# General Chemistry 1

**Goal of the course:** This is the first semester of a 2-semester general chemistry sequence that begins to prepare you for a science-based career. General Chemistry I is a demanding course and while its primary objective is to introduce you to the fundamental principles that underlie the chemical sciences, 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. Organization of your time will be essential!

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 1 hour recitation section) and participate in peer-learning activities using an iClicker (during our 2 hour lecture every Thursday).

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 will be required to buy the General Chemistry 1: Let's Practice Workbook from the Hunter College Bookstore. You can however, 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 a wonderful choice.

**Web Site:** As part of this course we will be using a new platform called GenChem.

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 (but not limited to) the Learning Goal Analysis (LGA), Videos, Video PDF documents, iClicker sessions, links to online Sapling homework, Workshop assignments and old general Chemistry exams.

**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 accounts. 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.

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**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 assignment due dates.

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.

| TOPIC | LGA[1] | Videos | Workshop[2] | i-Clicker[2] | Homework[2] | TOPIC TOTAL[3] | In-Class Exams[4] | Final Exam[4] |
|---|---|---|---|---|---|---|---|---|
| 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 (200 pts) | |
| Topic 4 | 1 | 1 | 10 | 0 | 5 | 17 | | |
| Topic 5 | 1 | 1 | 0 | 11 | 5 | 18 | | |
| Topic 6 | 1 | 1 | 10 | 0 | 5 | 17 | | |
| Topic 7 | 2 | 2 | 0 | 0 | 10 | 14 | | |
| Topic 8 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 9 | 2 | 2 | 10 | 11 | 10 | 35 | Exam 2 (200 pts) | 400 pts |
| Topic 10 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 11 | 2 | 2 | 10 | 0 | 10 | 24 | | |
| Topic 12 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 13 | 2 | 2 | 0 | 0 | 5 | 9 | | |
| Topic 14 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 15 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 16 | 2 | 2 | 10 | 11 | 10 | 35 | Exam 3 (200 pts) | |
| Topic 17 | 2 | 2 | 10 | 11 | 10 | 35 | | |
| Topic 18 | 2 | 2 | 0 | 0 | 10 | 14 | | |
| **TOTALS** | **30** | **30** | **120** | **110** | **145** | **435** | **600** | **400** |
| **Total Topic Grade Required = 400 out of a total of 435 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 is an all or nothing score. 1 or 2 points (as indicated) are earned for completion of an assignment 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 435 <u>total</u> TOPIC points, but only the first 400 points count. Think of the extra 35 points as extra points that you can accumulate and use if you miss an assignment. <u>You cannot earn more than 400 TOPIC points</u>. 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.

The total number of points you earn will be normalized to a score out of 100.00 and then assigned a latter grade according to the table shown to the right. Letter grades will be determined based on a score to 2 decimal places. There will be no rounding of scores to determine letter grades.

| Letter Grade | Course Requirement |
|---|---|
| A+ | 97.50 |
| A | 92.50 |
| A- | 90.00 |
| B+ | 87.50 |
| B | 82.50 |
| B- | 80.00 |
| C+ | 77.50 |
| C | 70.00 |
| D | 60.00 |
| F | <60 |

**Exams:** There will be three equally weighted in-class exams (200 points each for a total of 600 points) given during the course of the semester. There will also be a <u>Comprehensive Final Exam</u> (400 points) 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. In addition, we have created a video table of contents to help you organize your time effectively.

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**A Required Learning Goal Analysis (LGA):** Before you begin a new topic you will be required to complete a Learning Goal Analysis on 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. USE the LGA to study for your exams. Every single Exam question is based on at least 1 learning goal (although some will contain multiple learning goals). There is also an LGA document in the resources tab on GenChem – use this to review the learning goals after you have completed the LGA.

**Required 1-hour 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 5:00pm every Sunday.

There are 12 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 35 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” you may attend ANY workshop to ask questions or get individual help from one of the TA’s.

**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. 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.

**Required Homework**: This semester we will be using an on-line homework system called Sapling. While links to your homework will be provided in the GenChem platform, you will need to buy an access code through the Sapling Website and register for our course in order to access and complete your Sapling assignments.

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**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.

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# General Chemistry 1: Video Table of Contents

Video D: Naming Covalent Compounds *3 min 58 s*

Video E: Naming Ionic Compounds part 1 (metals and non-metals) *3 min 44 s*

Video F: Naming Ionic Compounds part 2 (with transition metals) *4 min 12 s*

Video G: Naming Ionic Compounds part 3 (with polyatomic ions) *4 min 59 s*

**Topic 4: Introduction to Covalent Bonding** 27 min 14 s

Video A: Evaluating Lewis Structures *7 min 29 s*

Video B: Drawing Lewis Structures *7 min 01 s*

Video C: Bond Lengths and Strengths *3 min 31 s*

Video D: Bond Polarity *9 min 13 s*

**Topic 5: The Chemical Equation** 16 min 32 s

Video A: Balancing Chemical Equations part 1 *6 min 34 s*

Video B: Balancing Chemical Equations part 2 *4 min 58 s*

Video C: Combining Ratios *5 min 00 s*

**Topic 6: Energy Considerations** 20 min 25 s

Video A: Internal Energy *4 min 39 s*

Video B: Endothermic and Exothermic Reactions *3 min 51 s*

Video C: Bond Energy *6 min 06 s*

Video D: Bond Enthalpy Calculations *5 min 49 s*

**Topic 7: Periodic Trends** 26 min 49 s

Video A: Atomic Size *7 min 21 s*

Video B: Ionic Size *3 min 36 s*

Video C: Ionization Energy part 1 *6 min 22 s*

Video D: Ionization Energy part 2 *4 min 48 s*

Video E: Electron Affinity *4 min 42 s*

**Topic 8: Atomic Spectroscopy** 28 min 05 s

Video A: Orbital Energies *5 min 49 s*

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|---|---|
| Video B: Calculating Energy Differences | *3 min 43 s* |
| Video C: Waves Properties | *4 min 49 s* |
| Video D: Photons | *5 min 12 s* |
| Video E: Line Spectra | *9 min 18 s* |

## Topic 9: The Electron — 28 min 50 s

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|---|---|
| Video A: Duality of Nature (particles and waves) | *8 min 20 s* |
| Video B: Birth of Quantum Mechanics | *4 min 24 s* |
| Video C: Quantum Numbers | *5 min 53 s* |
| Video D: Electron Spin | *4 min 14 s* |
| Video E: Wave Functions | *5 min 59 s* |

## Topic 10: Molecular Geometry — 45 min 08 s

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|---|---|
| Video A: Revisiting Lewis Structures | *7 min 28 s* |
| Video B: Resonance Structures | *4 min 51 s* |
| Video C: Formal Charge | *8 min 50 s* |
| Video D: Exceptions to the Octet Rule | *5 min 29 s* |
| Video E: VSEPR Theory | *7 min 50 s* |
| Video F: Determining Molecular Geometry | *10 min 40 s* |

## Topic 11: Valence Bond Theory — 26 min 32 s

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|---|---|
| Video A: Introduction to VBT | *8 min 24 s* |
| Video B: $sp^3$ hybridization (sigma bonds) | *6 min 40 s* |
| Video C: $sp^2$ and sp hybridization (sigma and pi bonds) | *7 min 11 s* |
| Video D: Bond rotation | *4 min 17 s* |

## Topic 12: Molecular Orbital Theory — 28 min 27 s

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|---|---|
| Video A: Visualizing Sigma bonds from s orbitals | *8 min 16 s* |
| Video B: Energy of Sigma bonds from s orbitals | *7 min 30 s* |
| Video C: Sigma bonds from p orbital overlap | *4 min 52 s* |
| Video D: Pi bonds from p orbital overlap | *7 min 49 s* |

## Topic 13: The Mole — 18 min 10 s

Video A: What is the mole? *5 min 59 s*

Video B: Avogadro's number and Molar Mass *7 min 16 s*

Video C: Mole calculations *4 min 55 s*

## Topic 14: Stoichiometry Calculations 38 min 59 s

Video A: Limiting Reagent *9 min 14 s*

Video B: Mole based Calculations *6 min 31 s*

Video C: Mass based Calculations *9 min 23 s*

Video D: Percent Yield calculations *8 min 56 s*

Video E: Advanced Stoichiometry Problems *4 min 55 s*

## Topic 15: Empirical and Molecular Formula 38 min 38 s

Video A: What's Different? *8 min 05 s*

Video B: Percent Composition part 1 *6 min 21 s*

Video C: Percent Composition part 2 *6 min 34 s*

Video D: Empirical formula from Combustion Reactions *8 min 06 s*

Video E: Advanced Empirical Formula Problems. *9 min 32 s*

## Topic 16: Phase Change and IMF 45 min 08 s

Video A: Heating Curves *8 min 14 s*

Video B: Inter vs. Intramolecular Forces *2 min 43 s*

Video C: Predicting Physical Properties *6 min 33 s*

Video D: Phase Diagrams *5 min 09 s*

Video E: Dipole-Dipole Interactions *6 min 31 s*

Video F: Hydrogen Bonds *6 min 25 s*

Video G: London Dispersion Forces *9 min 33 s*

## Topic 17: Gases 49 min 34 s

Video A: Properties of an Ideal Gas *6 min 03 s*

Video B: Moles, Volume and Temperature *4 min 53 s*

Video C: Pressure *8 min 11 s*

Video D: Ideal Gas Simulations *5 min 19 s*

Video E: The Ideal Gas Law *3 min 13 s*

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|---|---|
| Video F: Single-State Problems | *8 min 10 s* |
| Video G: Double-State Problems | *5 min 00 s* |
| Video H: Kinetic Energy | *8 min 45 s* |

| **Topic 18: Applications of Stoichiometry** | 32 min 18 s |
|---|---|
| Video A: Aqueous Solutions | *5 min 23 s* |
| Video B: Molarity and Dilutions | *9 min 42 s* |
| Video C: Precipitation and Solubility | *4 min 51 s* |
| Video D: Ionic Reactions | *6 min 41 s* |
| Video E: Combustion and Synthesis Reaction | *3 min 17 s* |
| Video F: Cumulative Stoichiometry Problems | *2 min 24 s* |