Kingsborough Community College
The City University of New York
Department of Physical Sciences
CHM1100 - General Chemistry 1
Syllabus

CHM 1100 – GENERAL CHEMISTRY I (4 crs. 6 hrs.)
Two-semester classroom and laboratory course. First term introduces: the mole concept, stoichiometry, thermochemistry, atomic structure, periodic properties, bonding, (especially of carbon compounds), the gaseous, liquid and solid states, phase changes, electrolytes, and the properties of selected elements in relation to environmental problems. Pre-requisites: MAT 900 or a passing score on the COMPASS parts 1 and 2 or a passing grade in MAT M200; and either CHM100 or passing exemption exam for CHM100. Contact department for exemption exam information. Satisfies Required Core: Life and Physical Sciences; Satisfies Flexible Core: Scientific World (Group E)

Section: SECTION NUMBER
Time: LECTURE AND LABORATORY SCHEDULE FOR SECTION
Room: ROOM (S) FOR SECTION
Instructor: INSTRUCTOR FOR SECTION
Email: EMAIL ADDRESS FOR INSTRUCTOR FOR SECTION
Office Hours: OFFICE HOURS FOR INSTRUCTOR FOR SECTION

Source materials: The textbook is *Chemistry, by Julia Burdge, published by McGraw Hill Higher Education*- Latest Edition. Scientific calculator – You may not use a cell phone as a calculator!

Course Learning Outcomes:

- Use the relationships between Avogadro's number, moles, molar mass and grams to conduct calculations.
- Understand the nature of chemical equations and what information can be obtained from them (reactants/products, physical states, stoichiometric ratios between reactants and products).
- Produce the molecular, ionic and net ionic equations for a reaction.
- Predict the neutralization reaction between an acid and base.
- Identify the various components of an oxidation-reduction reaction including reducing/oxidizing agents and half-reactions.
- Calculate the molarity of a solution.
- Apply concepts of stoichiometry toward reactions in solution and their associated problems including gravimetric analysis and titrations.
- Understand the law of conservation of energy and the first law of thermodynamics.
- Identify a process as endothermic or exothermic
- Calculate the enthalpy of a reaction and understand how it is dependent upon stoichiometric amounts of products and reactants.
- Perform calorimetric calculations involving specific heat or heat capacity.
- Apply Hess' Law in the determination of the heat of reaction of a multi-step process.
- Describe the major characteristics of the various gas laws: Boyle's, Charles, Avogadro and combined and use these laws to interconvert measurements of pressure, volume or temperature for a given gas.
- Use the ideal gas equation to determine the pressure, volume, moles or temperature of a gas given all of the other values.
- Apply the ideal gas equation to determine characteristics of a gas including density and molecular weight.
- Use the ideal gas equation in stoichiometric calculations.
- Use Dalton's law of partial pressures to determine the mole fraction or partial pressure of gases in a mixture of gases.
- List the basic assumptions of the kinetic molecular theory of gases.
- Describe properties of waves including wavelength, frequency and amplitude.
- Understand the basis of quantum theory and its relationship to the frequency of radiation.

- Provide the meaning of each type of quantum number (principal, angular momentum, magnetic and electron spin).
- Use the periodic table to determine the electron configuration of an atom.
- Describe the importance of valence electrons to chemical characteristics.
- Predict differences in effective nuclear charge, atomic radius, ionization energy, and electron affinity between elements using periodic trends.
- Explain why the similarity in chemical properties of groups of elements is due to their electron configurations.
- Define ionic bonding and provide examples of compounds that form ionic bonds.
- Use Coulomb's law and distance between ions to rank lattice energies of ionic compounds.
- Determine the polarity of a bond using differences in electronegativity.
- Apply rules for writing Lewis structures toward determining the Lewis structure of compounds. Use formal charges to identify the most likely structure of a compound when more than one Lewis structure can be drawn.
- Define resonance and determine the resonance structures of a compound.
- Use the VSEPR model to determine the molecular shape of a molecule.
- Explain why a molecule is polar or nonpolar based upon molecular geometry.
- Use the Lewis structure and number of electron domains of a compound to determine the hybridization of its bonds and provide the number of sigma and pi bonds in a molecule or around a central atom.
- Be able to describe the major relevance of the major bonding theories: Lewis-theory, VSEPR, valence bond theory, hybridization and molecular orbital theory.
- Describe the different types of intermolecular forces: dipole-dipole, hydrogen bonding, dispersion forces and ion-dipole.
- Rank molecules based upon relative strength of intermolecular forces as well as surface tension, viscosity and vapor pressure.
- Use the Clausius-Clapeyron equation to calculate the vapor pressure of a liquid at a given temperature.
- Identify key characteristics and examples of the major types of crystal: ionic, covalent, molecular, or metallic.
- Calculate the amount of heat lost or gained when a substance undergoes a series of phase and/or temperature changes.
- Use phase diagrams to determine the phase that a substance will exist under a given temperature or pressure.
- List and describe the factors that affect the solubility of a solute.
- Use concentration units to determine the concentration of a given solution or to interchange concentration units.
- List, describe and perform calculations involving colligative properties: vapor pressure lowering, boiling point elevation, freezing point depression and osmotic pressure.

Topical Outline: (Approximate and subject to change upon notification)

Lecture

Week	Topics	Book Chapter
1 & 2	Review of measurements, writing chemical formulas and naming compounds & Stoichiometry	1-3
2& 3	Reactions in Aqueous Solution	4
4	Thermochemistry	5
5	Exam 1 & Gases	10
6	Quantum Theory and the Electronic Structure of Atoms	6
7	Electron Configuration and the Periodic Table	7
8 & 9	Chemical Bonding	8
9 & 10	Molecular Geometry and Bonding Theories & Exam 2	9
11	Intermolecular Forces and the Physical Properties of Liquids and Solids	11
12	Physical Properties of Solutions & Exam 3	13
13	Final Exam	

Grades: Grades are calculated from a weighted average of exams, lab scores, and the final exam.
3 Lecture Exams - 50%, Laboratory performance - 25%, Cumulative Final Exam - 25%
Grades will be awarded as follows: 93% or above=**A**; 90-92.99%=**A-**; 87-89.99%=**B+**; 83-86.99%=**B**; 80-82.99%=**B-**; 77-79.9%=**C+**; 73-76.99%=**C**; 70-72.99%=**C-**; 67-69.99%=**D+**; 63-66.99%=**D**; 60-62.99%=**D-**; <60%=**F**

Missed Exam/Laboratory/Assignment Policy
If you miss an opportunity to demonstrate your knowledge of the subject matter by missing a duly scheduled exam, laboratory or other assignment, the grading scheme does not apply. Your grade will be determined at the discretion of the instructor. By missing a duly scheduled exam, laboratory or other assignment, you accept and recognize that the instructor must determine your grade within the context of determining the grade of students who did not miss a duly scheduled exam, laboratory or other assignment. Instructor Make-up Policy: SUGGESTED: NO MAKE-UP EXAMS, NO MAKE-UP LABORATORIES OR NO MAKE-UP OTHER ASSIGNMENTS. FINAL EXAM WEIGHTED WITH PENALTY (0-100%) FOR MISSED WORK.

Lecture attendance: Attending all classes is mandatory. The textbook is a guide for the course additional material will be covered during lecture meetings. If you miss class, you will miss out on taking notes and this ***will*** affect your ability to study for tests and quizzes. Except in extreme cases there can be no makeup exams and missing one is grounds for failure of the course. At all times, if you have any questions or need help, please ask your instructor. If you are having difficulties with the course, or if your life is affecting your performance in class, or your ability to attend, let the instructor know as soon as problems arise.

Laboratory

Date	Topic	Requirements
Meeting 1	Chemical Safety Rules & Laboratory Procedure Rules; Density	Hand in
Meeting 2	Empirical Formula of Copper Oxide	Hand in
Meeting 3	Vinegar Titration	Hand in
Meeting 4	Seawater Titration	Hand in
Meeting 5	Calorimetry	Hand in
Meeting 6	Properties of Oxygen	Hand in
Meeting 7	Molar Mass of a Condensable Vapor	Hand in
Meeting 8	Molar Volume of Carbon Dioxide	Hand in
Meeting 9	Spectrophotometry	Hand in
Meeting 10	Molecular Models	Hand in
Meeting 11	Freezing Point Depression	Hand in
Meeting 12	Laboratory Exam	Hand in

Laboratory Manual: All labs are posted on the Physical Science Department's webpage. Laboratory manuals need to be downloaded and read before coming to lab. You will not be permitted in the laboratory if you do not have a copy of the experiment.

Safety glasses or goggles/acceptable footwear – You may not enter the laboratory without these.

Note on laboratory component: The laboratory component counts for 25% of your overall result in CHM1100. Failure to pass the laboratory component of the course will result in a grade of F in the course. It is important to note that the laboratory component of the course serves a dual purpose. It offers the opportunity for students to deepen their understanding of a specific experimental science. The laboratory also offers the instructor an opportunity to assess each student's competence in the subject area.

The laboratory grade is based on the quality of your work in the laboratory and the quality of your laboratory assignments. Laboratory instructors may assess your competence in the subject through the use of pre-lab assignments, reports, quizzes or practical examinations. All laboratory meetings are mandatory. Performing an experiment at an alternate time will be considered only under exceptional cases. If you miss more than one laboratory meeting you may fail the laboratory portion of the course and, hence, the entire course. All laboratory assignments must be completed and handed in within the time limits set by your laboratory instructor.

Laboratory meetings are subject to the regulations of the New York City Fire Department and the laws of the State of New York. If your instructor is concerned that you are unprepared or unable to safely complete a given experiment you may be asked to leave the laboratory and will not receive credit for the meeting. Examples of reasons for an instructor's duty of action include a student arriving late to the meeting, failure to bring approved safety glasses/goggles, improper attire, failure to study the laboratory experimental protocol, or a general lack of laboratory competence.

Conduct: Students are required to follow *The Student Code of Conduct* as stated in the *Student Handbook*.

Accessibility: Access-Ability Services (AAS) serves as a liaison and resource to the KCC community regarding disability issues, promotes equal access to all KCC programs and activities, and makes every reasonable effort to provide appropriate accommodations and assistance to students with disabilities. Your instructor will make the accommodations you need once you provide documentation from the Access-Ability office (D205). Please contact AAS for assistance.