



Department: Chemistry Dept.

College: Education College

University: Salahaddin University

Subject: Industrial Chemistry

Course Book: *Stage 3*; **First semester**

Lecturer's name: Assist Prof.Dr.Suad Najmadin
Mohiaedin

Academic Year: 2023/2024

Course Book

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| 1. Course name | Industrial Chemistry |
| 2. Lecturer in charge | Dr.Suad Najmaldin mohialdin |
| 3. Department/ College | Chemistry/ Education |
| 4. Contact | e-mail: suad.mohiaedin@su.edu.krd , |
| 5. Time (in hours) per week | Theory: 6 Practical: 10 |
| 6. Office hours | Sunday 10.5am – 12.5 pm or by appointment |
| 7. Course code | |
| 8. Teacher's academic profile | <p>I graduated from the University of Baghdad, College of Science, Department of Chemistry in 1976 with a Bachelor's Degree of Science (BSc) in Industrial Chemistry. After that. I worked at Electronic Industries Company (EIC) for five years. Started to study Master degree (MSc) in petrochemical and Hydrocarbon Chemistry In in UK at Manchester University 1982-1984.</p> <p>In 1984 -1988. I studied my PhD. Study in synthetic of industrial fluorinated hydrocarbon) at Manchester University UK. From 1989 -1996 I carried out post-doctoral research at Manchester University in chemistry department in synthesis of Natural product field, synthesis fluorinating reagents, and synthesis of conducting polymers for odor sensors, during the above period I was also teaching part time the undergraduate student organic, industrial chemistry and polymer chemistry. During that period, I have published 17publication, in natura product, fluorinated hydrocarbon and conducting polymers. Also, I published one patent on new conducting polymer used in manufacturing of odor sensors by the company called (Aroma Scan). From 1986-1988 I worked at Astra Zeneca – Industrial at Dyes and pigments department. 1989 I started to my teaching course and gained higher diploma teaching of in Higher Education colleges. From 1989 -2000, I taught in different higher education colleges in Manchester. 2000-2010 worked at Aveica company as senior research scientist during that period I published 2patents and 7 publications on thin film organic transistors. From 2012 -to date I have been teaching at Salahaddin University, College of Education, Department of. During the above period I took a sabetic leave in 2014 and I carried research at Manchester University chemistry department, and managed to publish a Patent. Also I have published 3 publication during the 2020 and 2022.</p> |
| 9. Keywords | Organic Chemistry, thin film organic transistors, Patent, Industrial chemistry, natural product, odor sensors |

10. Course overview:

What is industrial chemistry?

- The development, optimization and monitoring of fundamental chemical processes used in industry for transforming raw materials and precursors into useful commercial products for society.

How is it important and relevant to you?

- Industrial chemistry plays a vital role as an applied science in diverse areas that influence human society ranging from economic, environmental and political stability.

Goals of this course: Why are you here?

- This is a survey course that will focus on industrial processes used in the production of major primary bulk chemicals (e.g., gases, acids, bases, fossil fuels) and their secondary commercial products (e.g., dyes, pesticides, fertilizers, sugar and edible oil manufacturing drugs, polymers). Emphasis will be placed on understanding of the relationship between natural resources, chemical transformation and waste generation for a sustainable future based on insights derived from green chemistry and environmental chemistry.
- Any changes to the course material will be notified if necessary. In most cases, formal class lectures will be held on Wednesday and Thursdays.

11. Course objective:

By the end of the course students should be able to:

1. Define, describe, and apply basic chemical processes involved in the production of major commercial products used in society.
2. Develop critical skills at scaling up, analyzing the cost/benefit/impact of traditional industrial chemical
3. processes on society as a whole.
4. Appreciate the role of green chemistry for efficient yet sustainable industrial chemical
5. processes with low impact on the environment and human health.
6. Course strategy: Hints on how to succeed in this course
7. If you attend every class on time and conscientiously do assignments reading and problem sets. This is particularly important as there is no assigned textbook for the course.
8. Actively participate in class/group discussions.
9. Relate knowledge gained in class which can be applied to “real-world” problems.
10. Creative contributions to group project and presentations.
11. During the course, compile a concise set of notes from lecture and material that includes basic principles and equations of chemical analysis (review for final exam).
12. • If you have any questions or doubts about the material being taught (before an exam!), feel free to ask questions in class, drop-by for a visit in my office or send an e-mail message.
13. • Working in groups for support throughout the term.
14. • Keep an update on any changes in test or report schedule announced in class

12. Student's obligation

The student attendance in class two hours a week, preparation of the home works examinations and participate in the discussion in the classroom.

13. Forms of teaching

Different forms of teaching will be used to reach the objectives of the course: Direct questions, Quizzes, Discussion and conclusions. Power point presentations

14. Assessment scheme

At least one exam for each course (200pts) and answering question during the year (100pts). Participation in class working in group and presenting short reports, and preparation a PowerPoint presentation for each topic and extra degree to attend the lecture (*).

15. Student learning outcome:

Upon completion of these topics, the student will learn how to:

1 By the end of the course students should be able to:

1. Define, describe, and apply basic chemical processes involved in the production of major commercial products used in society.
2. Develop critical skills at scaling up, analysing the cost/benefit/impact of traditional industrial chemical.
3. Developed skill in team working.
4. Develop skill in report writing.
5. develop skills in writing PowerPoint presentation and presentation skill in front of group audience.
6. The climax of the course is reflected by a group student presentation as well as individual report

16. Course Reading List and References:

1. Handbook of Industrial Chemistry Organic Chemicals, Mohammad Farhat Ali, Ph.D. King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia, Bassam M. El Ali, Ph.D., King Fahd University of Petroleum & Mineral, Dhahran, Saudi Arabia, James G. Speight, Ph.D., CD&WInc., Laramie, Wyoming, McGraw-Hill, New York Chicago San Francisco Lisbon London Madrid, Mexico City Milan New Delhi San Juan Seoul
2. Industrial Organic Chemicals, 2nd ed., by H.A. Wittcoff, B.G. Reuben, and J.S. Plotkin, Wiley-Interscience (2004)

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| 17. Industrial theory Topics | Lecture's Name |
| Week 1: Introduction about industrial chemistry: History, chemical industry survey (Top 20), traditional industrial chemistry . | Dr Suad Najmaldin |
| week 2: Water purification | |
| Week 3: Edible oils Fats and waxes | Lecture period 3 hours |
| Week 4: Surfactant | |
| Week 5: detergents | |
| Week 6: personal care formulation | |
| Week 7: first examination | |
| Week 8: pharmaceutical industry | |
| Week9: white sugar | |
| Week 10: fermentation | |
| 2nd examination | |
| Week 11: fertilisers | |
| Week 12: corrosion | |
| Week 15: paint and coating | |
| Final examination | |
| 18. Practical topics: The practical topics is reported in practical course book. | |

19. Grading procedure

• The final grade in this course will be based on following assessment.

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| 1. First examination | 15 % (10% theoretical + 5% attendance + group discussion +homework activities) | Held throughout semester prior to mid-term & final |
| 2. Second examination (Mid-Term Exam) | 15 % (10% theoretical + 5% attendance + group discussion +homework activities) | Date to be announced.) |
| Practical (examination + laboratory activities) | 35% (examination+ daily quiz + lab. Report) | |
| Final results | 50 % (35% practical +15% theory) | Last day of class, date to be announced (Review) |
| 6. Final Exam | 50% | Comprehensive; Date to be announced |
| Total | 100 % | Results date to be announce |

20. Academic Dishonesty

• Failure to attend a class for an exam will result in a grade of zero, unless absence is documented for a valid reason (i.e., a doctor's note). Plagiarism, improper collaboration in groups and copying or using unauthorized tests/exams can result in a grade of zero, loss of credit, or suspension from university. Although working in groups is encouraged, plagiarism is not! Please refer to the Academic Integrity

21. Examinations:

1. Mark as true or false:

Example

- Detergents are similar to soap but are more soluble in hard water.
- Surfactant used in detergents to increase the surface tension of liquid

2. Multiple choices:

Example

Naturally occurring fresh waters have a PH :

- Ranges between 6.5 and 8.5.
- 9.0
- Ranges between 4.0 and 8.5
- 5.0

3. Answer the following questions briefly:

Example

- what is the chemical structure of liquid fatty acid give one example.
- Draw two types of micelle aggregation.

4. Define the following.

Example

- Critical Micelle concentration,
- Solubilisation ,
- Margarine ----

22. Extra notes:

23. Peer review