De La Salle University-Manila
College of Science
Department of Chemistry

COURSE CODE: BASCHEM (Basic Chemistry)

Instructor: _____ Contact details: _____
Consultation hours: _____ Class schedule: _____
Term, AY: Term 1 2022-2023
Room/ Recurring Zoom link:_____
_____

TYPE OF COURSE

___ Service learning[1] ___ Hybrid _✓_ Fully online ___ In-person

GENERAL COURSE DESCRIPTION

This is a 3-unit course that emphasizes fundamental chemical concepts and principles that include atomic structure, electronic configurations and periodic trends, chemical bonding and molecular structure, chemical stoichiometry, chemical and physical properties of matter, chemical kinetics, chemical equilibrium, acid-base equilibria and chemical thermodynamics.

COURSE LEARNING OUTCOMES (LO)

Upon completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

ELGA	LO1
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	At the end of the term, the students are expected to relate chemistry concepts with current environmental issues and with the latest developments in various areas of research in their field of study.

Final Course Output

As evidence of attaining the above learning outcomes, the student is required to do and submit the following during the indicated dates of the term.

Learning Outcome	Required Output	Due Date
LO 1: At the end of the term, the students are expected to connect the concepts learned throughout the course and view chemistry as an integrated whole rather than a collection of concepts and algorithms	Submission: Specific Topic and Initial Reference(s) General Topic: A glimpse into the current situation of the country such as the environmental issues, waste disposal, evaluation of the economic benefits of recycling (data-based assessment) and the sustainability of our resources.	Week 1-2
	Organizational Meeting	Week 3-4

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	Share your schedules and discuss a strategy on how you will develop your position paper	
	Submission of *Written Output* (Paper, Poster, etc.) or *Oral Presentation* (Oral Reports using slide presentation, Videos, etc.)	Week 5-13
The Final Course Output is Group Work		

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RUBRIC FOR ASSESSMENT OF FINAL COURSE OUTPUT					
Criteria	Exemplary	Satisfactory	Developing	Beginning	Rating
Grade	**4**	**3**	**2**	**1**	
Organization, 20%	Output is well organized and structured.	Output is organized but lacks certain key elements.	Output shows organization but has several portions that are not relevant.	Output is disorganized and the flow of information and arguments are confusing.	
Scientific Accuracy, 40%	Scientific explanations or facts presented/cited are relevant.	Scientific explanations or facts presented/cited show some inaccuracies.	Scientific explanations or facts presented/cited show a significant number of inaccuracies.	Scientific explanations or facts presented or cited are all misconceptions.	
Presentation of Solutions or Explanations, 40%	Explanations presented are clear, valid, and convincing.	Explanations presented are clear, valid, and convincing but has several flaws.	Explanations presented only partially addressed the topic.	Explanations presented do not in any way relate to the topic.	
				TOTAL:	

OTHER REQUIREMENTS AND ASSESSMENTS

- Canvas Quiz/Seatwork/Problem Set/Homework/ Reading Assignment
- Long Exams
- Final Exam (Comprehensive)

GRADING SYSTEM

Details	**Weight**	**Scale**	
		Percentage	**GPE**
3 Long Exams	50%	95 -100	4.0
Final Exam	20%	90 - 94	3.5
Final Course Output	10%	84 - 89	3.0
Quizzes/Seatwork/ Problem Sets/Homework	20%	78 - 83	2.5
TOTAL	**100%**	72 - 77	2.0
Passing Grade 60%		66 - 71	1.5
		60 - 65	1.0
		Below 60	0.0

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LEARNING PLAN				
Learning Outcome	Topic	Week no.	Practice Problems and/or Reading Assignments	Learning Activities
Become familiar with the parts of the atom and their properties Distinguish between atomic number and mass number Explain the difference between covalent and ionic bonding	**Chapter 2: Atoms, Molecules, and Ions** 2.3 Atomic Number, Mass Number, and Isotopes 2.4 The Periodic Table 2.5 Molecules and Ions		***Practice Problems*** *2.3, 2.10, 2.12, 2.16, 2.18, 2.21, 2.27, 2.32, 2.33, 2.36, 2.37, 2.44, 2.45, 2.46, 2.61, 2.63, 2.66, 2.73*	*(Refresher Module - Not required but recommended)*
Understand the quantization of energy Characterize the Bohr model of the atom List the most important ideas of the quantum mechanical model of the atom Give quantum numbers, their relationships and designations Write electron configurations and differentiate core and valence electrons	**Chapter 7: Quantum Theory and the Electronic Structure of Atoms** 7.1 From Classical Physics to Quantum Theory 7.2 The Photoelectric Effect* (Advanced Reading Assignment) 7.3 Bohr's Theory of the Hydrogen Atom 7.4 The Dual Nature of the Electron 7.5 Quantum Mechanics 7.6 Quantum Numbers 7.7 Atomic Orbitals 7.8 Electron Configuration 7.9 The Building –Up Principle		***Practice Problems*** *7.5, 7.6, 7.8, 7.11, 7.13, 7.24, 7.23, 7.29, 7.37, 7.41, 7.46, 7.47, 7.48, 7.51, 7.52, 7.55, 7.57, 7.58, 7.62, 7.64, 7.66, 7.74, 7.76, 7.79, 7.80, 7.84, 7.88, 7.120, 7.124*	*(Refresher Module - Not required but recommended)*
Use the periodic table for the classification of elements and predicting trends in properties	**Chapter 8: Periodic Relationships Among the Elements** 8.2 Periodic Classification of the Elements 8.3 Periodic Variation in Physical Properties 8.4 Ionization Energy 8.5 Electron Affinity		***Practice Problems*** *8.5, 8.7, 8.13, 8.20, 8.24, 8.26, 8.34, 8.38, 8.44, 8.50*	*(Refresher Module - Not required but recommended)*
	Orientation & Class Policies	1 (0.5 h**)**		
Write Lewis dot symbols and Lewis structures	**Chapter 9: Chemical Bonding I. Basic** 9.5 Electronegativity 9.6 Writing Lewis Structures	1 (2.5 h)	**Self-Study Assignment** Chapter 9: Chemical Bonding I. Basic Concepts 9.1 Lewis Dot Symbols 9.2 The Ionic Bond 9.4 The Covalent Bond ***Interactivity:*** *Ionic Bonds; Covalent Bonds; Lewis Dot Structure; Resonance*	Lecture Presentation Guided Exercises Problem Solving

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			Animation: *Ionic Versus Covalent* ***Practice Problems:*** *9.5, 9.6, 9.8, 9.13, 9.17, 9.29, 9.31, 9.33, 9.34, 9.37, 9.39, 9.43, 9.44, 9.47, 9.69, 9.72*	
Predict molecular geometry using VSEPR theory; predict polarity of molecules	**Chapter 10: Chemical Bonding II. Molecular Geometry and Hybridization of Atomic Orbitals** 10.1 Molecular Geometry 10.2 Dipole Moments	2 (1.5 h)	***Self-Study Assignment Vectors*** ***8.1 Interactivity:*** *Determining Molecular Shapes; Molecular Polarity* *Animation: VSEPR; Polarity of Molecules;* ***Practice Problems*** *10.4, 10.9, 10.10, 10.11, 10.21*	Lecture Presentation Guided Exercises Problem Solving
Distinguish between inter- and intramolecular forces; give examples of intramolecular forces and how they affect the properties of the states of matter and phase behavior Discuss various physical changes and interpret phase diagrams	**Chapter 11: Intermolecular Forces and Liquids and Solids** 11.1 The Kinetic Molecular Theory of Liquids and Solids 11.2 Intermolecular Forces 11.8 Phase Changes 11.9 Phase Diagrams	2-3 (3 h)	***Self-Study Assignment*** *Chapter 11: Intermolecular Forces and Liquids and Solids* *11.3 Properties of Liquids* ***Animation****: Equilibrium Vapor Pressure* ***Practice Problems*** *11.1, 11.3, 11.4, 11.6, 11.10, 11.13, 11.14, 11.16, 11.17, 11.21, 11,22, 11,24, 11.29, 11.57, 11.69, 11.72, 11.76, 11.89, 11.91, 11.94*	Lecture Presentation Guided Exercises Problem Solving
	LONG EXAM 1	3 (1.5 h)		
Define and understand concepts of molar mass. Balance and interpret chemical equations and perform stoichiometric calculations while observing the proper techniques on handling numbers	**Chapter 3: Mass Relationships in Chemical Reactions** 3.8 Amounts of Reactants and Products 3.9 Limiting Reagents 3.10 Reaction Yield	4 (1.5 h	***Chemistry Research and Industry:*** *Reaction Yield: Research and the Manufacturing Industry* ***Self-Study Assignment*** *3.2 Molar Mass of an Element* *3.3 Molar Mass of a Molecule or Compound* *3.7 Writing Chemical Equations; Balancing Chemical Equations;* *3.8 The Mole Method* ***Animation:*** *Limiting Reagent*	Lecture Guided Exercises Problem Solving

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			***Practice Problems**: 3.63-3.65, 3.78, 3.81, 3.86, 3.92-3,94*	
Describe and distinguish different types of solutions; calculate the concentration of solutions using various concentrations units	**Chapter 4 and 12: Reactions in Aqueous Solution and Physical Properties of Solutions** 12.1 Types of Solutions 12.3 Concentrations Units 4.5 Concentration of Solutions • Percent by mass • Molarity	4 (1.5 h)	***Practice Problems**: 12.4, 12.15, 12.21, 4.63, 4.65, 4.71, 4.73*	Lecture Presentation Guided Exercises Problem Solving
Learn to write the rate of reaction in terms of concentration of reactants and products and how the rate is related to the stoichiometry of reaction Evaluate how the rate of a reaction is defined in terms of rate constant and order of reaction Determine the relationship between reactant concentration and time for first order reactions.	**Chapter 13: Chemical Kinetics** 13.1 The Rate of a Reaction 13.2 The Rate Law 13.3 The Relation Between Reactant Concentration and Time ***(First order reactions only)*** 13.4 Activation Energy and Temperature Dependence of Rate Constants ***(Descriptive only)***	5 (3 h)	***Practice Problems:** 13.1, 13.5, 13.7, 13,9, 13.12, 13.14, 13.16, 13.20, 13.21, 13.22, 13.24, 13.25, 13.26, 13.27,13.31, 13.51, 13.55, 13.58*	Lecture Presentation Guided Exercises Problem Solving
	Independent Learning Week	6	***Self-Study Assignment*** 13.6 Catalysts	
	LONG EXAM 2	7 (1.5 h)		
Distinguish the state of equilibrium for reactions, and how changes in conditions affect the equilibrium state (Le Chatelier's Principle)	**Chapter 14: Chemical Equilibrium** 14.1 The Concept of Equilibrium and the Equilibrium Constant 14.2 Writing Equilibrium Constant Expressions (Kc only) 14.4 What Does the Equilibrium Constant Tell Us? 14.5 Factors that Affect Chemical Equilibrium	7-8 (3 h)	***Practice Problems** 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.8, 14.13, 14.14, 14.18, 14.26, 14.28, 14.33, 14.34, 14.40, 14.44, 14.46, 14.49, 14.51, 14.52, 14.54, 14.56, 14.58, 14.62*	Lecture Presentation Guided Exercises Problem Solving
Characterize acids and bases according to their relative strength, and predict acid/base equilibria of aqueous solutions of salts	**Chapter 15: Acids and Bases** 15.1 Bronsted Acids and Bases 15.2 The Acid-Base Properties of Water 15.3 pH – A Measure of Acidity	8-9 (4.5 h)	***Advanced Reading Assignment*** Chapter 4: Reactions in Aqueous Solutions 4.3 Acid-Base Reactions	Lecture Presentation Guided Exercises Problem Solving

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and express the acidity or basicity of aqueous solutions in terms of the pH value	15.4 Strength of Acids and Bases 15.5 Weak Acids and Acid Ionization Constants 15.6 Weak Bases and Base Ionization Constants 15.7 The Relationship Between the Ionization Constants of Acids and Their Conjugate Bases 15.10 Acid-Base Properties of Salts **(Descriptive only)**		***Practice Problems*** *15.1, 15.2, 15.4, 15.5, 15.8, 15.11, 15.13, 15.16, 15.18, 15.22, 15.26, 15.31, 15.32, 15.34, 15.36, 15.39, 15.40, 15.42, 15.46, 15.50, 15.52, 15.54, 15.58, 15.60, 15.74, 15.78, 15.80, 15.83, 15.86, 15.90,*	
	Independent Learning Week	10	***Advanced Reading Assignment (ARA):*** *6.1 The Nature of Energy and Types of Energy*	
Evaluate the energy changes accompanying reactions and how these relate to their occurrence, their effects on generation of energy and identification of potential energy sources and the establishment of equilibrium	**Chapter 6: Chemical Energy** 6.2 Energy Changes in Chemical Reactions 6.3 Introduction to Thermodynamics 6.4 Enthalpy of Chemical Reactions 6.6 Standard Enthalpy of Formation and Reaction	11 (3 h)	***Practice Problems*** *6.1, 6.2, 6.3, 6.7, 6.12, 6.14, 6.16, 6.18, 6.21, 6.22, 6.24, 6.26, 6.30, 6.32, 6.34, 6.39, 6.41, 6.45, 6.46, 6.48, 6.52, 6.54, 6.62, 6.64*	Lecture Presentation Guided Exercises Problem Solving
	LONG EXAM 3	12 (1.5 h)		
Evaluate the energy changes accompanying reactions and how these relate to their occurrence, their effects on generation of energy and identification of potential energy sources and the establishment of equilibrium Apply the concepts of kinetics, equilibrium and thermodynamics to environmental issues and concerns	**Chapter 17: Entropy, Free Energy and Equilibrium** 17.1 The Three Laws of Thermodynamics 17.2 Spontaneous Processes 17.3 Entropy 17.4 The Second Law of Thermodynamics 17.5 Gibbs Free energy 17.6 Free Energy and Chemical Equilibrium	12-13 (4.5 h)	***Practice Problems*** *17.2, 17.4, 17.5, 17.7, 17.8, 17.10, 17.12, 17.14, 18.16, 17.18, 17.20, 17.21, 17.24, 17.28*	Lecture Presentation Guided Exercises Problem Solving
	FINAL EXAM	14 (2 h)		

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TEACHING STRATEGIES

The learning methodologies to be used in class will focus on active-learning, inductive teaching and learning such as problem-based learning.

REFERENCES

Main Textbook:

Overby, J. and Chang, R. (2022) Chemistry, (14th edition) New York: McGraw-Hill (ISBN10: 1260784479; ISBN13: 9781260784473).

Supplementary References:

Kotz, J.C. and Treichel Jr, P.M., Weaver, G.C. (2014) Chemistry and Chemical Reactivity, (8th edition). Australia: Brooks/Cole-Cengage Learning.

Masterton, W.L. and Hurley, C.N. (2008) Chemistry: Principle and Reactions, (6th edition). Canada: Brooks/Cole-Cengage Learning,

Malone, L.J., Dolter, T.O. with Gentemann, S. (2013) Basic Chemistry (9th edition) Hoboken, NJ, Wiley.

Moore, J.W. and Stanitski, C.L. (2015) Chemistry the Molecular Science (5th edition) Brooks/Cole-Cengage Learning

Petrucci, R.H. (2011) General Chemistry: Principles and Modern Applications, (10th edition) Toronto: Pearson Canada

Silberberg, M.S. (2013) Principles of General Chemistry (3rd edition). New York: McGraw-Hill.

Tro, N.J. with Neu, D. (2012) Chemistry in Focus: A Molecular View of our World, (5th edition). Australia: Brooks/Cole Cengage Learning.

Zumdahl, S.S., and Zumdahl, S.A. (2014) Chemistry, An Atoms First Approach (International Edition), Brooks/Cole Cengage Learning.

CLASS POLICIES

1. Students can learn to navigate AnimoSpace (Canvas) through the following resources: For students who are new to AnimoSpace: Passport to Canvas (public Canvas course) and AnimoSpace Student 101. For students who want to access their classes mobile device: Mobile Guides - Canvas Student.
2. Aside from Canvas, only the following Apps will be used for official communication with the students: DLSU Email, Google Meet, Google Hangouts and Google Chat.
3. It is the responsibility of the student to be mindful of his/her absences/tardiness and performance in class.
4. Specific class policies on attendance, make-up quizzes, academic honesty, dress code, classroom management, and others not mentioned above, are to be discussed by the faculty member on the first day of classes.
5. Synchronous sessions are recorded so that those who missed the session can catch up. Recorded sessions will give all students the chance to review the session. The recorded sessions will be uploaded in Canvas. The uploaded videos are confidential and are meant for academic purposes only.
6. Consultation time will be during the asynchronous sessions
7. Student conduct during synchronous classes and other observable criteria (e.g. punctuality in submissions) will still be monitored, and good behavior will still be recognized by the school.
8. Attendance in synchronous classes will only be recorded for documentation.
9. Students will be given the numeric equivalent or the grade of fail in this subject.
10. Cheating in exams and course output is punishable by expulsion from the university.

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