DLSHSI
DE LA SALLE HEALTH SCIENCES INSTITUTE
Nurturing Life

College of Humanities and Sciences
Lourdes E. Campos, MD Building
City of Dasmariñas, Cavite, Philippines
Trunk Lines: (63) (46) 481-8000 (63) (2) 988-3100
DLSHSI URL: www.dlshsi.edu.ph
CHS URL: https://sites.google.com/site/dlshsichs/

Local: 5007 (Dean's Secretary) | 1412 (Dean)
1408 (Department of Chemistry)
1345 (Dept. of Integrated Humanities and Sciences)
1115 (Chemistry Lab) | 1405 (Biology & Physics Lab)

COURSE SYLLABUS

DEPARTMENT: **CHEMISTRY DEPARTMENT**
COURSE CODE: **CHEM 110**
COURSE TITLE: **GENERAL CHEMISTRY**
CREDIT UNITS: 5.0 units (54 hours lecture & 108 hours laboratory)
PRE-REQUISITE: none
SCHEDULE: _____
INSTRUCTOR: _____
CONSULTATION TIME: _____

COURSE DESCRIPTION: This course introduces the basic concepts and principles of general chemistry. The course covers matter and measurement, atomic structure, periodic table, chemical bonding, formulas and names of inorganic compounds, chemical equations, stoichiometry, energy changes, reaction rates, chemical equilibrium, gas laws, intermolecular forces and condensed states, solutions, acids and bases, and nuclear chemistry. Course activities such as problem solving and laboratory experiments are designed to help develop analytical and critical thinking skills. Emphasis is also given on the practical applications of general chemistry in health and medicine. This course would also give a new appreciation of the role of chemistry in both the human body and the larger world around us.

EXPECTED LASALLIAN GRADUATE ATTRIBUTES (ELGA)	**LEARNING OUTCOMES BASED ON ELGA** At the end of this course, the students shall manifest the ELGA by:
GOD-LOVING Spirit of Faith	○ imparting to the public and making them realize the amazing works of God in our world and society through chemistry and ○ demonstrating the love of God by showing to the public how chemistry can change and improve the lives of people in our society.
PATRIOTIC PROFESSIONALS Zeal for Service	○ developing ways on how to increase the awareness of the public to the common health and environmental problems in our country through chemistry and ○ developing means on how to address the common health and environmental problems in the society through chemistry.
PERSON-ORIENTED Communion in Mission & Reverence for Life	○ extending help to the community by increasing the awareness of the public to the common health and environmental problems in the society or in the community through chemistry.

LEARNING OUTCOMES

LO 1. Higher levels of comprehension
LO 2. Proficient and effective communication
LO 3. Understanding of basic concepts across the domains of knowledge
LO 4. Critical, analytical, and creative thinking
LO 5. Application of different analytical modes in tackling problems methodically
LO 6. Ability to contribute personally and meaningfully to the country's development
LO 7. Capacity to reflect critically on shared concerns and think of innovative, creative solutions guided by ethical standards
LO 8. Working effectively in a group
LO 9. Problem-solving
LO 10. Basic work-related skills and knowledge

PRELIMINARY PERIOD LEARNING PLAN

COURSE OUTLINE

LEARNING OUTCOMES At the end of each topic, the students should be able to:	**TOPICS**	**LEARNING ACTIVITIES/ TEACHING STRATEGIES**	**ASSESSMENT**
• distinguish chemistry from the other branches of natural sciences; • construct a simple hypothesis to explain some observations or a given rule; • modify and design experiments to explain certain problem; • perform precise and accurate measurements; • evaluate units of measurements in various situations; • compare and contrast the different states of matter; • create a diagram showing the transformations of energy; and • integrate heat transfer in the physiology of the human body.	**1. Matter, Energy, and Measurement** 1. Nature of Chemistry 2. Scientific Method 3. Scientific Notation & Significant Figures 4. Measurement 5. Unit Conversion 6. Density 7. Specific Gravity 8. States of Matter 9. Forms of Energy 10. Heat & Heat Transfer	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
• create a schematic diagram on how to separate mixtures; • explain how the basic laws of matter (law of conservation of mass, law of constant composition, law of multiple proportion) led to the formulation of Dalton's Atomic Theory; • construct a table showing the relationship among the subatomic particles, atomic number and mass number of an element; • calculate the average atomic weight of an element given the natural abundances of its isotopes; • explain the relationship between the mass and size of an atom; • construct a timeline on the development of the Periodic Table;	**2. Atoms** 1. Atoms 2. Classification of Matter 3. Dalton's Atomic Theory 4. Subatomic Particles 5. Mass Number and Atomic Number 6. Isotopes and Atomic Weight 7. The Mass and Size of an Atom 8. Origin of the Periodic Table 9. Classification of Elements 10. Shells, Subshells, Orbitals	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set

• categorize elements in the Periodic Table; • write the electron configuration of a specific element; • construct a hypothetical Periodic Table given the properties of specific elements; and • predict both physical and chemical properties of an element based on its position on the periodic table.	11. Shapes and Orientation in Space of Orbitals 12. Electron Configuration 13. Chemical Periodicity 14. Relationship between Electron Configuration and Position in the Periodic Table 15. Periodic Properties: Atomic Size and Ionization Energy		
• compare the different types of bonds; • determine the polarity of a bond based on electronegativities of the atoms forming the bond; • name compounds given the formula; • write formula given the compound; • create a model for the different molecular geometry; • predict the polarity of molecules given their dipole moments or their corresponding geometry; and • indicate the movement of electrons using curved arrows.	**3. Chemical Bonds** 1. Octet Rule 2. Types of Chemical Bonds 3. Electronegativity 4. Ionic and Covalent Bond Formation 5. Polarity of Bonds 6. Lewis Structures 7. Valence Shell Electron Pair Repulsion Theory 8. Polarity of Molecules 9. Resonance and Electron Pushing using Curved Arrows 10. Naming Inorganic Compounds	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
PRELIMINARY PERIOD ASSESSMENT			

MIDTERM PERIOD LEARNING PLAN

LEARNING OUTCOMES At the end of each topic, the students should be able to:	**TOPICS**	**LEARNING ACTIVITIES/ TEACHING STRATEGIES**	**ASSESSMENT**
• write, balance, and translate a chemical equation; • calculate the theoretical yield and percent yield of chemical reactions; • design a plausible chemical reaction; • predict the products of the different types of reactions; • propose a reasonable reaction that happens in the human body; and • differentiate an exothermic reaction and an endothermic reaction.	**4. Chemical Reactions** 1. Introduction to Chemical Reactions 2. Writing and Balancing Chemical Equations 3. Molecular Weights and Formula Weights 4. Stoichiometry 5. Reactions in Aqueous Solutions 6. Oxidation and Reduction Reactions 7. Heat of Reaction	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
• explain and justify the compressibility and expandability of gases using the relationships among pressure, temperature, volume, and amount of substance;	**5. Gases, Liquids, and Solids** 1. Gas Pressure and Its Measurement 2. Gas Laws and the Kinetic Molecular Theory	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work

• differentiate the types of intermolecular forces of attraction; • relate the intermolecular forces of attraction to physical properties of matter; • describe and identify the different types of solids; and • construct and interpret phase diagrams.	3. Intermolecular Forces of Attraction 4. Preview on the Behavior of Liquids at the Molecular Level 5. Surface Tension 6. Vapor Pressure 7. Boiling Point and Factors that Affect Boiling Point 8. Characteristics of the Various Types of Solids 9. Phase Changes 10. Heating Curve and Phase Diagrams		• Seat Work • Problem Set
• describe the fundamental properties of a solution; • calculate the concentration of common household products; • prepare a dilute solution from a more concentrated solution; • compare the solubility of different substances in water; • explain the effect of dissolved particles on the boiling point and melting point of a solution; and • describe the process of osmosis and how it relates to biological membranes and dialysis.	**6. Solutions and Colloids** 1. Common Types of Solutions 2. Distinguishing Characteristics of Solutions 3. Factors Affecting Solubility 4. Electrolytes 5. Common Units of Concentration and Dilution 6. Introduction to Properties of Water 7. Ionic and Covalent Compounds 8. Solid Hydrates 9. Water in the Body 10. Colloids 11. Colligative Properties 12. Dialysis	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
MIDTERM PERIOD ASSESSMENT			

FINAL PERIOD LEARNING PLAN

LEARNING OUTCOMES At the end of each topic, the students should be able to:	**TOPICS**	**LEARNING ACTIVITIES/ TEACHING STRATEGIES**	**ASSESSMENT**
• describe energy changes in a reaction; • explain the relationship between activation energy and reaction rate • predict the effect of concentration, temperature, and presence of catalyst on the rate of reaction; • describe the basic features of chemical equilibrium; • write expression for an equilibrium constant; • calculate and interpret the value of *K*; and • evaluate what happens when a stress is introduced in the	**7. Reaction Rates and Chemical Equilibrium** 1. Reaction Rates 2. Measuring Reaction Rates 3. Effective Collision 4. Activation Energy and Reaction Rate 5. Factors Affecting Reaction Rates 6. Chemical Equilibrium 7. Equilibrium Constant 8. Rate of Reaction and the Value of *K* 9. Le Chatelier's Principle	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set

system and equilibrium is disturbed by using Le Chatelier's principle.			
• categorize common commercial products as an acid or a base; • identify conjugate acid-base pairs; • relate acid strength to the direction of equilibrium; • calculate and interpret the value of acid ionization constant; • predict the products of an acid-base reaction based on their properties; • identify the acidic and basic properties of pure water; • calculate and interpret the value of pH and pOH; • perform titration properly; • calculate the concentration of an acid or base by titration; • describe the basic features of a buffer; • calculate and interpret the value of the pH of a buffer; and • relate the significance of buffers in our body.	**8. Acids and Bases** 1. Introduction to Acids and Bases 2. Strengths of Acids and Bases 3. Conjugate Acid-Base Pairs 4. Acid-Base Equilibrium and Acid Ionization Constants 5. Properties of Acids and Bases: Neutralization, Reaction with Metals, Reaction with Metal Hydroxides, Reaction with Metal Oxides, Reaction with Carbonates and Bicarbonates and Reaction with Ammonia and Amines 6. Acidic and Basic Properties of Pure Water, pH and pOH 7. Titration, Buffers and pH of a Buffer	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
• summarize the discovery of radioactivity; • describe radioactivity, radioisotopes and types of radiation; • recognize the different units used for measuring radioactivity; • relate radiation dosimetry to human health; • identify common radiostopes used in medical diagnosis and treatment; and • describe the general features of nuclear fusion and nuclear fission.	**9. Nuclear Chemistry** 1. Discovery of Radioactivity 2. Definition of Radioactivity 3. Radioisotopes 4. Nuclear Half-life 5. Detection and Measurement of Nuclear Radiation 6. Radiation Dosimetry Related to Human Health 7. Nuclear Medicine and Its Application 8. Nuclear Fusion 9. Nuclear Fission and its Relation to Atomic Energy	• Lecture Discussion • Video Presentation • Group Discussion	• Formal Examinations • Recitations • Board Work • Seat Work • Problem Set
FINAL PERIOD ASSESSMENT			

LEVELS OF ASSESSMENT

Lecture Components (60%)		Laboratory Components (40%)	
• Long Exams	25%	• Practical Exam	10%
• Major Exam	25%	• Major Exam/s	20%
• Others	10%	• Lab. Performance & Others	5%
		• Laboratory Reports a. Experiment Sheets b. Results & Discussion Reports (RDR)	5%
Total	**60%**	**Total**	**40%**

COMPUTATION OF GRADES

- *Each form of assessment will be computed as follows:*
  - $$\text{ASSESSMENT SCORE} = \frac{\text{RAW SCORE}}{\text{TOTAL SCORE}} \times 50 + 50$$
- *At the end of the course, the final course output will computed as follows:*
  - $$\text{FINAL COURSE OUTPUT SCORE} = \frac{\text{GARNERED POINTS}}{\text{TOTAL POINTS}} \times 50 + 50$$
- *At the end of the course, the final course grade will be computed as follows:*
  - $$\text{FINAL COURSE GRADE} = \left(\frac{\text{PRELIM GRADE} + \text{MIDTERM GRADE} + \text{FINAL GRADE}}{3} \times 0.95 \right) + \left(\text{FINAL COURSE OUTPUT SCORE} \times 0.05 \right) = 100$$

REFERENCES

Textbook

- Bettelheim, F., Brown, W., Campbell, M., Farrell, S., and Torres, O. (2013). *Introduction to general, organic, and biochemistry* (10th ed.). Singapore: Cengage Learning.

Other References

- Smith, J. (2012). *General, organic, and biological chemistry* (2nd ed.). Boston: McGraw-Hill Companies.
- Denniston, K., Topping, J., and Caret, R. (2007). *General, organic, and biochemistry* (5th ed.). Boston: McGraw-Hill Companies.
- Timberlake, K. (2011). *Chemistry: an introduction to general, organic, and biological chemistry* (11th ed.). Upper Saddle River, New Jersey: Prentice Hall, Inc.

COURSE POLICIES

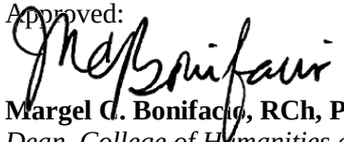
- Students are allowed 20% of the total number of schooldays of absences inclusive of tardiness. All absences after that will mean excessive absences, which will merit a grade of 0.00.
- Home works will be due at the beginning of the class. No home works will be accepted thereafter.
- The students will be given a score of zero (0) with corresponding grade of zero percent (0%) in a requirement which is not submitted under the following conditions:
    - They are given a chance to make-up for the said requirement.
    - They are given enough time to work on the make-up requirement.
- The students will be given a score of zero (0) with corresponding grade of zero percent (0%) in a quiz which is given during their absence under the following conditions:
    - The absent is unexcused.
    - They are offered a make-up quiz and still fail to appear during the given time.
    - They are given enough time to prepare for the make-up quiz.
- In case the students submitted a requirement given by the instructor/professor to make-up for their lost grade, a certain percent will be deducted on their actual grade.
- Special major exams are scheduled one week after the administration of the major exams. No special exams will be given thereafter EXCEPT IN SPECIAL SITUATIONS.
- Students must be honest at all times; cheating and plagiarism in any form will merit a grade of 0.00.
- Cellular/Mobile phones should always be in silent mode during class hours; the use of cellular phones is prohibited in class unless a special permission is sought. Cellular phones cannot also be used as calculator during examination.
- Borrowing of calculators and modern periodic table of elements during examination is strictly prohibited.
- Wearing of laboratory gowns and safety goggles during experiments will be strictly implemented. No lab gown and safety goggles, no experiment.
- The laboratory instructor will not be held legally responsible to accidents due to student's unawareness of safety measures and non-compliance with experimental guidelines.
- Any complaints (teaching, grades, etc.) against the teacher or against classmates (relative to the class) should be properly addressed to the subject-teacher for appropriate action. Students may seek the help and guidance of their academic/registration adviser in resolving the issue with the subject–teacher.

All policies (attendance, tardiness, decorum, grievances, etc.) will be subject to the provisions of the latest revision of the Student Handbook.

Endorsed:

Tabitha L. Amora, RCh, PhD
Program Director for Biochemistry
Head, Chemistry Department

Approved:



Margel C. Bonifacio, RCh, PhD
Dean, College of Humanities and Sciences