



# Course Specification

## **DIPLOMA**

Course Title: **General Chemistry**

Course Code: **APEP1602**

Program: **Diploma - Technology of Environmental Protection**

Department: **Diploma Department**

College: **The Applied College**

Institution: **Umm Al-Qura University**

Version: **2**

Last Revision Date: **2025**

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## A. General information about the course:

### 1. Course Identification

|   |  |                                  |  |                                |                                 |
|---|--|----------------------------------|--|--------------------------------|---------------------------------|
| <b>1. Credit hours:</b>   |  |                                  |  |                                |                                 |
| 3   |  |                                  |  |                                |                                 |
| <b>2. Course type</b>   |  |                                  |  |                                |                                 |
| A.  | <input type="checkbox"/> University          | <input type="checkbox"/> College | <input checked="" type="checkbox"/> Department | <input type="checkbox"/> Track | <input type="checkbox"/> Others |
| B.  | <input checked="" type="checkbox"/> Required |                                  | <input type="checkbox"/> Elective              |                                |                                 |
| <b>3. Level/year at which this course is offered: Level 1, 1<sup>st</sup> Year</b>  |  |                                  |  |                                |                                 |
| <b>4. Course General Description:</b>   |  |                                  |  |                                |                                 |
| This course provides students with the fundamental concepts of general chemistry, including measurements, atomic structure, periodic properties, chemical bonding, stoichiometry, chemical equilibrium, acids and bases, thermochemistry, and an introduction to organic and biological chemistry. The course emphasizes both theoretical knowledge and laboratory applications, enabling students to develop essential skills in problem solving, experimental techniques, and scientific communication. It serves as a foundation for advanced courses in chemistry and related fields within the Diploma in Environmental Protection Technology. |  |                                  |  |                                |                                 |
| <b>5. Pre-requirements for this course (if any):</b>  |  |                                  |  |                                |                                 |
| None  |  |                                  |  |                                |                                 |
| <b>6. Co-requisites for this course (if any):</b>   |  |                                  |  |                                |                                 |
| None  |  |                                  |  |                                |                                 |
| <b>7. Course Main Objective(s):</b>   |  |                                  |  |                                |                                 |
| The main objective of this course is to introduce students to the fundamental principles of general chemistry, covering the structure and properties of matter, stoichiometry, periodic trends, chemical equilibrium, acids and bases, thermochemistry, and basic concepts of organic and biological chemistry. The course aims to develop students' ability to apply theoretical concepts in laboratory settings, enhance their problem-solving and analytical skills, and prepare them for more advanced courses in chemistry and environmental sciences.   |  |                                  |  |                                |                                 |

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction                          | Contact Hours | Percentage |
|----|--|---------------|------------|
| 1  | Traditional classroom                        | 30            | 50%        |
| 2  | Traditional classroom (Laboratory/Practical) | 30            | 50%        |
| 3  | Hybrid                                       | None          |            |





| No | Mode of Instruction   | Contact Hours | Percentage |
|----|---|---------------|------------|
|    | <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul> |               |            |
| 4  | Distance learning   | None          |            |

### 3. Contact Hours (based on the academic semester)

| No    | Activity          | Contact Hours |
|-------|-------------------|---------------|
| 1.    | Lectures          | 30            |
| 2.    | Laboratory/Studio | 30            |
| 3.    | Field             | None          |
| 4.    | Tutorial          | None          |
| 5.    | Others (specify)  | None          |
| Total |                   | 60            |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes  | Code of PLOs aligned with the program | Teaching Strategies                 | Assessment Methods |
|------|---|---------------------------------------|-------------------------------------|--------------------|
| 1.0  | Knowledge and understanding   |                                       |                                     |                    |
| 1.1  | Explain the International System of Units (SI) and apply basic measurement concepts such as precision and accuracy. | K1                                    | Lectures, Class discussion          | Exams, Assignments |
| 1.2  | Describe the atomic structure and write the electronic configuration of elements.                                   | K1                                    | lectures, Problem-solving exercises | Exams, Assignments |
| 1.3  | explain the atomic structure and write the electronic configuration of elements.                                    | K1                                    | Presentations, Discussion           | Exams, Assignments |
| 2.0  | Skills  |                                       |                                     |                    |





| Code | Course Learning Outcomes   | Code of PLOs aligned with the program | Teaching Strategies                 | Assessment Methods           |
|------|--|---------------------------------------|-------------------------------------|------------------------------|
| 2.1  | perform stoichiometric calculations (mole, molar mass, quantitative equations) | S1                                    | lectures, Problem-solving sessions  | Exams, Homework              |
| 2.2  | Calculate solution concentrations from volume, mass, or moles                  | S1                                    | Lectures, Lab experiments           | Exams, Lab reports           |
| 2.3  | Calculate the pH of acids and bases using theoretical and experimental methods | S2                                    | Lectures, Lab practice              | Exams, Lab reports           |
| 2.4  | Apply lab techniques safely in measurements, reactions, and thermochemistry    | S1                                    | Laboratory training, Demonstrations | Lab exams, Practical reports |
| 3.0  | Values, autonomy, and responsibility   |                                       |                                     |                              |
| 3.1  | Demonstrate responsibility and adherence to lab safety and ethics.             | V4                                    | Lab orientation, Group discussions  | Observation, Lab reports     |
| 3.2  | Communicate effectively with instructors and peers (written & oral).           | V3                                    | Group activities, Presentations     | Presentations                |

### C. Course Content

| No  | List of Topics  | Contact Hours |
|-----|---|---------------|
| 1.  | Introduction, SI units, measurements (precision & accuracy), lab safety | 4             |
| 2.  | Significant figures and their applications in chemical calculations     | 4             |
| 3.  | Matter and its states, molecules, and molecular compounds               | 4             |
| 4.  | Atomic structure and electronic configuration of elements               | 4             |
| 5.  | Periodic table and periodic properties of elements                      | 4             |
| 6.  | Stoichiometry: atomic & molecular weights, chemical equations           | 4             |
| 7.  | The mole concept and quantitative chemical calculations                 | 4             |
| 8.  | Chemical equilibrium: basic principles                                  | 4             |
| 9.  | Factors affecting equilibrium (Le Chatelier's principle)                | 4             |
| 10. | Acids and bases: theories and properties                                | 4             |
| 11. | pH calculations and acid–base equilibria                                | 4             |





|       |  |   |
|-------|--|---|
| 12.   | Thermochemistry: energy changes in reactions         | 4 |
| 13.   | Organic chemistry: hydrocarbons                      | 4 |
| 14.   | Organic compounds containing oxygen and nitrogen     | 4 |
| 15.   | Introduction to biological chemistry & course review | 4 |
| Total |  |   |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|-------------------------|--------------------------------|--------------------------------------|
| 1. | Quizzes                 | Week 3,12                      | 10%                                  |
| 2. | Assignments             | 10                             | 20%                                  |
| 3. | Midterm Exam            | Week 7                         | 20%                                  |
| 4. | Project                 | Continuous                     | 10%                                  |
| 5. | Final Exam              | Week 16                        | 40%                                  |

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

|                          |   |
|--------------------------|---|
| Essential References     | Brown, T. L., LeMay, H. E., Bursten, B. E., Murphy, C., Woodward, P., & Stoltzfus, M. (2021). <i>Chemistry: The Central Science</i> (15th ed.). Pearson . |
| Supportive References    | Zumdahl, S. S., & Zumdahl, S. A. (2020). <i>Chemistry</i> (11th ed.). Cengage Learning .  |
| Electronic Materials     |   |
| Other Learning Materials |   |

### 2. Required Facilities and equipment

| Items   | Resources                                    |
|---|--|
| <b>facilities</b><br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | <b>Classrooms &amp; Chemistry Laboratory</b> |
| <b>Technology equipment</b><br>(projector, smart board, software)                         | Data show projector<br>Collab                |
| <b>Other equipment</b><br>(depending on the nature of the specialty)                      |  |



## F. Assessment of Course Quality

| Assessment Areas/Issues                     | Assessor                            | Assessment Methods   |
|---|-------------------------------------|--|
| Effectiveness of teaching                   | Students                            | <b>Indirect</b><br>Course survey and students' feedback.       |
| Effectiveness of Students                   | Faculty Members, Peer Reviewers     | <b>Direct</b><br>Report on the satisfaction of exam standards. |
| Quality of learning resources               | Faculty Member, Course Coordinators | <b>Direct</b><br>Learning resources evaluation survey.         |
| The extent to which CLOs have been achieved | Faculty Members, Program Leaders    | <b>Direct</b><br>Course reports.                               |
| Other                                       |                                     |  |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

|                           |                                |
|---------------------------|--------------------------------|
| <b>COUNCIL /COMMITTEE</b> | Umm Al-Qura University Council |
| <b>REFERENCE NO.</b>      | 851141114462/190635            |
| <b>DATE</b>               | 22/11/1446                     |

