MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

M.Sc. AND HIGHER DIPLOMA PROGRAM IN CHEMICAL ENGINEERING

OUTLINE OF SYLLABUSES ALLOCATION OF SUBJECTS AND WEEKLY LOAD
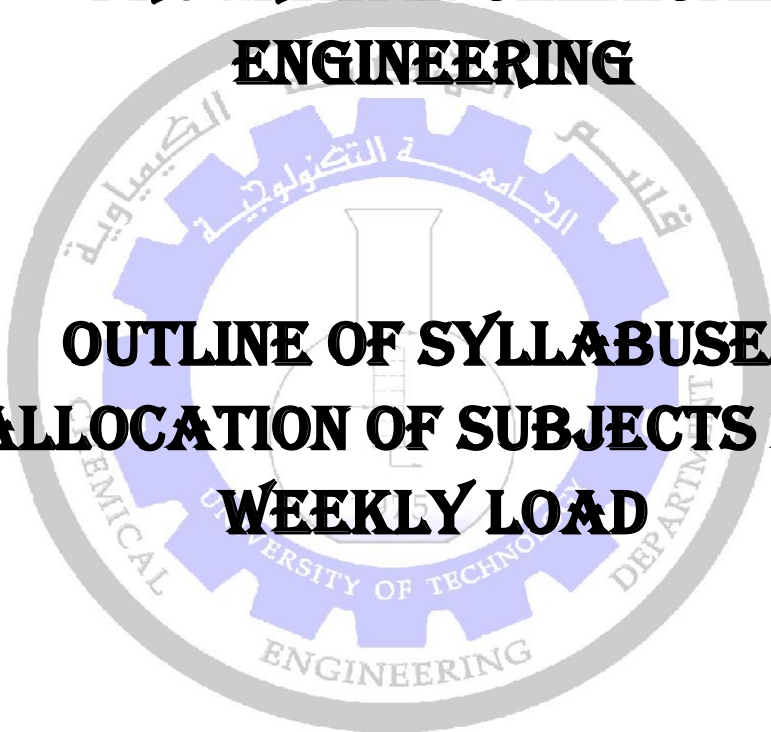
2012-2013

Preface

Postgraduate studies in the Department of Chemical Engineering were established in 1979 starting with a Masters of Science degree in industrial unit operations. The duration of the course was one year after which the student is granted a Higher Diploma Certificate which qualifies him for a second year during which the student is asked to prepare a dissertation in the field of industrial unit operations after which the student is granted M.Sc. degree.

The Doctor of Philosophy Degree in Chemical Engineering was established in 1987 which consists of a one year course after which the student has to sit a comprehensive examination and then prepare a thesis after a two year research project in any of the fine specializations of Chemical Engineering.

For the sake of catching up with the scientific, development in the modern science frontiers, a Master of Science Course was established in 1987 in the field of Engineering Materials followed by Master of Science in Petroleum Refinery and Petrochemicals, and Master of Science in Corrosion Engineering both in 1988. The last two courses were halted for technical reasons and the first was re-established in 2004.

In 1998, M.Sc. degree in Biochemical Engineering was established. In 2001 a higher diploma degree in oil and Gas Refining Engineering was established followed by a higher diploma degree in Industrial Pollution Engineering.

The duration of both higher diploma degrees was one year consisted of courses plus a research in the field concerned. These two courses are both halted for technical academic reasons.

In the academic year 2004-2005, the post- graduate studies were concentrated only on the M.Sc. degree in industrial unit operations and the M.Sc. course in Petroleum Refining and Petrochemical Industries was re-opened due to its importance in modern industries. In addition to the Ph.D. graduates the total number of post- graduate students graduated from the department is 377 up till 2011.

In 2010 a higher diploma degree in Petroleum Refining and Gas Technology was established. This course is specialized for the staffs of the Ministry of Oil and it continues up to now.

In 2012-2013 the total students were (22) M.Sc., (5) Higher Diploma under research, (20) M.Sc. and (9) Higher Diploma in courses.

The aims of the above degrees are to provide the graduates with advanced knowledge in the fundamental topics in Chemical Engineering and to prepare specialized personnel for scientific research and academic fields. Postgraduate studies involved a scientific collaboration strategy reflected by the joint supervision with pioneers in the field of Chemical Engineering from other universities and from industry to interchange knowledge and experience between university and industry.

Prof. Thamer J. Mohammed

Head of Chemical Engineering Department

CHEMICAL ENGINEERING DEPARTMENT
2012/2013

M.Sc. Program in Chemical Engineering
CHEMICAL PROCESSING ENGINEERING

Code	First Term — Subject	Hours / week	Units
	First Term		
Code	**Subject**	**Hours / week**	**Units**
MS-101	Fluid Flow	2	2
MS-102	Reactor Design	2	2
MS-103	Numerical Analysis	2	3
	Numerical Analysis Laboratory	2	
MS-104	Mathematical Modeling	2	2
MS-105	English Language (I)	1	1
MS-11---	Optional Subject (1)	2	2
	Total	13	12

	Second Term		
Code	**Subject**	**Hours / week**	**Units**
MS-106	Heat Transfer	2	2
MS-107	Thermodynamics	2	2
MS-108	Mass Transfer	2	2
MS-109	Process Control	2	2
MS-110	Corrosion Engineering	2	2
MS-105	English Language (II)	1	1
MS-11---	Optional Subject (2)	2	2
	Total	13	13

Total Theoretical Units	**25**
Dissertation Units	**12**
Grand Total /Units	**37**

Optional Subjects			
Code	**Subject**	**Code**	**Subject**
MS-111	Separation Process	MS-114	Nanotechnology
MS-112	Catalysts Engineering	MS-115	Environmental Engineering
MS-113	Polymer Technology		

M.Sc Program in Chemical Engineering
PETROLEUM REFINING AND PETROCHEMICAL INDUSTRIES

First Term			
Code	**Subject**	**Hours / week**	**Units**
MS-201	Fluid Flow	2	2
MS-202	Petroleum Refining Engineering	2	2
MS-203	Numerical Analysis	2	3
	Numerical Analysis Laboratory	2	
MS-204	Petrochemical Complexes	2	2
MS-205	English Language (I)	1	1
MS-21---	Optional Subject (1)	2	2
Total		13	12

Second Term			
Code	**Subject**	**Hours / week**	**Units**
MS-206	Heat Transfer	2	2
MS-207	Thermodynamics	2	2
MS-208	Mass Transfer	2	2
MS-209	Heterogeneous Reactors	2	2
MS-210	Gas Technology	2	2
MS-205	English Language (II)	1	1
MS-21---	Optional Subject (2)	2	2
Total		13	13

Total Theoretical Units	**25**
Dissertation Units	**12**
Grand Total /Units	**37**

Optional Subjects			
Code	**Subject**	**Code**	**Subject**
MS-211	Process Control	MS-214	Corrosion Engineering in Oil Equipment
MS-212	Mathematical Modeling	MS-215	Pollution from Petroleum Industries
MS-213	Enegy Conservation		

DESCRIPTION AND BREAKDOWN OF SUBJECTS
M.Sc. COURSE CHEMICAL PROCESS

MS-101 - Fluid Flow

Viscosity and mechanisms of momentum transport; Shell momentum balances and viscosity distributions in laminar flow: The equation of change for isothermal systems; Viscosity distributions with more than one independent variable: Velocity in turbulent flow: Interphase transport in isothermal systems; Non-Newtonian viscosity and generalized Newtonian models.

MS-102- Reactor Design

Nonisothermal Continuous-Flow Reactors (at Steady State): Continuous-Stirred Tank Reactor (CSTR): Adiabatic CSTR, CSTR with a cooling coil for reversible & irreversible reactions. Tubular Reactor: Adiabatic tubular reactor, tubular reactor with heat exchange, multi-stage adiabatic reactors. Multiple Steady States: Heat removed, heat of generation, ignition-extinction curve, stable & unstable steady states. Non-Ideal Flow Reactors Characteristics of nonideal flow: Macromixing and micromixing, Earliness of mixing, residence time distribution (RTD). Nonideal flow reactors: Reactors with axial dispersion, Tanks-in-Series, Segregated flow. Reactor performance with nonideal flow. Applied Computational Flow Dynamics (CFD): Introduction to CFD: What is CFD?, applications of CFD, advantages of CFD, CFD-how it works, discretization, grid generation, set up the numerical method, compute the solution, examine the results. Examples of CFD: Bubble column design, fluidized bed system.

MS-103- Numerical Analysis

Solutions of nonlinear algebraic equations; Solution of simultaneous equations by matrix methods; Curve fitting, Interpolating and extrapolating technique; Solution of ordinary differential equations; Solution of partial differential equations.

Numerical Analysis Laboratory

The laboratory work includes computer solutions of different chemical processes using numerical analysis techniques.

MS-104- Mathematical Modeling

Introduction, Mass transfer model in different columns, Model for mass transfer drops, Simultaneous heat and mass transfer model Mathematical model for mass transfer with chemical reaction.

MS-105- English Language

English Language (I)

- Synonyms (Meanings)   - Confusion Words   - Parts of Speech
- Verb Tenses   - Passive Voice

English Language (II)

- Conditional sentences   - Relative Pronouns & Clauses
- Finite and Non-Finite Verbs   - Kinds of Subordinate Clauses
- Kinds of Sentences: the simple sentence, the Compound sentence, and the complex sentence.

MS-106- Heat Transfer

Hydrodynamic and thermal boundary layers. Analysis of heat transfer in laminar tube flow. Unsteady state heat transfer. Temperature profile in turbulent flow. Design of tubular furnace. Air cooler design.

MS-107- Thermodynamics

Basic Concepts and Definitions: Basic thermodynamic terminology, Types of energy and thermodynamic properties, Fundamental equation of thermodynamics, Thermodynamics laws. Thermodynamics of Flow Process: Fundamental equations, Flow in pipes, Expansion processes (Nozzles and Turbines), Throttling processes (Joule-Thomson coefficient), Compression processes (Compressors and Pumps). Vapor-Liquid Equilibria – Ideal Behavior: Fundamentals of phase equilibrium (Duhem's theorem), Property change of mixing (Gibbs theorem), Vapor pressure (Antoine equation and Cox chart), Raults law (Dew and Bubble point calculation), Vapor-liquid diagrams of binary mixtures, Flash calculation. Vapor-Liquid Equilibria – Nonideal Behavior: Nomographs and charts of K-values, Polynomial equations of K-values, Tabulated K-values at different reduced conditions, Prediction of thermodynamic properties of fluids-nonideal behavior, Theorem of corresponding states and reduced conditions, Residual properties, Departure charts and tables of thermodynamic properties, Computational path for property changes.Properties of Mixtures-Nonideal Behavior: Partial property and nonideal solution, Fugacity and fugacity coefficients of mixture components (Lewis-Randall rule), Activity and activity coefficient, Excess Gibbs free energy, Activity coefficients from VLE data.

MS-108- Mass Transfer

Diffusion and mass transfer. Equation of change in multi-component systems, Boundary layer theory. Heat transfer and concentration distribution in turbulent flow. Mass transfer theory and Mass transfer equations in solid materials with chemical reaction.

MS-109- Process Control

Analysis and design of feedback control system. Analysis and design of advanced control systems (feedforward control, adaptive control, cascade control, inferential control, Fuzzy-logic control, and neural control). Design of control system for multi control of complete variable process plant. Process control using digital computers. Interaction effect on the closed loop.

MS-110- Corrosion Engineering

Introduction to Corrosion. Basic Concepts in Corrosion: Anodic and cathodic reactions, Types of corrosion cells, Mechanism of corrosion of iron, Pourbaix diagrams, Corrosion Kinetic, Polarization, activation polarization, concentration polarization, combined polarization, Tofel equation, Evans diagrams, Mixed potential theory and its application, Determination of corrosion rate by electrochemical measurements. Kinetics of Passivity: Definition of important electrochemical parameters for active-passive metal, Measured vs. actual polarization, Behavior of active-passive metal control of passivity, Effects of environment. Corrosion Prevention: Cathodic protection, Anodic protection, Coating, Inhibitors, Corrosion prevention by design selection of materials for corrosion environment. Rotating Electrodes for Corrosion Study: Rotating cylinder electrode, Rotating disc electrode.

OPTIONAL SUBJECTS: CHEMICAL PROCESS

MS-111- Separation Processes

Design of freedom analysis. Ultrafiltration, Microfiltration, Nanofiltration. Pervaporation Membrane distillation hybrids. Gas separation. Pressure swing distillation. Extractive distillation. Reactive distillation. Homogeneous isotropic distillation. Hetroazeotropic distillation. Forward osmoses; Reverse osmosis; Adsorption and ion exchange.

MS-112- Catalysts Engineering

Catalyst functions. Organization of catalysis. Steps in catalytic reaction. Structures of catalysis. Catalyst component. Catalyst design. Catalytic material. Catalyst preparation. Physical adsorption of solid material. Chemisorptions. Catalyst characterization. Catalyst deactivation. Models for deactivation of catalyst. Case study for industrial and petroleum catalytic processes.

MS-113- Polymer Technology

Introduction. Classification and types. Industrial application of polymers molecular weight determination. Kinetics of linear condensation polymerization. Kinetics of addition polymerization;

   a- Kinetics of free radical polymerization.
   b- Kinetics of cationic polymerization.
   c- Kinetics of anionic polymerization.

Copolymers types. Kinetics of copolymerization. Polymer engineering. Melt rheology and processing. Flow properties of polymer melt measurement of flow properties. Rheometry thermal analysis (DSC).

MS-114- Nanotechnology

Introduction; Simple kinetic theory; Schrodinger equation; Quantum wells; Rigid rotors; Electronic energy levels in crystals; Reciprocal lattice; Energy spectrum in Nanostructures; Specific heat of molecules; Effects of Nanostructures on energy storage; Electromagnetic waves; Acoustic waves; Laudauer formalism; Transport in carbon nanotubes.

MS-115- Environmental Engineering

Introduction. Air Pollution. Design the industrial ventilation. Water Pollution and treatment methods. Solid-wastewater desalination by membrane separation (Reverse osmosis and electrodialysis). Removal of heavy metals from water.
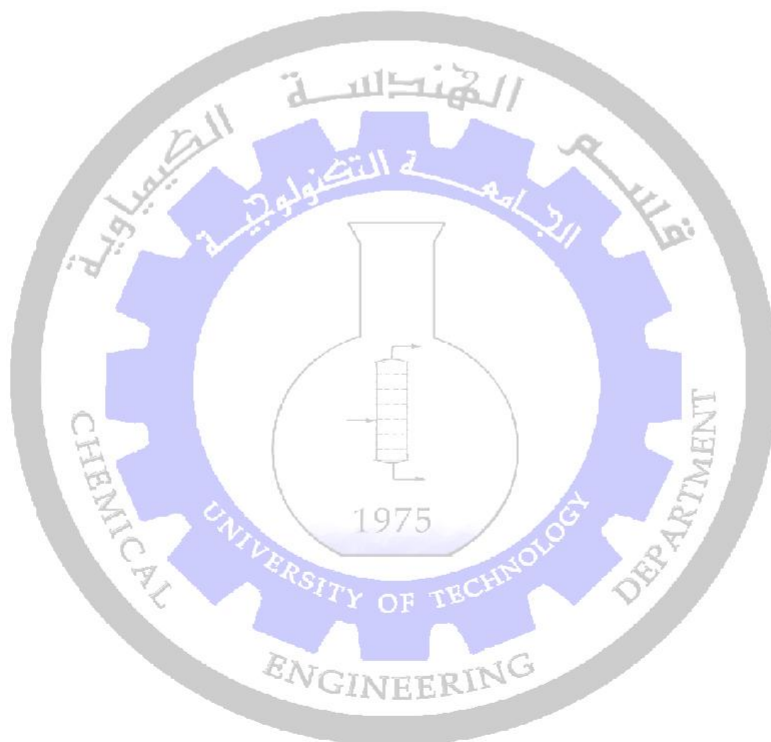
DESCRIPTION AND BREAKDOWN OF SUBJECTS
M.Sc. COURSE PETROLEUM REFINING & PETROCHEMICAL

MS-201 - Fluid Flow

Viscosity and mechanisms of momentum transport; Shell momentum balances and viscosity distributions in laminar flow: The equation of change for isothermal systems; Viscosity distributions with more than one independent variable: Velocity in turbulent flow: Interphase transport in isothermal systems; Non-Newtonian viscosity and generalized Newtonian models.

MS-202- Petroleum Refinery Engineering

An introduction to crude oil and its processing. Products and a refinery configuration. The atmospheric and vacuum crude distillation units. The distillation of the 'Light Ends' from crude oil. Catalytic reforming. Fluid catalytic cracking. Distillate hydrocracking. Hydrotreating. Gasoline components: Motor fuel alkylation, Isomerization technologies.

MS-203- Numerical Analysis

Solutions of nonlinear algebraic equations; Solution of simultaneous equations by matrix methods; Curve fitting, Interpolating and extrapolating technique; Solution of ordinary differential equations; Solution of partial differential equations.

Numerical Analysis Laboratory

The laboratory work includes computer solutions of different chemical processes using numerical analysis techniques.

MS-204- Petrochemical Complexes

Introduction. Production of low olefins ethylene. Type of crackers, quenchers, scrubbers. Production of ethylene from liquid feed stocks. Comparison of equipment used in case of naphtha feed stock or gasoil or crude oil. Hydropyrolysis, mill second furnace, cracking by steam and molten salt. Production of diolefins. BD production by dehydrogenation process and others. Isoprene. Synthesis Gas: Comparison between steam reforming and partial oxidation of production of H2. Chemical derived from Synthesis Gas. Methanol and acetic acid. Chemical derived from ethylene. Ethanol chemical derived from propylene acrylonitrile. BTX: production of Benzene, Benzoic acid, LBA. Polymers: introduction, classification molecular weight determination. Polymerization systems. Thermoplastic: LDPE, HDPE, PP, PVC, PS.

MS-205- English Language

English Language (I)

- Synonyms (Meanings)
- Confusion Words
- Parts of Speech
- Verb Tenses
- Passive Voice

English Language (II)

- Conditional sentences
- Relative Pronouns & Clauses
- Finite and Non-Finite Verbs
- Kinds of Subordinate Clauses
- Kinds of Sentences: the simple sentence, the Compound sentence, and the complex sentence.

MS-206- Heat Transfer

Hydrodynamic and thermal boundary layers. Analysis of heat transfer in laminar tube flow. Unsteady state heat transfer. Temperature profile in turbulent flow. Design of tubular furnace. Air cooler design.

MS-207- Thermodynamics

Basic Concepts and Definitions: Basic thermodynamic terminology, Types of energy and thermodynamic properties, Fundamental equation of thermodynamics, Thermodynamics laws. Thermodynamics of Flow Process: Fundamental equations, Flow in pipes, Expansion processes (Nozzles and Turbines), Throttling processes (Joule-Thomson coefficient), Compression processes (Compressors and Pumps). Vapor-Liquid Equilibria – Ideal Behavior: Fundamentals of phase equilibrium (Duhem's theorem), Property change of mixing (Gibbs theorem), Vapor pressure (Antoine equation and Cox chart), Raults law (Dew and Bubble point calculation), Vapor-liquid diagrams of binary mixtures, Flash calculation. Vapor-Liquid Equilibria – Nonideal Behavior: Nomographs and charts of K-values, Polynomial equations of K-values, Tabulated K-values at different reduced conditions, Prediction of thermodynamic properties of fluids-nonideal behavior, Theorem of corresponding states and reduced conditions, Residual properties, Departure charts and tables of thermodynamic properties, Computational path for property changes.Properties of Mixtures-Nonideal Behavior: Partial property and nonideal solution, Fugacity and fugacity coefficients of mixture components (Lewis-Randall rule), Activity and activity coefficient, Excess Gibbs free energy, Activity coefficients from VLE data.

MS-208- Mass Transfer

Diffusion and mass transfer. Equation of change in multi-component systems, Boundary layer theory. Heat transfer and concentration distribution in turbulent flow. Mass transfer theory and Mass transfer equations in solid materials with chemical reaction.

MS-209- Heterogeneous Reactors

Gas-Solid Noncatalytic Reactions: Physical properties of porous solids: Specific surface area, density, porosity, micro-&macro-pores, average pore radius, tortuosity, gas diffusion (Bulk, Kundson, and effective). Design of gas-solid noncatalytic reactors: Shrinking core model, conversion vs. time, rate controlling steps, conversion vs. length of a bed, mixture of particles of different sizes, moving-bed reactor. Fluid-phase reactions catalyzed by solids: Fixed-bed reactor: External transport processes in heterogeneous reactions Mass and heat-transfer coefficient (fluid-particle) in packed bed, Quantitative treatment of external transport effects, Design consideration: particle and bed characteristics, pressure drop, kinetics considerations. Fluidized-bed reactor: Fluidization regimes, minimum fluidization velocity, terminal velocity, one-phase and two-phase models. Non-Ideal Flow Reactors: Characteristics of nonideal flow: Macromixing and micromixing, Earliness of mixing, residence time distribution (RTD). Nonideal flow reactors: Reactors with axial dispersion, Tanks-in-Series, segregated flow reactor. Reactor performance with nonideal flow

MS-209- Gas Technology

Overview of natural gas industry. Natural gas liquid separation. Condensate stabilization. Natural gas sweetening. Acid gases removal. Natural gas dehydration. Water removal. Natural gas liquids recovery. Gas to liquids technology.

OPTIONAL SUBJECTS
PETROLEUM REFINING & PETROCHEMICAL

MS-211- Process Control

Analysis and design of feedback control system. Analysis and design of advanced control systems (feedforward control, adaptive control, cascade control, inferential control, Fuzzy-logic control, and neural control). Design of control system for multi control of complete variable process plant. Process control using digital computers. Interaction effect on the closed loop.

MS-212- Mathematical Modeling

Introduction, Mass transfer model in different columns, Model for mass transfer drops, Simultaneous heat and mass transfer model Mathematical model for mass transfer with chemical reaction.

MS-213- Energy Conservation

Different energy sources. Present and future shares of the various energy kinds. Technical ways of converting available energy into work. Various field of energy saving in insulating buildings, pipes, tanks, and equipment. Increasing efficiency of the different heat units especially furnaces, air coolers, and shell and tubes heat exchangers. The various techniques of enhancing heat transfer coefficients. Drag reduction and optimum velocity in pumping of fluids. Energy conservation in various unit operations. Energy conservation in power generation plants. Direct and indirect conservation of heat into work. Cogeneration of power. Higher efficiency for power cycles.

MS-214- Corrosion Engineering in Oil Equipment

Introduction to Corrosion: Definitions, why metal corrode?, corrosive environment, consequences of corrosion. Basic Concepts in Corrosion: Definition of anode and cathode, anodic reactions characteristics, cathodic reactions characteristics. Types of corrosion cells. Classification of corrosion. Forms of corrosion. Thermodynamics: Concept of free energy. Reversible electrode potential, Nernest equation. Application of free energy of corrosion cell. Kinetics of aqueous corrosion: Faraday's law. Polarization, activation polarization, concentration polarization, combined polarization. Measurement of corrosion: Immersion test. Electrochemical technique. Tofel extrapolation, linear polarization. Passivity, definition of important electrochemical parameters for active-passive metals. References electrodes. Pourbaix diagrams. Corrosion prevention, cathodic protection.

MS-214- Pollution from Petroleum Industries

Introduction, Water pollution in oil industry and oily water-water treatment methods (Floatation process); Air pollution in refineries; Ventilation equipment design in refineries, Oil wastes and methods of treatment, Oil disasters.

CHEMICAL ENGINEERING DEPARTMENT
2012/2013

Higher Diploma Program in Chemical Engineering
Petroleum Refining and Gas Technology

First Term

Code	Subject	Hours / week	Units
HD−001	Multiphase Reaction Engineering	2	2
HD−002	Transportation of Petroleum Fractions	2	2
HD−003	Gas Technology	2	2
HD−004	Corrosion Engineering & its Control in Petroleum Industry	2	2
HD−005	Instrumentation Measurement & Control in Refining Processes	2	2
HD−006	Technical English Language	1	1
Total		**11**	**11**

Second Term

Code	Subject	Hours / week	Units
HD−007	Catalyst Engineering	2	2
HD−008	Energy Conservation	2	2
HD−009	Petroleum Refinery Engineering	3	4
	Lab: Computer Application in Petroleum Refining Processes	2	
HD−010	Environmental Pollution & Safety in Petroleum Industry	2	2
HD−011	Management & Economics of Refining Projects	2	2
Total		**13**	**12**

Total Theoretical Units	23
Project Units	6
Grand Total /Units	29

DESCRIPTION AND BREAKDOWN OF SUBJECTS
HIGHER DIPLOMA COURSE
PETROLEUM REFINING AND GAS TECHNOLOGY

HD-001- Multiphase Reaction Engineering

Fundamentals of Reaction Kinetics: reaction rate, reaction order, elementary and non-elementary reactions, reversible and irreversible reactions, rate and equilibrium constants, conversion, yield, selectivity, complex reactions, Finding rate law, relation between pressure drop and the rate law. Design Equations of Isothermal and adiabatic Fixed-bed Reactor (FBR). Case Study: [Kinetics and Reactor Design Improvement]. Fixed-bed Hydro cracking Reactor. Fluid Catalytic Cracking (FCC). Ebulated-bed Reactor. Performance Evaluation of Non-ideal reactors: RTD, analysis of reactor performance by RTD models.

HD-002- Transportation of Petroleum Fractions

Fundamentals of flow in pipe: Gas and liquid flow in pipes, Flow of non-Newtonian fluid in pipes. Multiphase flow of liquids and gases: Flow in horizontal pipelines, flow in a pipeline laid over hilly terrains, flow in vertical pipe strings. Pipeline transportation of oil: Isothermal flow of a Newtonian oil in single line, branching, and looping pipelines, Non-isothermal flow, Means of improving flow characteristics. Pipeline transportation of Natural gas: Temperature of flowing gases, steady-state flow in pipelines systems (design fundamental, loopless and looped systems). Case study.

HD-003- Gas Technology

Overview of natural gas industry. Hydrates. LTX units and line headers. Condensate stabilization. Acid gas treating. Gas Dehydration. Natural gas liquids recovery. Gas to liquid technology.

HD-004- Corrosion Engineering & its Control in Petroleum Industry

Introduction: Cost of corrosion, definition of corrosion, environments, corrosion damage, and classification of corrosion. Corrosion Principles: introduction, corrosion rate expression, electrochemical aspects, polarization, passivity, and forms of corrosion. Corrosion prevention: materials selection for corrosion resistance, Metal purification, selection of materials, and environment control (design, Cathodic and anodic protection, coating).

HD-005- Instrumentation Measurement & Control in Refining Processes

Instrumentation: Flow control valve, Process measurements (temperature, pressure, level, flow) Protection instrumentation, Analog and digital signal transmitions and conversion.

Control: Understanding proves dynamics, Feedback and feed-forward control, Controller tuning concepts and methods, Control applications in petroleum industries (Distillation columns, Heat exchangers, Reactors, FCCU.

HD-006- Technical English Language

Reading scientific passages, Words and phrases that require special attention, Verb tenses, Punctuation, Prepositions, Passive voice.

HD-007- Catalyst Engineering

Catalyst features: Structure, Cut. Type of catalytic processes. Catalyst Design: Primary, Secondary, and Testing. Catalyst characterization. Catalyst preparation: Support, Deposition of active component. Internal diffusion in porous catalyst. Developing Industrial catalyst: Acidity, Selectivity, Stability, Morphology, Regenerability, Cost. Practical Examples. Catalytic Reforming. Hydrocracking. Isomerization.

HD-008- Energy Conservation

Different energy sources, Present and future share of the various energy kinds. Energy saving through using insulation, Increasing efficiency of the different heat units like furnaces and air or water cooled heat exchangers, The various techniques of enhancing heat transfer coefficients, Drag reduction and using optimum velocity, Energy conservation in various unit operations. Energy conservation in power generation plants. Direct and indirect conversion of heat into work, Using the principle of cogeneration of power, Higher efficiency for power cycles.

HD-009- Petroleum Refinery Engineering

Refining process and refinery configuration. Refinery feedstocks and products. Thermophysical properties of petroleum fractions and crude oils. Crude distillation. Catalytic reforming and isomerisation. Thermal cracking and Coking. Hydroconversion. Fluidized catalytic cracking. Product blending. Alkylation. Hydrogen production.Clean fuels. Residue upgrading.

Lab. - Computer Application in Petroleum Refining Processes

Estimation of thermophysical properties of petroleum fractions and crude oils. Crude assay. Crude distillation unit material and energy balances. Light ends fractionation. FCC unit calculations. Amine unit calculations and design. Product blending calculations

HD-010- Environmental Pollution & Safety in Petroleum Industry

Introduction, Environment, Pollution, Pollutants, Sources & characteristics of waste pollutants in petroleum refinery, Pollution prevention and control, Recycling, Specific measurement of water and air pollutants, BOD, COD, Turbidity, particulate matter, SOx---etc., Types of pollution causes by wastes, ex. green house effect, Acid rains, Chlorofluorocarbon CFC'S----etc. Oil disasters. Emission Guidelines. Terminology of Environmental Pollution, Legislation of Environment protection, Iraqi standard and others National standard for drinking water, effluent discharge. Wastewater treatment processes and produced water from oilfield, Reuse, closed system, unit operations, physical chemical treatment by precipitation, coagulation, flocculation, flotation, membrane filter, reverse osmosis, nanofilter, dewatering (sludge treatment). Biological treatment, Activated sludge process, Case study of wastewater treatment as Examples of wastewater treatment and reuse technologies such as LNG. Oily wastewater treatment, API, PPI, CPI and DAF. Air pollution in refiners and dispersion of pollutants waste gases in atmosphere, general control methods for treatment waste particulate matter, gases, SOx, NOx. Petroleum refining safety: Hazard and Risk, safety terms equipments, dangers effect, chemical, biological and storage of chemicals, Threshold limit value (TLV), Dow fire explosion index (F,

EI) personal protection equipment (PPE), fire prevention and control, noise hazards. Health & safety consideration of petroleum processes.

HD-011- Management & Economics of Refining Projects

Overview, Definition of a project, The project team, Engineering design. Contracts, Project system, Planning, Estimating cost control, Finance and accounts, Procurement, construction and pre-commissioning, HSE-Health safety and environment, Security, Quality assurance, insurance, Accountability of the project manager, Abbreviations used. Oil and gas in the word, international of oil and gas markets, economics of refinery schemes, petrochemical economics.