



Course Specification

(Bachelor)

Course Title: Environmental Chemistry

Course Code: CEM406

Program: Chemistry

Department: Chemistry

College: College of Science

Institution: Majmaah University

Version: Course Specification Version Number

Last Revision Date: Pick Revision Date.



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A. General information about the course:

1. Course Identification

1. Credit hours: (02 hours)

2. Course type

A. University College Department Track Others
B. Required Elective

3. Level/year at which this course is offered: (Level 8)

4. Course General Description:

The students learn the environmental chemistry and know methods of collection, storage and analysis of air, soil and water samples.

5. Pre-requirements for this course (if any):

CEM 101

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

What is the main purpose for this course?

- The student learn the environmental chemistry.
- The student discusse atmosphere chemistry and realize air pollution sources with primary and secondary pollutants. The student learn methods used to analyze air and methods to reduce air pollution impact.
- The student apprehend natural composition of soil, soils pollutants such as fertilizers, pesticides and herbicides and pesticides innovative alternatives.
- The student realize water composition and types, water pollutants, treatment and quality (acidity, hardness, COD, BOD...).
- The student familiarize with steps of physical, chemical and biological treatment, sea water desalination and waste water treatment methods.

2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|---------------|------------|
| 1 | Traditional classroom | 02 hours/week | 100% |
| 2 | E-learning | | |
| 3 | Hybrid | | |



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

3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|--------------|-------------------|---------------|
| 1. | Lectures | 30 hours |
| 2. | Laboratory/Studio | |
| 3. | Field | |
| 4. | Tutorial | |
| 5. | Others (specify) | |
| Total | | |

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 | Define the concepts and principles of environmental chemistry and related sciences, along with the ability to evaluate and interpret environment chemistry principals | K1 | -Lectures. -Conduct scientific research. - Seminars. -Discussions -Brainstorming | -Final exam - Midterm exam - Short tests -Quizzes. - Homework - Class exercises - Evaluation of research |
| 1.3 | Explain environment concepts to problems involving soil, air, and water | K3 | | |
| ... | | | | |
| 2.0 | Skills | | | |
| 2.3 | Demonstrate the ability to use modern | S3 | Lectures Laboratories | Final exam |





| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|------------|--|---------------------------------------|--|---|
| | technology and statistical applications that are used in the environmental chemistry | | Active learning - E-learning -Self-learning -Cooperative Education -Examinations | - Midterm exam - Short tests -Quizzes. - Homework - Class exercises - Evaluation of research -Practical tests |
| 2.4 | Solve chemical problems related to environmental chemistry through critical thinking to develop appropriate rational, explanations and answers | S4 | | |
| ... | | | | |
| 3.0 | Values, autonomy, and responsibility | | | |
| 3.1 | Dealing honestly and professionally with peers and writing reports | V1 | Simulation programs Cooperative work | Practical tests |
| 3.2 | | | | |
| ... | | | | |

C. Course Content

| No | List of Topics | Contact Hours |
|----|--|---------------|
| 1. | Definition of environmental chemistry. The environments of the earth (atmosphere, hydrosphere, lithosphere and biosphere). | 4 |
| 2. | Importance of atmosphere, Principal atmosphere layers (troposphere, stratosphere, mesosphere and thermosphere). Natural composition of atmosphere Air pollution sources and air pollutants (CO, CO ₂ , NO _x , SO _x , etc) | 4 |
| 3. | Natural composition of soil (macronutrients and micronutrients). Soil pollutants (fertilizers, pesticides, organophosphates, carbamates, chlorinated hydrocarbons, herbicides, innovative alternatives of pesticides). Soil analysis and soil pollution control. | 4 |
| 4. | Water distribution in earth planet and water cycle Chemical natural composition of water (rain waters, sea waters, ground waters). | 4 |





| | | |
|--------------|---|---|
| 5. | Water pollution (pollution sources, types of pollutants, organic pollutants, inorganic pollutants, biological pollutants, impact of pollutants, acidity and alkalinity, hardness). | 4 |
| 6. | Purification of water (physical treatment, storage, physical coagulation, filtration, chemical treatment, chemical coagulation, water softening, ion-exchange, biological treatment, thermal sterilization, UV radiation sterilization, ozone sterilization, chlorination sterilization). | 4 |
| 7. | Sea water desalination (reverse osmosis, electrodialysis, distillation). Waste water treatment (primary treatment, secondary treatment, tertiary treatment). | 3 |
| 8. | Water analysis (sampling, physical analysis, chemical analysis, total solids, acidity, alkalinity, hardness, cations, anions, TOC, DO, etc. | 3 |
| 9. | | |
| --- | | |
| Total | | |

D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|-----|-------------------------|--------------------------------|--------------------------------------|
| 1. | Quiz | Every week | 10 |
| 2. | Mid term 1 | Week 7 | 15 |
| 3. | Mid term 2 | Week 12 | 15 |
| 4. | Homeworks | Every week | 10 |
| 5. | E-exam | Week 14 | 10 |
| 6. | Final Exam | Week 17 | 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 | Soil Chemistry and its Applications, Malcolm Cresser, University of Aberdeen, Ken Killham, University of Aberdeen, Tony Edwards Publisher: Cambridge University Press, 2012. Online ISBN:9780511622939 DOI: https://doi.org/10.1017/CBO9780511622939 |
|-----------------------------|---|



| | |
|---------------------------------|---|
| Supportive References | <p>Introduction to Atmospheric Chemistry Peter V. Hobbs, University of Washington Publisher: Cambridge University Press, 2000. Online ISBN:9780511808913 DOI:https://doi.org/10.1017/CBO9780511808913</p> |
| Electronic Materials | <p>Chemistry and the Environment, Sven E. Harnung, University of Copenhagen, Matthew S. Johnson, University of Copenhagen, Publisher: Cambridge University Press, 2012 Online ISBN:9781139109390 DOI: https://doi.org/10.1017/CBO9781139109390</p> |
| Other Learning Materials | |

2. Required Facilities and equipment

| Items | Resources |
|---|----------------------------------|
| <p>facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)</p> | Classrooms, simulation rooms |
| <p>Technology equipment (projector, smart board, software)</p> | Projector, smart board, software |
| <p>Other equipment (depending on the nature of the specialty)</p> | NA |

F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|-----------------|--------------------|
| Effectiveness of teaching | Faculty | Direct |
| Effectiveness of Students assessment | Faculty | Direct |
| Quality of learning resources | Peer reviewers | |
| The extent to which CLOs have been achieved | Program leaders | direct |
| Other | | |

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

| | |
|---------------------------|-------------------|
| COUNCIL /COMMITTEE | NUMBER 16 |
| REFERENCE NO. | |
| DATE | 15/06/1446 |



