

## Course (MT01001): General Chemistry

### 1. General information

- Term: 1
- Credits: **Total credits 2 (Lecture: 1.5 – Practice: 0.5)**
- **Self-study: 6** credits
- Credit hours for teaching and learning activities: 30 hrs
- Self-study: 90 hrs.
- Department conducting the course:
  - Department of Chemistry
  - Faculty of Natural Resources & Environment
- Kind of the course:

Foundation <input checked="" type="checkbox"/>		Fundamental <input type="checkbox"/>		Option 1 <input type="checkbox"/>		Option 2 <input type="checkbox"/>	
Compulsory <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>

- Prerequisite course(s): none

### 2. Course objectives and expected learning outcomes

**\* Course objectives:**

- Knowledge: Course provided for students with knowledge in general chemistry and calculation of some characteristic quantities of chemical reaction energy, solution, and electrochemistry.
- Skills: The course provides students with skills in the chemistry laboratory.
- Attitude: The course provides students with active attitudes in learning.

**\* Course expected learning outcomes**

Notation	Course expected learning outcomes After successfully completing this course, students are able to	PLO performance criteria
<b>Knowledge</b>		
CELO1	Identify the basic concepts and laws needed to solve problems about the composition of matter, and the calculation of the amount of matter and energy in chemistry.	1.1
CELO2	Identify the relationship between chemical phenomena to agriculture, environment	1.2
<b>Skills</b>		
CELO3	Perform basic experiments in general chemistry.	6.3
<b>Attitude</b>		
CELO4	Active in learning, responsible for environmental protection	9.2

### 3. Course description

Brief description of the course: This course consists of 7 theoretical chapters with the following contents: Some basic concepts and laws, substance structure,

thermodynamics, reaction rate, and stoichiometry, solutions, electrochemistry, colloidal systems, and 3 lab exercises.

#### 4. Teaching and learning & assessment methods

CELOs	CELO1	CELO2	CELO3	CELO4
<b>Teaching and learning</b>				
Lecturing	x			
Discussing and Exercises	x	x		x
Lab instruction			x	
E- learning	x	x		
<b>Assessment</b>				
Rubric 1. Attendance & Discussion (10%)	x	x	x	x
Rubric 2. Practical (condition)			x	
Rubric 3. Exercise (10%)	x	x		x
Rubric 4: Midterm exam (30%)	x	x		
Rubric 5: Final exam (50%)	x			

#### 5. Student tasks

- Attendance: All students are required to attend at least 75% lecture hours and 100% practical hours.
- Preparation for the lecture: All students must prepare for all lectures.
- Mid-term exam: All students must take the mid-term exam.
- Final exam: All students must take the final exam

#### 6. Textbooks and references

**\* Text Books/Lecture Notes:**

1. Nguyễn Văn Tấu (2007). Giáo trình Hóa học đại cương, NXB Giáo dục
2. Steven S. Zumdahl (2017). Chemistry, 10th edition, Houghton Mifflin Company, Boston, New York.

**\* Additional references:**

1. Nguyễn Thị Hồng Hạnh (chủ biên, 2021). Thực hành và Bài tập Hóa học đại cương, NXB Học viện Nông nghiệp.
2. Ke Son Phan, Hoai Thu Nguyen, Thi Thu Huong Le, Thi Tuyet Thuy Vu, Hai Doan Do, Thi Kim Oanh Vuong, Hoai Nam Nguyen, Chung Huu Tran, Thi Thanh Hang Ngo, Phuong Thu Ha. Fabrication and activity evaluation on *Asparagus officinalis* of hydroxyapatite based multimicronutrient nano systems. Advances in Natural Sciences: Nanoscience and Nanotechnology 10 (2019) 025011.

#### 7. Course outline

Week	Content	Course expected learning outcome
1-2	<i>Chapter 1: Fundamental concepts and laws</i>	

	<p><b>A/ Main contents:</b> (4.5 hours)</p> <p><b>Theory:</b> (2 hours)</p> <p>1.1. Atoms, molecules, mole</p> <p>1.2. Fundamental laws</p> <p>1.3. Equivalent and Equivalent law</p> <p>1.4. Ideal gas law</p> <p><b>Practice:</b> (2.5 hours)</p> <p>Inorganic compound</p>	CELO1, CELO2, CELO3, CELO4
	<p><b>B/ Self-study contents</b></p> <p>Exercise Chapter 1 and Practice report (13.5 hours)</p>	
2-3	<p><b>Chapter 2: Matter structure</b></p>	CELO1, CELO2, CELO4
	<p><b>A/Main contents:</b> (2 hours)</p> <p><b>Theory:</b> (2 hours)</p> <p>2.1. Atom structure: quantum numbers, orbitals, electron configuration</p> <p>2.2. Bonding: covalent bond and ionic bond</p> <p>2.3. Bonding between molecules</p>	
	<p><b>B/ Self-study contents:</b></p> <p>Exercise Chapter 2 (6 hours)</p>	
4	<p><b>Chapter 3: Thermodynamic chemistry</b></p>	CELO1, CELO2, CELO4
	<p><b>A/ Main contents:</b> (4 hours)</p> <p><b>Theory:</b> (3 hours)</p> <p>3.1. Basic concepts</p> <p>3.2. The First law</p> <p>3.3. Hess's law</p> <p>3.4. The second law</p> <p><b>Exercise:</b> (1 hours)</p> <p>Exercise chapter 3</p>	
	<p><b>B/ Self-study contents:</b></p> <p>Exercise Chapter 3 (12 hours)</p>	
5-6	<p><b>Chapter 4: Reaction rate and Equilibrium</b></p>	CELO1, CELO2, CELO3, CELO4
	<p><b>A/ Main contents:</b> (6 hours)</p> <p><b>Theory:</b> (4 hours)</p> <p>4.1. Reaction rate and factors affecting reaction rate</p> <p>4.2. Equilibrium</p> <p><b>Practice:</b> (2 hours)</p> <p>Factors affecting reaction rate and equilibrium</p>	
	<p><b>B/ Self-study contents:</b></p> <p>Exercise Chapter 4 and Practice report (18 hours)</p>	
7-8	<p><b>Chapter 5: Solution</b></p>	

	<p><b>A/ Main contents:</b> (8 hours)</p> <p><b>Theory:</b> (5 hours)</p> <p>5.1. Basic concepts</p> <p>5.2. Vapor pressure, boiling point, freezing point, osmotic pressure</p> <p>5.3. Electrolyte solution</p> <p>5.3.1. Water ionization</p> <p>5.3.2. Acids and bases</p> <p>5.3.3. Buffer solution</p> <p>5.3.4. Calculate pH of solutions</p> <p><b>Practice:</b> (3 hours)</p> <p>Solution</p>	CELO1, CELO2, CELO3, CELO4
	<p><b>B/ Self-study contents</b></p> <p>Exercise Chapter 5 and Practice report (24 hours)</p>	
9	<p><b>Chapter 6: Electrochemistry</b></p>	CELO1, CELO2, CELO4
	<p><b>A/ Main contents:</b> (2 hours)</p> <p><b>Theory:</b> (2 hours)</p> <p>6.1. Redox reaction</p> <p>6.2. Electrodes and reduction potential</p> <p>6.3. Galvanic cells and concentration cells</p>	
	<p><b>B/ Self-study contents</b></p> <p>Exercise Chapter 6 (6 hours)</p>	
10	<p><b>Chapter 7: Colloidal chemistry</b></p>	CELO1, CELO2, CELO3, CELO4
	<p><b>A/ Main contents:</b> (3.5 hours)</p> <p><b>Theory:</b> (3 hours)</p> <p>7.1. Basic concepts</p> <p>7.2. Surface properties and adsorption</p> <p>7.3. Structure of micelles</p> <p>7.4. Interaction between colloids</p> <p><b>Practice:</b> (0.5 hours)</p> <p>Preparation of a colloid</p>	
	<p><b>B/ Self-study contents</b></p> <p>Exercise Chapter 7 (10,5 hours)</p>	