Module (Course Syllabus) Catalogue

2023-2024

College/ Institute	**Shaqlawa Technical College**	
Department	**Medical Laboratory Technology- Evening**	
Module Name	**General Chemistry**	
Module Code	**GEC104**	
Degree	**Technical Diploma** ■ **Bachelor** ☐ **High Diploma** ☐ **Master** ☐ **PhD** ☐	
Semester	**1st**	
Qualification	**MSc. Biochemistry**	
Scientific Title	**Lecturer**	
ECTS (Credits)	**7**	
Module type	**Prerequisite** ☐ **Core** ■ **Assist.** ☐	
Weekly hours	**4**	
Weekly hours (Theory)	**(Two)hr Class**	**(95)Total hrs Workload**
Weekly hours (Practical)	**(Two)hr Class**	**(95)Total hrs Workload**
Number of Weeks	**15**	
Lecturer (Theory)	**Hardi Rafat Baqi**	
E-Mail & Mobile NO.	hardi.baqi@epu.edu.iq **+964(0)7507175583**	
Lecturer (Practical)	**Hardi Rafat Baqi**	
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Websites		

Course Book

Course Description	General chemistry course is one of the major subjects designed for students in majors related to basic sciences, medicine, agriculture, and medical laboratories. The course is often taught during introductory university level and is intended to serve as a broad introduction to a variety of concepts in chemistry. Chemistry is the study of matter and energy and the interaction between them. Studying chemistry is important for students pursuing a career in science and laboratories. The applications of chemistry are everywhere in life. Studying chemistry helps us understand the world around us in a better way. That's why sometimes it's referred to as a central or basic science that connects all other sciences together. The importance of studying this course for students in medical laboratory department can be shown in the following points (However, the importance of this course is not limited only in the following points): 1- Chemistry gives a better understanding of the everyday things you see in your life by applying chemistry in real life. 2- Measurements and units in chemistry are widely used in almost all product labels. 3- Understanding practical chemistry and basic laboratory skills in chemistry are crucial in every lab. practices including reagent preparations, reaction, pH, acidity, alkalinity. etc. 4- This course prepares students to work accurately and use laboratory equipment sufficiently with higher precision that is essential for medical laboratory carriers.
Course objectives	The main objective of the course is to make students realize the importance and applications of chemistry for their future study and career in medical laboratory science. Also, teaching them the basics and fundamental concepts of modern chemistry that is both needed and useful in their major. In order of achieving this objective, the current course is split into two (Theoretical and Practical) sections that fulfils the major concepts of theoretical modern chemistry and applies practical concepts and laboratory skills in the lab. through proper use of lab equipment, glassware, techniques, and reagents. This course also is integrated with the student's participation through making assignments and presentations in subject areas.
Student's obligation	Students attending General Chemistry course need to: 1- Attend the scheduled classes whether on campus or online. 2- Read the course documents (lectures): It is important that students read all course documents (e.g., syllabus, assignments) to become familiar with course expectations. This will allow students the ability to properly plan for all course activities.

	3- Participate in all activities related to the course including: practical experimentations, presentations, reports, discussions, quizzes, and exams. 4- Success in the assigned assessments with a minimum grade of 60%.				
Required Learning Materials	- Printouts of weekly lectures taught at the college campus (Theoretical and Practical). - Reviewing of internet - Proper laboratory (Chemistry, Clinical Chemistry, or Biochemistry). - Proper instruments - Chemicals and reagents - Laboratory glassware, equipment				
Forms of teaching	General Chemistry subjects are taught through presenting the lecture slides by slideshow in the class or electronically by recorded videos. Students attending the class can share their thoughts and ask the lecturer any questions they want. The practical section of the subject is taught in the lab where students need to do practical experimentations and report their results.				
Evaluation	**Task**		**Weight (Marks)**	**Due Week**	**Relevant Learning Outcome**
	Paper Review				
	Assignments	Homework	5%		Encourages students to search for more detailed knowledge relevant to the topics taught at campus.
		Class Activity	2%		
		Report	5%		Report their weekly laboratory work
		Seminar	5%		Enhances the preparation and presenting skills of the students
		Essay			To make students engage more with their favorite topics
		Project			
	Quiz		8%		To encourage students, study every week.
	Lab. reports		10%		To make students practice obeying the laboratory rules including scientific, safety, attitude, and ethics.
	Midterm Exam		25%		To evaluate students and their achievements at the middle of the term.
	Final Exam		40%		Final evaluation and assessment.
	Total		100%		

Specific learning outcome:	At the end of the course, students should be familiar with the basic concepts in general chemistry including the importance and applications of chemistry in life and its contributions in forming all other life sciences. Also, the reasons make chemistry subject a mandatory course to be taught in all departments related to life sciences especially the Medical Laboratory Science department. Students should have a clear view and understandings about matter, atoms, molecules, complexes, mixtures, etc. Besides, Students should learn the basic laboratory skills needed for conducting experiments in chemistry and other laboratories. Another learning outcome of the course is understanding the concepts of accuracy and precision in laboratory measurements which is the basis of good practice in any science related experiment.
Course References:	**Books:** ● Chemistry the central science 13th edition by Theodore L. Brown et. al. ● Fundamentals of Analytical chemistry 9th edition by F. James Holler and Stanley R. Crouch ● General chemistry 11th edition by Ebbing and Gammon ● Laboratory manual for principles of general chemistry 8th edition by J. A. Beran ▪ Magazines and internet review

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction to General Chemistry	**1**	An introduction to general chemistry, why do we study chemistry?
Analytical chemistry, Qualitative and Quantitative analysis	**2**	Understanding, importance, and objective of analytical chemistry
Matter and substances	**3**	Definition, molecular perspective of matter, distinguish between the physical and chemical properties of matter
Measurements SI units	**4**	Measurement units in chemistry, metric and SI units, convert measurements into scientific notation
Uncertainties in measurements Accuracy and precision	**5**	Sources of errors in measurements, understanding accuracy and precision

Calculations with chemical formulas and equations	**6**	Chemical formulas and calculations, dimensional analysis, perform mathematical operations involving significant figures
Atoms, Molecules and Ions	**7**	Definitions, Differences, distinguish between mixtures and pure substances, summarize the essential points of Dalton's atomic theory
Electronic structure of atoms	**8**	Electronic structure of atoms, describe electron configurations, draw Lewis structures for molecules
Mid-term exam	**9**	
Chemical reactions, Solutions, Reactions in aqueous solution	**10**	Properties of solutions Chemical equilibria Acid-Base equilibria
Periodic properties of elements	**11**	Classification of element properties according to periodic table, describe the arrangement of the periodic table
Basic concepts of chemical bonding	**12**	Understanding chemical bonding, types of bonding
Electromagnetic radiation and photons	**13**	Understanding basics of EMR and photons
Chemistry of life (Organic chemistry and Biochemistry)	**14**	An introduction to the fields of organic chemistry and biochemistry
Final exam (1st trial)	**15**	
Final exam (2nd trial)	**16**	
Practical Topics	**Week**	**Learning Outcome**
Introduction to the lab., chemistry lab safety rules	**1**	

Laboratory glassware and equipment	**2**	
Basic operations in chemistry laboratory, measurements in laboratory	**3**	
Density determination	**4**	
Calculations for preparing solution using different concentration methods (solids and liquids)	**5,6,7**	
Different chemical reactions Standardization, Acid-base, Oxidation-Reduction, Precipitation reactions	**8,9,10**	
Filtration, Separation, Sublimation, Re-crystallization	**11,12**	
Melting point and boiling point of organic compounds	**13**	

Questions Example Design (theoretical and practical exam):

All of the activities provided in the workload section are considered when awarding you a grade for this course. In order to pass this course, you will need to earn a 50% or higher on the final exam. Your score on the exam will be calculated as soon as you complete it. If you do not pass the exam on your first try, you may take it again in the second trial.

- Type of the exam (composition and multiple choice)
- Exam's duration (for example one hour)
- The number of the questions: at least four questions. The marks distributed evenly throughout.

The answer should contain preface, main contents and conclusion.

1. *Compositional:* In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?

Example:

1- Why do we study General Chemistry?

2- How is it related to other life sciences?

3- Minor differences in structure or composition of molecules make big differences in the molecule's properties. Show this effect with an example.

4- Differentiate between accuracy and precision

5- Write the names and symbols of 15 elements

6- Use a dimensional analysis method to calculate the mass in lb of a woman whose mass is 60 kg.

(1 lb = 453.6 g), (1kg = 1000 g)

2. *Multiple choices:*

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase.

Example:

1- Examples of extensive properties of matter include: ……

a/ freezing point, b/ mass, c/ melting point, d/ all of them

2- The atomic number of an element equals the number of its ……..

a/ atoms, b/ neutrons, c/ electrons, d/ protons

3- If a substance changes its physical appearance but not its composition it's called a ……

a/ physical change, b/ chemical change, c/ chemical reaction, d/ none of them

4- Law of conservation of mass states that

a/ the total mass remains constant during a chemical change, b/ the total volume remains constant during a chemical change, c/ the total mass remains constant during a physical change, d/ the total volume remains constant during a physical change

5- Which number is most precise and accurate among the following numbers?

a/ 5.0, b/ 5.00, c/ 0.5 X10, d/ 0.005

6- Each ……. is composed of a unique kind of atom.

a/ matter, b/ element, c/ molecule, d/ structure

7- Atoms with identical atomic numbers but different mass numbers (that is, same number of ……. but different numbers of …….) are called ……. of one another

a/ isotopes-neutrons-protons, b/protons-isotopes-neutrons, c/ neutrons-protons-isotopes, d/ protons-neutrons-isotopes

8- …… are substances that cannot be decomposed into simpler substances.

a/ elements, b/ molecules, c/ mixtures, d/ atoms

9- Mixtures that are uniform throughout are …… .

a/ heterogeneous, b/ homogeneous, c/ components, d/ gases

10- The ability of a substance to burn in the presence of oxygen is a ……

a/ chemical property, b/ physical property, c/ flammability, d/ changes the composition

11- …… refers to how closely individual measurements agree with the correct, or "true," value.

a/ accuracy, b/ precision, c/ depends on the instrument, d/ depends on the number of trials

12- Cathode rays are originating from the ……. electrode and travelled to the ……. electrode.

a/ positive-negative, b/ negative-positive, c/ negative-negative, d/ positive-positive

Extra notes:

External Evaluator