

SUBJECT OUTLINE DETAILS

1. Subject: General Chemistry 1

- **Code:** CH141C
- **Credits:** 3
- **Hours:** 45 theory hours

2. Management Unit:

- **Department:** Department of Chemistry
- **Faculty/School/Institute/Center/Department:** College of Natural Sciences

3. Prerequisites

4. Subject objectives

4.1 Learning Objectives:

To provide the student with a general introduction to chemistry as it applies to the subjects that will be mentioned in the course description and a basic foundation of problem solving skills.

4.2 Skills:

In addition to learning objectives, the course will provide students other skills as follows:

- 4.2.1. **Critical Thinking:** To include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- 4.2.2. **Communication:** To include effective development, interpretation and expression of ideas through written, oral, and visual communication.
- 4.2.3. **Empirical & Quantitative:** To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusion.
- 4.2.4. **Teamwork:** To include the ability to connect choices, ideas; to interact, discuss and pose questions; as well as to respect other opinions and defend the arguments.

4.1. Attitudes:

The course also provides an opportunity to set up and develop personal characteristics necessary for scientific activities such as curiosity, persistence, and concentration. A successful student will bear a balance between scepticism and receptivity, a love for science and self confidence.

5. Course Description

To achieve the goals above, students will be introduced to the following concepts:

- **Structure of Atoms & the Periodic Table of Elements:** Quantum mechanics; Quantum numbers; Atomic orbital; Electron configuration; The periodic table of elements; Naming compounds.
- **Chemical Bonding:** The ionic bond and lattice energy of ionic compounds; The covalent bond and writing Lewis structures; Formal charge and Lewis structure and the concept of Resonance; Hybridization of atomic orbitals; Valence shell electron pair repulsion theory; Molecular geometry.
- **Solutions & Their Behavior:** Types of solutions; Concentration units; Colligative properties of nonelectrolyte solution; Colligative properties of electrolyte solution; Dilution; Acid-base titration
- **Chemical Equilibrium:** Equilibrium constant and reaction quotient; Writing equilibrium constant expressions; Factors that affect chemical equilibrium; pH; Common ion effect; Buffer solutions.

6. Tentative Lecture Syllabus

	Contents	Hours	Goals
Chapter 1.	Structure of Atoms & the Periodic Table of Elements	12	
	1.1. Quantum mechanics	1	4.1; 4.2; 4.3
	1.2. Quantum numbers	1	4.1; 4.2; 4.3
	1.3. Atomic orbital	1	4.1; 4.2; 4.3
	1.4. Electron configuration	1	4.1; 4.2; 4.3
	1.5. The periodic table of elements	2	4.1; 4.2; 4.3
	1.6. Chemical nomenclature and formula	4	4.1; 4.2; 4.3
	1.7. Problems	2	4.1; 4.2; 4.3
Chapter 2.	Chemical Bonding	10	
	2.1. The ionic bond and lattice energy of ionic compound	1	4.1; 4.2; 4.3
	2.2. The covalent bond and writing Lewis structures	1	4.1; 4.2; 4.3
	2.3. Formal charge and Lewis structure and the concept of Resonance	1	4.1; 4.2; 4.3
	2.4. Hybridization of atomic orbitals	2	4.1; 4.2; 4.3
	2.5. Valence shell electron pair repulsion theory	1	4.1; 4.2; 4.3
	2.6. Molecular geometry	2	4.1; 4.2; 4.3
	2.7. Problems	2	4.1; 4.2; 4.3
Chapter 3.	Solutions & Their Behavior	10	
	3.1. Types of solutions	1	4.1; 4.2; 4.3
	3.2. Concentration units	1	4.1; 4.2; 4.3
	3.3. Colligative properties of nonelectrolyte solution	2	4.1; 4.2; 4.3
	3.4. Colligative properties of electrolyte solution	1	4.1; 4.2; 4.3
	3.5. Dilution	1	4.1; 4.2; 4.3
	3.6. Acid-base titration	1	4.1; 4.2; 4.3
	3.7. Problems	3	4.1; 4.2; 4.3
Chapter 4.	Chemical Equilibrium	13	
	4.1. Equilibrium constant and reaction quotient	1	4.1; 4.2; 4.3

4.2. Writing equilibrium constant expressions	1	4.1; 4.2; 4.3
4.3. Factors that affect chemical equilibrium	1	4.1; 4.2; 4.3
4.4. pH	4	4.1; 4.2; 4.3
4.5. Common ion effect	1	4.1; 4.2; 4.3
4.6. Buffer solutions	2	4.1; 4.2; 4.3
4.7. Problems	3	4.1; 4.2; 4.3

7. Teaching Methods

- Lecture; discussion; demonstration; self-learning; group-working

8. Course Requirements

- No food, drinks, or use of tobacco products in class.
- Telephones, headphones, and any other electronic devices must be turned off while in class.
- Late assignments will be not accepted.
- Students that miss a test must make up the test the day they return to class. It is the student's responsibility to make arrangements to make up test.
- Only two absences are allowed during the course. If a student is tardy to class or departs early three (3) times, it will be equal to one (1) absence. Each absence beyond two absences will result in a 10% point deduction from your final grade.
- Student who stop coming to class and fails to drop the course will earn an 'F' in the course.
- Academic honesty; dishonesty in any aspect of the course will result in a course failure. Academic dishonesty includes looking at another student's test during an exam, allowing another student to copy your work, use of unauthorized materials (e.g., lecture notes, textbooks, inappropriate, electronic devices) during an exam.
- The class policies can be modified by the individual course instructor.

9. Evaluation of coursework:

9.1. Calculation of Final Numerical Grade

Distribution of points used for course evaluation:

N°	Components	Policies	Assigned points	Goals
1	Attendance	No absence will be accepted	10%	4.1; 4.2; 4.3
2	Exercise	Complete all of assigned exercises	10%	4.1; 4.2; 4.3
3	Midterm Exam	- Written test: Essay + Multiple choice (60 mins)	20%	4.1; 4.2; 4.3
4	Final Exam	- Written test: Essay + Multiple choice (90 mins) - Required	60%	4.1; 4.2; 4.3

9.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

10. References

Materials covered in lecture	Số đăng ký cá biệt
[1] Raymond Chang and Jason Overby, <i>General Chemistry: The Essential Concepts</i> , 6 th Ed., McGraw-Hill, 2011 .	KH.004084 MON.035532
[2] Brady and Holum, <i>Chemistry: the Study of Matter and its Changes</i> , 2th Ed., John Wiley & Sons, 1996 .	KH.002505

11. Self-learning instructions:

Week	Contents	Hours	Student's Task
	Chapter 1. Structure of Atoms & the Periodic Table of elements Quantum mechanics Quantum numbers Atomic orbital Electron configuration The periodic table of elements Naming compounds Problems	12	Read before the Ref [1] from section 7.5 to 7.8; from 8.1 to 8.3 and 2.7 Homework: Problems of Chapter 2, 7 and 8, Ref [1]
	Chapter 2. Chemical Bonding The Ionic bond and lattice energy of ionic compound The covalent bond and writing Lewis structures Formal charge and Lewis structure and the concept of Resonance Hybridization of atomic orbitals Valence shell electron pair repulsion theory Molecular geometry Problems	10	Read before the Ref [1] from section 9.2 to 9.3, 9.4, 9.7 and 10.1 Homework: Problems of Chapter 9 and 10, Ref [1]
	Chapter 3. Solutions & Their Behavior Types of solutions Concentration units Colligative properties of nonelectrolyte solution Colligative properties of electrolyte solution Dilution Acid-base titration	10	Read before the Ref [1] from section 12.1 to 12.2, 12.6, 12.7, 4.5 and 4.7 Homework: Problems of

	Problems		Chapter 4 and 12, Ref [1]
	Chapter 4. Chemical equilibrium Equilibrium constant and reaction quotient Writing equilibrium constant expressions Factors that affect chemical equilibrium pH Common ion effect Buffer solutions Problems	13	Read before the Ref [1] from section 14.1 to 14.2, 14.5, 15.3, 16.2 and 16.3 Homework: Problems of Chapter 14, 15 and 16, Ref [1]

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**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

HEAD OF DEPARTMENT