



Course Specifications

| | |
|----------------------|----------------------------------|
| Course Title: | Organic Chemistry -1 |
| Course Code: | 212CHEM-4 |
| Program: | Bachelor of Science in Chemistry |
| Department: | Chemistry |
| College: | Science |
| Institution: | King Khalid University |

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A. Course Identification

| |
|--|
| 1. Credit hours: 4 (3+1) |
| 2. Course type |
| a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> |
| b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/> |
| 3. Level/year at which this course is offered: Level 3 / Year 1 |
| 4. Pre-requisites for this course (if any): No prerequisite |
| 5. Co-requisites for this course (if any): No co-requisite |

6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|-----------------------|---------------|------------|
| 1 | Traditional classroom | 3 | 66% |
| 2 | Blended | 0 | 0% |
| 3 | E-learning | 0 | 0% |
| 4 | Correspondence | 0 | 0% |
| 5 | Other (Practical) | 2 | 34% |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
|------------------------------|---------------------------------|----------------|
| Contact Hours | | |
| 1 | Lecture | 45 |
| 2 | Laboratory/Studio | 0 |
| 3 | Tutorial | 0 |
| 4 | Others (specify) | 30 |
| | Total | 75 |
| Other Learning Hours* | | |
| 1 | Study | 30 |
| 2 | Assignments | 15 |
| 3 | Library | 15 |
| 4 | Projects/Research Essays/Theses | 0 |
| 5 | Others (specify) | 0 |
| | Total | 60 |

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the essential principles, nomenclature, and common applications of organic chemistry. It focuses on how chemical structure impacts the properties and reactivity of organic molecules, namely, saturated, and unsaturated hydrocarbons, including aromatics. In addition, this course presents fundamentals of molecular geometry, polarity, conformation, isomerism, functional groups, stereochemistry, reactions of organic compounds and their mechanisms.

2. Course Main Objective

The students are able to: -

- ◆ know the principles and the fundamental concepts of organic chemistry as well as organic synthesis and mechanisms.
- ◆ Understand IUPAC nomenclature of organic compounds.
- ◆ Develop and understanding of the three-dimensional structure of organic compounds and how it affects their reactivity.

3. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|----------|---|---------------|
| 1 | Knowledge: | |
| 1.1 | Recognize the fundamental principles and concepts of organic chemistry, and summarize the real-life applications related to this course. | K1 |
| 1.2 | Distinguish common functional groups in organic chemistry and recognize curved arrow mechanisms for the organic reaction types: additions, substitutions, and eliminations. | K1 and K3 |
| 1.3 | Name an organic compound using IUPAC rules when provided its structure and draw the structure of an organic compound when provided its name. | K1 |
| 2 | Skills: | |
| 2.1 | Predict the products of organic reactions and illustrate the mechanisms of these reactions. | S1 |
| 2.2 | Infer the energetically preferred conformation for an organic molecule and identify the relative energies of reactive intermediates. | S4 |
| 2.3 | Apply thermodynamics, kinetics, and acid-base fundamentals to explain the chemical behavior and reactivity of organic compounds. | S2 |
| 2.4 | Design synthesis of an organic compound from a specified starting material. | S3 and S4 |
| 3 | Competence: | |
| 3.1 | Practice ethical principles and responsibility in self learning, problem solving, and continuing personal and professional development. | C2, C3 and C4 |
| 3.2 | Demonstrate the ability to work effectively in groups and to practice leadership when appropriate. | C2, C3 and C4 |
| 3.3 | Show independency and self-confidence in self learning, problem solving, and continuing personal and professional development. | C1 |
| 3.4 | Communicate effectively in oral and written form. | C4 |
| 3.5 | Use computers to store, retrieve, transmit, and manipulate physical and chemical data or information related to chemical systems. | C2 |
| 3.6 | Apply mathematical and statistical techniques to calculate physical and chemical properties related to chemical systems. | C3 |

C. Course Content

| No | List of Topics | Contact Hours |
|----------------------------|--|---------------|
| Lectures | | |
| 1 | Demonstrating the Importance of Organic Chemistry and Its Applications | 1 |
| 2 | Structure and Bonding | 2 |
| 3 | Polar Covalent Bonds; Acids and Bases | 2 |
| 4 | Alkanes and cycloalkanes Nomenclature | 4 |
| 5 | Alkanes and cycloalkanes synthesis and reactivity | 3 |
| 6 | Alkenes Nomenclature | 2 |
| 7 | Alkenes synthesis and reactivity | 6 |
| 8 | Alkynes Nomenclature | 3 |
| 9 | Alkynes synthesis and reactivity | 5 |
| 10 | Alkyl halides nomenclature | 2 |
| 11 | Alkyl halides synthesis and reactivity | 3 |
| 12 | Aromatics nomenclature, characteristics, and reactivity | 7 |
| 13 | Stereochemistry | 5 |
| Total for Lectures | | 45 |
| Practical section | | |
| 1 | Safety in the Laboratory | 2 |
| 2 | Identification of purity of organic compounds using Melting point | 2 |
| 3 | Purification of solid organic compounds by Recrystallisation | 2 |
| 4 | Purification of solid organic compounds by sublimation | 2 |
| 5 | Simple distillation of liquids | 2 |
| 6 | Fractional distillation of Liquids | 2 |
| 7 | Steam distillation of Liquids | 2 |
| 8 | Separation of mixture by solvent extraction | 2 |
| 9 | Separation of mixture by simple filtration | 2 |
| 10 | Separation of liquid mixture by simple distillation | 2 |
| 11 | Separation of liquid mixture by steam and fractional distillation | 4 |
| 12 | Extraction of Caffeine from Teal leaves | 2 |
| 13 | Thin Layer Chromatography | 2 |
| 14 | Identification of Aromatic compounds (Nitration and Unsaturation test) | 2 |
| Total for Practical | | 30 |
| Total | | 75 |

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 | | |
| 1.1 | Recognize the fundamental principles and concepts of organic chemistry, and summarize the real-life applications related to this course. | <ul style="list-style-type: none"> • Lecture • Classroom discussion | <ul style="list-style-type: none"> • Homework • Examinations |
| 1.2 | Distinguish common functional groups in organic chemistry and recognize curved arrow mechanisms for the organic reaction types: additions, substitutions, and eliminations. | | |
| 1.3 | Name an organic compound using IUPAC rules when provided its structure and draw the structure of an organic compound when provided its name. | | |
| 2.0 | Skills | | |
| 2.1 | Predict the products of organic reactions and illustrate the mechanisms of these reactions. | <ul style="list-style-type: none"> • Lecture • Classroom discussion | <ul style="list-style-type: none"> • Homework • Examinations |
| 2.2 | Infer the energetically preferred conformation for an organic molecule and identify the relative energies of reactive intermediates. | | |
| 2.3 | Apply thermodynamics, kinetics, and acid-base fundamentals to explain the chemical behavior and reactivity of organic compounds. | | |
| 2.4 | Design synthesis of an organic compound from a specified starting material. | | |
| 3.0 | Competence | | |
| 3.1 | Practice ethical principles and responsibility in self learning, problem solving, and continuing personal and professional development. | <ul style="list-style-type: none"> • Lecture • Classroom discussion | <ul style="list-style-type: none"> • Homework • Examinations |
| 3.2 | Demonstrate the ability to work effectively in groups and to practice leadership when appropriate. | | |
| 3.3 | Show independency and self-confidence in self learning, problem | | |

| | | | |
|-----|---|--|--|
| | solving, and continuing personal and professional development. | | |
| 3.4 | Communicate effectively in oral and written form. | | |
| 3.5 | Use computers to store, retrieve, transmit, and manipulate physical and chemical data or information related to chemical systems. | | |
| 3.6 | Apply mathematical and statistical techniques to calculate physical and chemical properties related to chemical systems. | | |

2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|-------------------------|---------------------------------|-------------------------------------|--------------------------------------|
| Theory Course | | | |
| 1 | Homework 1. | 4th | 2 % |
| 2 | Exam 1. | 5 th | 7 % |
| 3 | Homework 2. | 9th | 1 % |
| 4 | Exam 2. | 10th | 6 % |
| 5 | Homework 3. | 14th | 2 % |
| 6 | Exam 3. | 15th | 7 % |
| 7 | Final exam | 16 th | 50 % |
| Practical Course | | | |
| 1 | Quiz 1. | 7th | 3% |
| 2 | Quiz 2. | 14th | 3% |
| 3 | Reports | 2 nd to 16 th | 5% |
| 4 | Students performance in the Lab | 1 st to 16 th | 4% |
| 5 | Final Exam | 16 th | 10% |
| 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:

- 10 office hours are offered for students for individual consultations.

F. Learning Resources and Facilities

1. Learning Resources

| | |
|---------------------------------------|---|
| Required Textbooks | Organic Chemistry. John E. McMurry. 2015, 9 th ed. Cengage Learning. Chapter 1 (page 1) to Chapter 11 (page 309) |
| Essential References Materials | <ul style="list-style-type: none"> Journal of physical organic chemistry. Journal of organic chemistry. |
| Electronic Materials | <ul style="list-style-type: none"> Blackboard: E-Learning Deanship (http://elc.kku.edu.sa/). YouTube. OWLv2, Printed Access Card for McMurry's Organic Chemistry, 9th Edition. |
| Other Learning Materials | No other learning materials. |

2. Facilities Required

| Item | Resources |
|--|---|
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) | Classroom and computer lab |
| Technology Resources (AV, data show, Smart Board, software, etc.) | Accessible databases Endnote software package Authenticate software package |
| 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 |
|---|--|-----------------------|
| Course delivery (teaching methods and assessment methods) | Students | Questionnaire |
| | Departmental Plan and curriculum committee; external reviewers | Reports and workshops |
| Course contents (update) | Program Leader | Meetings |
| | Departmental Plan and curriculum committee; external reviewers | Reports and workshops |
| Quality of learning resources | External reviewers | Reports |

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 | Department counsel |
| Reference No. | 1/22/142 |
| Date | 15-9-1442 |