هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

# Course Specification
(Bachelor)

| | |
|---|---|
| **Course Title:** | Chemistry and Processing of Oils and Fats |
| **Course Code:** | ICHM461-2- |
| **Program:** | Bachelor of Science in Industrial Chemistry |
| **Department:** | Department of Physical Sciences |
| **College:** | College of Science |
| **Institution:** | Jazan University |
| **Version:** | TP-153 (2024) |
| **Last Revision Date:** | 15 February 2024 |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

**1. Credit hours: ( 2hrs )**

**2. Course type**

| | | | | | |
|---|---|---|---|---|---|
| A. | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
| B. | ☐Required | | ☒ Elective | | |

**3. Level/year at which this course is offered: (8th Level/ 4thyear)**

**4. Course general Description:**

| Course title | Course code | Contact Hours | | | Credit Hours | Year | Level | Pre-requisite | Co-requisite |
|---|---|---|---|---|---|---|---|---|---|
| | | Lec | Tut | Lab | | | | | |
| Chemistry and Processing of oils and Fats | ICHM461-2 | 2 | 0 | 0 | 2 | 4th | 8th | CHEM336-2 | - |

This course covers the basic knowledge about the production and processing technologies of fats and oils, as well as the degradation problems due to processing and storage.

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

CHEM336-2

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

None

**7. Course Main Objective(s):**

This course has been designed to provide students with the following concepts:

1. Introduction to Oils and Fats: Overview of the chemical composition, properties, and classifications of different types of oils and fats.
2. To provide the general knowledge on the extraction of oil from oilseeds (soybean, Corn, sunflower, canola and palm).
3. To provide the basics of refining, bleaching, deodorization of fats and oils and their modifications (blending, interesterification, emulsification, votation, fractionation and genetic manipulation) into functional shortenings and the subsequent handling and the preservation of their quality.
4. Applications of Oils and Fats: Exploration of the various industrial, culinary, and pharmaceutical applications of oils and fats, including their use as ingredients, additives, and functional components in different products.
5. Health and Nutrition: Discussion of the role of oils and fats in human nutrition, including their impact on health, metabolism, and disease prevention.
6. Sustainable Production and Environmental Impact: Consideration of the environmental and sustainability aspects of oilseed cultivation, oil extraction, and waste management in the oils and fats industry.

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

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 30 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• E-learning | | |
| 4 | Distance learning | | |

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

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | $2 \times 15 = 30$ |
| 2. | **Field** | |
| 3. | **Tutorial** | |
| 4. | **Others (specify)** | |
| **Total** | | 30 |

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

| Code | Course Learning Outcomes | Code of CLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding;** *Upon completion of the course, students are able to:* | | | |
| **1.1** | **Demonstrate a broad knowledge and understanding of the chemical composition, properties, and classifications of different types of oils and fats. (M)** | **K1** | **lecture/ discussion Seminars/ presentation** | **Objective question** |
| **1.2** | **Explain the uses and applications of of Oils and Fats, and the refining, (M)bleaching, deodorization of fats and oils and their modifications. (M)** | **K2** | **lecture / discussion /** | **Essay question** |
| **2.0** | **Skills;** *Upon completion of the course, students are able to:* | | | |
| 2.1 | **Demonstrate ability in critical** | **S1** | **lecture /** | **Solving** |

| Code | Course Learning Outcomes | Code of CLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | thinking, analyzing the exploration of the various industrial, culinary, and pharmaceutical applications of oils and fats, and analyze the role of oils and fats in human nutrition. (M) | | discussion / Seminars /Individual presentation | Problems & Essay question |
| 2.2 | Communicate scientific information and research findings effectively in writing research papers, or orally, using clear and concise scientific language. (M) | S5 | Research /Seminars /Individual presentation | Interactive Discussions /Rubric |
| **3.0** | **Values, autonomy, and responsibility;** *Upon completion of the course, students are able to:* | | | |
| 3.1 | Recognize a chemist's ethical and scientific responsibilities. | V2 | Research project or presentation | group work Rubric |

## C. Course Content

1- Theoretical Part

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | Introduction to Oils and Fats: Overview of the chemical composition, properties, and classifications of different types of oils and fats. | 2 |
| 2. | Lipid Chemistry: Study of the chemical structure and properties of lipids, including fatty acids, triglycerides, phospholipids, and sterols. | 2 |
| 3. | General knowledge on the extraction of oil from oilseeds (soybean, Corn, sunflower, canola and palm). | 2 |
| 4. | Basics of refining, bleaching, deodorization of fats and oils and their modifications (blending, interesterification, emulsification, votation, fractionation and genetic manipulation) into functional shortenings and the subsequent handling and the preservation of their quality. | 4 |
| 5 | Quality Control and Analysis: Introduction to analytical techniques for assessing the quality and purity of oils and fats, including methods for measuring fatty acid composition, oxidative stability, and impurities. | 4 |
| 6. | Applications of Oils and Fats: Exploration of the various industrial, culinary, and pharmaceutical applications of oils and fats, including their use as ingredients, additives, and functional components in different products. | 4 |
| 7. | Health and Nutrition: Discussion of the role of oils and fats in human nutrition, including their impact on health, metabolism, and disease prevention. | 4 |
| 8. | Sustainable Production and Environmental Impact: Consideration of the environmental and sustainability aspects of oilseed cultivation, oil extraction, and waste management in the oils and fats industry. | 3 |
| 9. | Sustainable Production and Environmental Impact: Consideration of the | 3 |

| | | |
|---|---|---|
| | environmental and sustainability aspects of oilseed cultivation, oil extraction, and waste management in the oils and fats industry. | |
| 10. | Case Studies and Industry Trends: Analysis of specific examples and current developments in the oils and fats industry, including emerging technologies, market trends, and challenges. | 2 |
| Total | | 30 |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| 1. | *Periodic Exams* | *6-8* | *20%* |
| 2. | *Assignments & Classroom activities* | *During semester* | *30%* |
| 3. | *Final Exam* | *16-17* | *50%* |
| *Total* | | | *100%* |

*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 | 1. Erham, S.Z. 2005. Industrial uses of vegetable oils. AOCS Press, Champaign, Illinois. ISBN 1-893-997-84-7.<br>2. Gupta, M. K. 2008. Practical guide to vegetable oil processing. AOCS Press, Urbana, Illinois. ISBN978-1-893997-90-5 |
| Supportive References | Hui, Y.H. 1996. Bailey's Industrial oil and fat products. 5th Ed. Volume 4. John Wiley & Sons, Inc. ISBN 0-471-59428-8. |
| Electronic Materials | • https://en.wikipedia.org/wiki/Chemical_industry<br>• http://www.rsc.org/learn-chemistry<br>• https://www.khanacademy.org/science/organic-chemistry<br>• https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/intro1.htm<br>• https://chem.libretexts.org/ |
| Other Learning Materials | |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | **1 Lecture room(s) for groups of 50 students** |

| Items | Resources |
|---|---|
| **Technology equipment** (projector, smart board, software) | **Smart board, Data show, Black board, internet** |
| **Other equipment** (depending on the nature of the specialty) | |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Student | Likert-type Survey CES) Indirect |
| Effectiveness of Students' assessment | Instructor & Course coordinator | Class room evaluation (direct & indirect |
| Quality of learning resources | Program coordinator | Indirect |
| The extent to which CLOs have been achieved | Assessment committee | Indirect |
| Other | | |

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

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

| | |
|---|---|
| **COUNCIL /COMMITTEE** | Physical Sciences Department Council |
| **REFERENCE NO.** | Meeting (3) |
| **DATE** | 12/03/2024 -02/09/1445 |