**Course Description Form**

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| 1. Course Name:
 |
| Industrial Chemistry |
| 1. Course Code:
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| **Industrial Chemistry**/**403CHIC2** |
| 1. Semester / Year:
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| Year |
| 1. Description Preparation Date:
 |
| 1-10-2024 |
| 1. Available Attendance Forms:
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| Regularity. |
| 1. Number of Credit Hours (Total) / Number of Units (Total)
 |
| 60 hours |
| 1. Course administrator's name (mention all, if more than one name)
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| Name: Abdlwahhab Hameed MajeedEmail: abdulwahhab@uodiyala.edu.iq Name: Omar Ghazi HamoodiEmail: omerkazi@uodiyala.edu.iq  |
| 1. Course Objectives
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| **Course Objectives** | * Enabling students to understand the principles and concepts of industrial chemistry.
* Training students on the characterization of polymeric compounds using modern instrumentation.
* Explaining the theoretical principles underlying the measurement of molecular weight for various polymers.
* Clarifying petrochemical industries, their chemical formulations, components, and applications.
* Providing university-level students with theoretical and applied knowledge to enhance their understanding and critical thinking skills.
* Identifying various industries, their manufacturing processes, and the significant role of chemistry in industry, as well as utilizing them as a foundation for further study in chemistry to develop a chemist's personality.
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| 1. Teaching and Learning Strategies
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| **Strategy** | 1. Explanation and Clarification
2. Lecture Method
3. Presentation of Models
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| 1. Course Structure
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| **Week** | **Hours** | **Required Learning Outcomes** | **Unit or subject name** | **Learning method** | **Evaluation method** |
| 1 | 2 | Introducing the student to the chemistry of polymers and the degree of polymerization and how to calculate it  | Polymer Chemistry  | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 2 | 2 | Introduce the student to the classification of polymers and know the types of each class | classification of polymers | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 3 | 2 | Definition of the student naming polymers | nomenclature of polymers | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 4 | 2 | Factors affecting polymers | Factors affecting polymers | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 5 | 2 | Types of Molecular Weight of Polymers, Molecular Weight Diffusion Rate of Polymers  | Molecular weight of polymers | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 6 | 2 | The most important types of reactions leading to the formation of condensing polymers, controlling the molecular weight of condensing polymers | condensation polymerization | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 7 | 2 | The most important types of reactions leading to the formation of condensing polymers, controlling the molecular weight of condensing polymers | Condensation polymers  | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 8 | 2 | The most important types of condensing polymers: Polyesters, polyamides, polyurea, polyurethane, copolymers | Industrial condensing polymers | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 9 | 2 | The first month exam | is a theoretical exam in the previous article mentioned above |  |  |
| 10 | 2 | Ionic polymerization and its types, its importance, the difference between condensation and addition polymerization | addition polymerization | blackboard + PowerPoint+ data show |  |
| 11 | 2 | Types of addition polymerization, free radical polymerization, its mechanisms, initiators , the most important polymers that exhibit this type of polymerization | negative ionic addition polymerization | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 12 | 2 | Ionic addition polymerization, types, anionic ionic addition polymerization, its initiations, polymerization mechanism, the most important polymers that exhibit this mechanism | Anionic addition polymerization | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 13 | 2 | Cationic addition polymerization, its precursors, the polymerization mechanism, the most important polymers that exhibit this mechanism | Cationic addition polymerization | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 14 | 2 | The most important factors affecting on the ionic addition polymerization, temperature, polarity of the solvent, type of monomer, nature of the polymeric chain, live polymerization | Ionic addition and coordination polymerization  | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 15 | 2 | Different polymerization processes and conditions | Polymerization processes and conditions  | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 16 | 2 | The second month exam | is a theoretical exam in the previous article mentioned above |  |  |
| 17 | 2 | Teaching the student the chemistry of oil, the beginning of the emergence of oil, the most important theories that explain the emergence of oil | Chemistry of petroleum | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 18 | 2 | The most important hydrocarbon and non-hydrocarbon components and the percentage of their presence in crude oil | Chemical composition of crude oil | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 19 | 2 | Classification of crude oil in relation to its basis, the most important general characteristics of crude oil | Crude oil basics | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 20 | 2 | Characteristics of oil derivatives, their importance and the extent to which they are related to different oil products | Characteristics of petroleum products | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 21 | 2 | Crude oil treatment and re-refining, separation of water and salts, separation of emulsions, separation of gases, physical processes: distillation and its types, extraction with solvents, absorption and stripping, thermal diffusion, | Crude oil processing and re-refining | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 22 | 2 | Chemical processes in oil refining, thermal cracking, thermal catalytic cracking, catalytic alkylation | Chemical processes in oil refining | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 23 | 2 | Catalytic structural transformation processes and their types, catalytic isomerization processes, catalytic polymerization processes | Chemical processes in oil refining | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 24 | 2 | The third month exam | is a theoretical exam in the previous article mentioned above |  |  |
| 25 | 2 | Treatment and purification processes, impurities to be removed, treatment with sulfuric acid, removal of mercaptans | Processing and purification | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 26 | 2 | Treatment and purification processes, treatment with clay, treatment with molecular sieves, desalination, treatment with hydrogen gas and its types | Processing and purification | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 27 | 2 | The most important oil derivatives (an overview), natural gas, its types, methods of separation and its importance, gasoline and its composition, natural gasoline, automotive gasoline and its importance, improving the quality of gasoline. | Petroleum products | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 28 | 2 | Kerosene and its importance, lighting and heating kerosene, engine and aircraft kerosene, aircraft kerosene and its types, gas oil (diesel fuel), fuel oils, lubricating oils and their types, oil greases, their composition and importance | Petroleum products | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 29 | 2 | Petroleum wax, petroleum asphalt, petroleum solvents or naphtha | Petroleum products | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 30 | 2 | The forth month exam | is a theoretical exam in the previous article mentioned above |  |  |

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| 1. Course Evaluation
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| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc |
| 1. Learning and Teaching Resources
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| Required textbooks (curricular books, if any) | Polymer Chemistry (Koltzenburg, Sebastian, Maskos, Michael, Nuyken, Oskar)The Chemistry and Technology of Petroleum (James G. Speight) |
| Main references (sources) | Introduction to Polymer Chemistry (Charles E. Carraher Jr.)Petroleum Chemistry (Mohamed Sikkander) |
| Recommended books and references (scientific journals, reports...) |  |
| Electronic References, Websites |  <https://www.goodreads.com/book/show/1355898.The_Chemistry_And_Technology_Of_Petroleum> <https://www.kobo.com/gr/en/ebook/textbook-of-polymer-chemistry> |