**Philadelphia University**
**Faculty of Science**
**Department of Basic Sciences**
**First Semester, 2019/2020**

# Course syllabus

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| **Course title: General Chemistry 1** | **Course code: 0212101** |
| **Course level: 1** | **Course prerequisite (s) and/or corequisite (s):** |
| **Credit hours: 3** | **calculus 0250101** |
| **Lecture time: (9:10-10:00) Sun., Tue., Thur. / Location: 9315**<br>**(11:15-12:45) Mon.,Wed, /Location: 1005** | |

**Academic Staff Specifics**

| Name | Rank | Office number and location | Office hours | E-mail address |
|---|---|---|---|---|
| Khadeejah Al Abrouni | Lecturer | Nursing building 9212 | 10-11 am **Sun., Tue., Thur.** | kabrouni@philadelphia.edu.jo |
| | | Science building 1019 | 12-1 pm **Sun., Tue., Thur.**<br>10-11 am Mon.,Wed, | |

**Course description :**

This course introduces the fundamental theories of chemistry and covers atomic nature of matter, stoichiometry, periodic table, aqueous solution and concentrations, oxidation and reduction, atomic structure, chemical bonding, law of gases, acids and bases.

**Course objectives:**

- Presents a basic introduction of chemical concepts and the development of stoichiometric principles.
- Understand that all matter consists of atoms, and the limitless variety observed around us stems from the ways that these atoms bond with one another.
- To provides the student with a fundamental store of chemical information and an understanding to apply them in more advanced courses and throughout ones career.
- To become adept at problem solving, by learning to interpret data, to employ valid and efficient methods of analysis.

**Course/ resources**

- **Text book/ books (title , author (s), publisher, year of publication)**

**Title:** General Chemistry, The essential concepts, 6th edition
**Author:** Raymond Chang
**Publisher:** McGraw Hill 2011
**ISBN:** 978-007-131368-1

- **Support material (s) (vcs, acs, etc):----------**
- **Study guide (s) (when applicable):----------**
- **Laboratory Handbook/ books (when applicable)**

  **Title:** Featuring Experiments in General Chemistry Measure Net , 6th edition
  **Author:** Bobby Stanton, Lin Zhu, Charles H. Atwood
  **Publisher:** Brooks/Cole 2010
  **ISBN:** 978-0-495-56179-8

**Teaching methods**
**Lectures, discussion groups, problem solving**

**Learning outcomes:**

- Knowledge and understanding

  Upon completion of this course students will be able to:

  - Perform unit analysis problems (involving the metric system, unit conversions, volume, density and temperature) applying significant digits and scientific notation.
  - Know and correctly use the language of chemistry (nomenclature, terminology, and symbolic representations).
  - Understand the basic principles of atomic theory, the isotopes and atomic mass .
  - Demonstrate knowledge of the principles and distinguishing characteristics of ionic and molecular compounds based upon physical properties and electronegativity differences.
  - Predict the behavior of gases while undergoing changes in volume, pressure, temperature and quantity.

- Cognitive skills (thinking and analysis).
  - Gather and assess information relevant to a question
  - Analyze, evaluate, and synthesize information
  - Use critical thinking and logic in the solution of problems
  - Solve quantitative problems using basic mathematical skills

- Communication skills (personal and academic).
  - Develop, interpret, and express ideas through written communication( home works)
  - Improve general performance for student through the interaction with each other in solving different chemical problems ( social media)

- Transferable Skills.
  - To generalize the analytical and quantitative skills gained in this course and to apply them in more advanced courses and throughout ones career.
  - Employ valid and efficient method of analysis and to assess whether or not the result of calculation are reasonable.
  - possess initiative in problem solving

- Psychomotor Skills (When applicable)

**Assessment instruments**

- Exams (First, Second and Final Exams)
- Quizzes.
- Homework assignments

| Allocation of Marks | |
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| **Assessment Instruments** | **Mark** |
| First examination | **20** |
| Second examination | **20** |
| Final examination: 40 marks | **40** |
| Quizzes, homework. | **20** |
| Total | **100** |

**Documentation and academic honesty**

- Documentation style (with illustrative examples)
  Submit your homework covered with a sheet containing your name, number, course title number, and number of the home work (e.g. assignment).
  Any completed homework must be handed in to my office (room 212) by 13:00 on the due date. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

- Protection by copyright
  Students should realize that some published information or data are the property of their authors and they are not allowed to use it without asking permission from the originators.

- Avoiding plagiarism.
  Plagiarism is the unauthorized use or close imitation of the language and thoughts of another author and the representation of them as one's own original work, without proper acknowledgment of the author or the source. Students must pursue their studies honestly and ethically in accordance with the academic regulations. Cheating in exams and plagiarism are totally unacceptable and those who, intentionally, commit such acts would be subjected for penalties according to the University regulations.

**Course/ academic calendar**

| week | Basic and support material to be covered | Homework/ and quizzes |
|---|---|---|
| **(1) , (2)** | **(chapter 1)**<br>**1.1 The Scientific Method**<br>**1.2 Classifications of Matter**<br>Substances and Mixtures • Elements and Compounds<br>**1.3 Physical and Chemical Properties of Matter**<br>**1.4 Measurement**<br>SI Units • Mass and Weight • Volume • Density • Temperature Scales<br>**1.5 Handling Numbers**<br>Scientific Notation • Significant Figures • Accuracy and Precision<br>**1.6 Dimensional Analysis in Solving Problems** | |
| **(3)** | **(chapter 2) Atoms, molecules, and Ions**<br>**2.1 The Atomic Theory**<br>**2.2 The Structure of the Atom** | |

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| | The Electron • Radioactivity • The Proton and the Nucleus •The Neutron<br>**2.3 Atomic Number, Mass Number ,and Isotopes**<br>**2.4 The Periodic Table**<br>**2.5 Molecules and Ions**<br>**2.6 Chemical Formulas**<br>Molecular Formulas • Empirical Formulas • Formula of Ionic Compounds<br>**2.7 Naming Compounds** | **Quiz** |
| **(4), (5)** | **(chapter 3) Stoichiometry**<br>**3.1** Atomic Mass<br>Average Atomic Mass<br>**3.2** Avogadro's Number and the Molar Mass of an Element<br>**3.3** Molecular Mass<br>**3.5** Percent Composition of Compounds<br>**3.6** Experimental Determination of Empirical Formulas<br>Determination of Molecular Formulas<br>**3.7** Chemical Reactions and Chemical Equations<br>Writing Chemical Equations • Balancing Chemical Equations<br>**3.8** Amounts of Reactants and Products<br>**3.9** Limiting Reagents<br>**3.10** Reaction Yield | |
| **(6)** | **First examination** | |
| **(6) ,(7)** | **(chapter 4) Reactions in aqueous solutions**<br>**4.1** General Properties of Aqueous Solutions<br>Electrolytes versus Nonelectrolytes<br>**4.2 Precipitation Reactions**<br>Solubility • Molecular Equations, Ionic Equations, and Net Ionic Equations<br>**4.3** Acid-Base Reactions<br>General Properties of Acids and Bases<br>• Brónsted Acids and Bases<br>•Acid-Base Neutralization • Acid-Base Reactions Leading to Gas Formation<br>**4.4** Oxidation Number<br>**4.5** Concentration of Solutions and Dilution of Solutions<br>**4.6** Solution Stoichiometry | |
| **(8)** | **(chapter 16) Acids and Bases**<br>**16.1** Brónsted Acids and Bases ,Conjugate Acid-Base Pairs<br>**16.2** The Acid-Base Properties of Water ,The Ion-Product of Water<br>**16.3** pH—A Measure of Acidity<br>**16.4** Strength of Acids and Bases | **Quiz** |
| **(14), (15)** | **(chapter 5) Gases**<br>**5.1** Substances That Exist as Gases<br>**5.2** Pressure of a Gas SI Units of Pressure • Atmospheric Pressure<br>**5.3** The Gas Laws<br>The Pressure-Volume Relationship: Boyle's Law • The Temperature-Volume Relationship: Charles's and Gay-Lussac's Law • The Volume-Amount Relationship: Avogadro's Law<br>**5.4** The Ideal Gas Equation<br>Density and Molar Mass of a Gaseous Substance •Gas Stoichiometry<br>**5.5** Dalton's Law of Partial Pressures | |
| **(9),(10)** | **(chapter 7) The electronic structure of atoms**<br>**7.1** From Classical Physics to Quantum Theory<br>Electromagnetic Radiation • Planck's Quantum Theory<br>**7.4** The Dual Nature of the Electron<br>**7.5** Quantum Mechanics<br>Quantum Mechanical Description of the Hydrogen Atom<br>**7.6** Quantum Numbers | |

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| | The Principal Quantum Number (*n*) • The Angular Momentum Quantum Number • The Magnetic Quantum Number , The Electron Spin Quantum Number<br>**7.7** Atomic Orbitals , *s* Orbitals • *p* Orbitals • *d* Orbitals and Other Higher-Energy<br>Orbitals • The Energies of Orbitals<br>**7.8** Electron Configuration<br>The Pauli Exclusion Principle • Diamagnetism and Paramagnetism • The Shielding Effect in Many-Electron Atoms • Hund's Rule • General Rules for Assigning Electrons to Atomic Orbitals<br>**7.9** The Building-Up Principle<br>(chapter **8**)<br>The Periodic table<br>**8.1** Development of the Periodic Table<br>**8.2** Periodic Classification of the Elements ,Electron Configurations of Cations and anions | |
| **(10)** | **Second examination** | |
| **(11), (12)** | **(chapter 9) Chemical bonding I: the covalent bond**<br>**9.1** Lewis Dot Symbols<br>**9.2** The Ionic Bond<br>**9.4** The Covalent Bond<br>**9.5** Electronegativity , Electronegativity and Oxidation Number<br>**9.6** Writing Lewis Structures<br>**9.7** Formal Charge and Lewis Structure<br>**9.8** The Concept of Resonance | |
| **(13)** | **(chapter 10)**<br>**Chemical bonding II: Molecular geometry and hybridization of atomic orbitals**<br>**10.1** Molecular Geometry , Guidelines for Applying the VSEPR Model<br>**10.2** Dipole Moments<br>**10.3** Valence Bond Theory<br>**10.4** Hybridization of Atomic Orbitals<br>**10.5** Hybridization in Molecules Containing Double and Triple Bonds | |
| **(16)** | **Final Examination** | |

**Expected workload:**

**On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.**

**Attendance policy:**

**Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.**

**Other Education Resources**

**Books**

**References**

**1.** Title: *Chemistry: The Molecular Nature of Matter and Change* , 5th edition
Author :**Martin Silberberg**
Publisher: McGraw Hill 2009
ISBN**:** 978-0-07-1283540

**Journals**

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**Websites**

**http://www.chemicool.com/**
**http://www.unit5.org/chemistry/chemistry.htm**