acid base pairs Amphoteric species (water) strong vs weak What is pH (no real calcs yet) Equilibrium concentrations (1:1 Stoichiometry ICE calcs)
3	<u>Topic 4: pH calculations</u> Strong acids and bases Weak acids and Bases Acid base reactions (salts) Salt pH predictions pKa and pKb <u>Topic 5: Polyprotic Acids</u> What is a polyprotic acid Stepwise acid dissociations pH calculations for polyprotic acids polyprotic acid salts

4	Topic 6: Buffers What is a buffer? (conjugate species review) pKa and pH calculations Buffer capacity (what is it?) and making a buffer
5	Topic 7: Titration Curves Acid dissociations on a curve Identifying species based on curve pH calculations review (on different parts of the curve) pKA identification from curve
6	**Exam 1 (T1 – T7)** Topic 8: Heat and work Heat conservation, system vs surroundings (1^{st} law of thermodynamics) Calorimetry part 1: Single system Calorimetry part 2: Double system Latent heat calculations
7	Topic 9: Hess's Law Enthalpy of formation Enthalpy and bond energy review deltaH formation calculations Hess's Law calculations
8	Topic 10:Entropy What is Spontaneity 2^{nd} law of thermodynamics delta S and delta E of the universe Predicting changes in entropy (based on systems) Topic 11: Probability Entropy and probability - The one way street (heat flow)

9	Topic 12: Free Energy What is free energy (Start with S and move to G) Delta G and Delta G nought Free energy curves Relationship to K
10 *11* *(Spring break)*	Topic 13: Applications of Free energy Delta G and work Phase transitions (vapor pressure, bp, fp) Solubility Concentration cells
12	**Exam 2 (T8 – T13)** Topic 14: Redox Reactions Oxidation states Oxidation and reduction reactions Balancing redox reactions
13	Topic 15: Batteries Galvanic Cells and Batteries Half cell potential Nernst equation calculations Connection to G
14	Topic 16: Kinetics Kinetics and Curves (Thermo vs kinetics) Reaction Rates (rate vs concentration plots) Method if initial rates Integrated Rate Law Reaction Mechanisms Applications

15	Topic 17: Radioactive Decay 1st order decay and nuclear chemistry rate law calcs and integrated rate laws – First order decay
16	Topic 18: Extension to Organic Chemistry Organic Acids and Bases (Inductive effect and electronegativity) Resonance effects for strength of acids and bases pKa discussion kinetic vs thermodynamic control **Exam 3: (T14-T18)**