هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

# Course Specifications

| | |
|---|---|
| **Course Title:** | Engineering Chemistry |
| **Course Code:** | GE 313 |
| **Program:** | Basic Science |
| **Department:** | Basic Science |
| **College:** | Computer and information Sciences |
| **Institution:** | Majmaah University |

## Table of Contents

## A. Course Identification

| |
|---|
| **1. Credit hours:** **3 (3,0,1)** |
| **2. Course type**<br>**a.** University ☐ College ☒ Department ☐ Others ☐<br>**b.** Required ☐ Elective ☒ |
| **3. Level/year at which this course is offered:** **Level 7** |
| **4. Pre-requisites for this course** (if any)**:** Nil |
| **5. Co-requisites for this course** (if any)**: Nil** |

**6. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | **Traditional classroom** | 44 | 100% |
| 2 | **Blended** | | |
| 3 | **E-learning** | | |
| 4 | **Distance learning** | | |
| 5 | **Other** | | |

**7. Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 33 |
| 2 | **Laboratory/Studio** | |
| 3 | **Tutorial** | 11 |
| 4 | **Others** (specify) | |
| | **Total** | 44 |

## B. Course Objectives and Learning Outcomes

1. Course Description

This course is introducing the following topics: Introduction, The study of chemistry, Physical and chemical properties of matter, Atoms, Molecules and Ions, The Atomic theory, The Electronic structure of Atoms, the Photoelectric effect, Bohr's Theory of the Hydrogen Atom, The Dual Nature of the Electron, Quantum Mechanics, Quantum Numbers, Atomic orbitals, Electronic Configuration,Periodic Table, Periodic Classification of the elements, Periodicity of properties, Ionization energy, Chemical Bonding, Electrochemistry, Redox reactions, Chemistry in the Atmosphere.

**2. Course Main Objective**

This is an introductory course. Students will become proficient in applying their knowledge of Chemistry. The goal of this course is to provide the student with fundamentals and basic chemical engineering concepts which directly related to the engineering sciences. This course is appropriate both as an introductory course for chemistry and other science majors as well as an introductory and terminal course for non-science majors who desire a foundation in chemical principles. The primary learning outcomes are learning the fundamental nature of chemicals and chemical systems and becoming familiar with the language and symbols of chemistry.

**3. Course Learning Outcomes**

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | | |
| 1.2 | | |
| 1.3 | | |
| 1.4 | | |
| 1.5 | | |
| **2** | **Skills :** | |
| 2.1 | Gain knowledge of the basic concepts and principles of Chemistry | S5 |
| 2.2 | Understand the concepts and principles of Chemistry | S5 |
| 2.3 | Analyze the Chemical problem and can be able to express it as a chemical equation. | S5 |
| 2.4 | Apply the basic principles of Chemistry in solving problems in a structured process. | S5 |
| 2.5 | Able to use necessary techniques and skills in solving chemical problems. | S5 |
| **3** | **Values:** | |
| 3.1 | | |
| 3.2 | | |
| 3.3 | | |
| 3.4 | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | **Introduction: The scientific method, classifications of matter, Physical and chemical properties of matter, measurement, Handling Numbers, Dimensional Analysis in solving problems.** | 4 |
| 2 | **The Atomic theory, The structure of Atom, Atomic Number, Mass Number and Isotopes** | 4 |
| 3 | **The Periodic Table, Molecules and Ions, Chemical formulas, Naming Compounds, Introduction to Organic compounds** | 4 |
| 4 | **From Classical Physics to quantum theory, the Photoelectric effect, Bohr's Theory of the Hydrogen Atom** | 4 |

| | | |
|---|---|---|
| 5 | **The Dual Nature of the Electron, Quantum Mechanics, Quantum Numbers, Atomic orbitals, Electronic Configuration, The Building-Up Principle** | 4 |
| 6 | **Development of the Periodic table, Periodic Classification of the elements, Periodicity of properties, Ionization energy, Electron affinity.** | 4 |
| 7 | **Lewis Dot Symbols, The Ionic Bond, Lattice Energy of Ionic Compounds** | 4 |
| 8 | **The Covalent bond, Electronegativity, Writing Lewis structures,** | 4 |
| 9 | **Redox reactions, Balancing redox equations,** | 4 |
| 10 | **Earth's Atmosphere, Phenomena in the outer layers of Atmosphere,** | 4 |
| 11 | **,volcanoes, The greenhouse effect, Depletion of ozone in the stratosphere** | 4 |
| **Total** | | 44 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| 1.1 | | | |
| 1.2 | | | |
| 1.3 | | | |
| 1.4 | | | |
| 1.5 | | | |
| **2.0** | **Skills** | | |
| 2.1 | CLO1-Gain knowledge of the basic concepts and principles of Physics, which is relevant to their further studies. | Classroom Teaching, Laboratory | Quiz, Class test, Mid Exam, Lab exam, Final Exam |
| 2.2 | CLO2- Student can understand the concepts and principles of mechanics through lectures and assessment tools. | Classroom Teaching | Assignment, Mid Exam, Final Exam |
| 2.3 | CLO3- Student can able to analyze the physical problem and learn to express mathematical equations. | Classroom Teaching | Assignment, Mid Exam, Final Exam |
| 2.4 | CLO4- Able to apply basic principles of Physics in solving problems in a structured process. | Classroom Teaching | Quiz, Class test, Mid Exam, Final Exam |
| | | | |
| **3.0** | **Values** | | |
| 3.1 | | | |
| 3.2 | | | |
| 3.3 | | | |
| 3.4 | | | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | **Homework** | During the term | 20% |
| 2 | **Midterm** | 6th week | 20% |
| 3 | **Class Test** | 8th week | 20% |
| 4 | **Final Exam** | 12th week | 40% |
| 5 | **Total** | | **100%** |

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- **Student can access the concern staff during office hours; each student can take the consultation and advice.**
- **Students also contacts through social networking websites/Email for clarification of doubts and consultation.**
- **Available for 2-3 hours in day to the students**

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | **Textbook:**<br>**1. Chemistry, Raymond Chang, 10th. Ed. McGraw - Hill, 2010, ISBN: 978-007-127220-9.**<br>**2. Engineering Chemistry, Extended Edition, Wiley India, ISBN: 9788126536337** |
| **Essential References Materials** | **Engineering Chemistry, P.R. Vijayasarathy, 2th. Ed. Eastern Economy.**<br>**Schum's Outline Beginning Chemistry, David E. Goldberg, PhD, McGraw-Hill, 1997.** |
| **Electronic Materials** | http://science.pppst.com/chemistry.html<br>http://www.sciencegeek.net/Chemistry/Powerpoints2.shtml<br>http://www.chem1.com/chemed/genchem.shtml<br>http://www.wiredchemist.com/chemistry/instructional/intro_chem_contents.html<br>http://chemwiki.ucdavis.edu/Wikitexts<br>http://www.chem1.com/acad/webtext/virtualtextbook.html<br>http://wiki.chemeddl.org/index.php/Collections:Texts:Chemistry |
| **Other Learning Materials** | |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** (Classrooms, laboratories, demonstration rooms/labs, etc.) | **Classroom** |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | **Enough facilities are present (Such as projector, Video conferencing machine)** |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of Teaching | Students | Indirect |
| Effectiveness of assessment | Instructor | Direct |
| Achievement of CLOs | Instructor | Direct |
| | | |
| | | |
| | | |
| | | |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | CCIS MEETING |
| **Reference No.** | |
| **Date** | |