

الجامعة الإماراتية الدولية
كلية الهندسة وتكنولوجيا المعلومات
برنامج الهندسة الكيميائية

وصف المقررات الدراسية
Courses Description

المستوى الأول

الفصل الدراسي الأول

C.H.	L.	T.	P.	General chemistry I (CHE125)
3	2		2	

The course aims to provide students of the basic concepts in chemical engineering through exploring the feature of and its wide range applications in social industrial environment. The course topics that are covered including: matter and its classification; mass relationships in chemical reactions; properties of gases ,liquids and solids; concepts of thermochemistry; quantum theory and electronic behavior; periodic relationship of elements in the periodic table; intermolecular forces; atomic structure; electrochemistry; chemical safety; water chemistry Students assumed to develop their skills through working in the Lab and weakly requested assignments as well as course project work.

C.H.	L.	T.	P.	لغة انجليزية I (UNI 105)
2	2			

This course is a skill-based course that focuses on elementary skills of listening, speaking, reading and writing. The course is a pre-requisite for the English 102. It develops students' language skills and competencies by exposing them to a variety of short general and academic contexts at the beginner level. In addition, the course builds the students' basic vocabulary and grammar structures that enable them to communicate orally and in writing in limited contexts. Interactive exercises and tasks will be encouraged in order to strengthen students' confidence in using English.

C.H.	L.	T.	P.	الثقافة الإسلامية (UNI101)
2	2			

C.H.	L.	T.	P.	الصراع العربي الإسرائيلي (UNI107)
2	2			

C.H.	L.	T.	P.	مقدمة في الحاسوب (UNI109)
3	2		2	

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The aim of this course is to give student the fundamentals of computer. It focuses on introduction to computer topics with an emphasis on learning about computer, operating systems, application software, Internet, and applying software using MS Office. The course helps student to learn about the importance of computers and how to use computers.

C.H.	L.	T.	P.	رياضيات I (EIT111)
3	2	2		

This course aims to get students acquainted with basic concepts of differential calculus and its various applications in science and engineering. Course topics cover real numbers, inequalities, absolute value, exponential and logarithmic functions, limits and continuity, differentiation rules, derivatives of trigonometric functions and their inverses and the derivatives of exponential and logarithmic functions. The course focuses as well on the applications of differential calculus including: curve sketching, relative and absolute extrema, Rolle's theorem, mean-value theorem, related rates, applied maximum and minimum problems, applications in business and economics., applications of exponential and logarithmic functions.

C.H.	L.	T.	P.	فيزياء هندسية (BIO121)
3	2		2	

Engineering physics is both a foundation and a framework for most of the branches of engineering. The main objective of this course is to provide students with fundamental concepts/theories and skills in physics that offer them a solid base for studying various engineering disciplines. Course topics will include units and dimensions, vectors analysis, linear, curvilinear and rotational motions, Newton's mechanic and it applications, fluids, work-energy principles, wave principles, the properties of matter such as elasticity, viscosity and continuity, heat transfer as well as the essential electrical concepts and laws. The course will include laboratory experiments that emphasize problem-solving, laboratory investigation and applications.

C.H.	L.	T.	P.	الرسم هندسي (CIV125)
3	1		4	

This course introduces students to engineering drawings and the required skills for communicating information through engineering drawings. Students learn the techniques of graphical communication and standard practices of manual technical drawing. Course topics include: geometric construction, methods of projection, free hand sketching, dimensioning and orthogonal projection, missing views, pictorial projection and sectional viewing. In addition, students will be introduced to the use of computer aided drafting tools. They will be taught the basic skills necessary to complete dimensioned drawings in AutoCAD including setting up a drawing, basic lines and coordinates, geometric shapes, layering, editing commands, dimensioning, hatching and plotting to scale.

الفصل الدراسي الثاني

C.H.	L.	T.	P.	الثقافة الوطنية (UNI102)
2	2			

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C.H.	L.	T.	P.	
3	2	2		Chemical Engineering Principles I (CHE130)
<p>The aim of this course is to provide knowledge on the concept and applications of mass balances for chemical engineering processes. Identify unit operations involved in a process, draw process flowcharts, and develop relationships between process variables. Degree-of-freedom analysis to identify the number of unknowns relating to mass, mass flow rate, composition. Topics include an introduction to flow chart for the chemical industry, concepts of recycle, bypass and purge in mass balances for reactive and non-reactive systems.</p>				
C.H.	L.	T.	P.	
2	2			لغة انجليزية II (UNI 106)
<p>This course builds on what students have learned in English 101. It provides more practice and learning experiences for students to develop their elementary skills of listening, speaking, reading and writing. In addition, the course builds the students' ability in the language use through equipping them with a wide range of vocabulary, grammatical structures and expressions relevant to general and academic contexts by exposing them to a variety of short general and academic texts and conversations at the elementary level. More learner-centered activities will be emphasized to enhance students' independent learning.</p>				
C.H.	L.	T.	P.	
2	2			لغة عربية II (UNI 104)
<p>يتناول هذا المقرر مهارات الكتابة الإبداعية والوظيفية بهدف تعميق قدرات الطلاب على الكتابة وطرائق استخدامها في حياتهم العلمية والعملية، من خلال التعليم والتدريب على تجاوز المشكلات الكتابية في بيئة تعمل على تنمية التفكير الناقد وأساليب الإبداع، وما ينبغي أن يتحقق من دقة التعبير الكتابي وأساليبه على المستويين الوظيفي والإبداعي، ويساعد على اكتساب المعرفة وبناء الوعي الثقافي بأهمية الكتابة الصحيحة وتنمية مهاراتها.</p>				
C.H.	L.	T.	P.	
3	2	2		رياضيات II (EIT112)
<p>This course aims to get students acquainted with basic concepts of definite and indefinite integrals and to assist them in using various techniques to evaluate integrals, and realize integration applications in life. Course topics include: integration of elementary functions, definite integrals: sigma notation – fundamental theorem of calculus – properties of definite integrals – the mean value theorem for integrals, integration techniques: integration by parts – integration by partial fractions – trigonometric substitution – integrating power of trigonometric functions, numerical integration: trapezoidal rule and Simpson's rule. In addition, applications of integration in engineering and physics are introduced such as the calculation of: area, volume, arc length, centre of mass, moments, ...etc.</p>				
C.H.	L.	T.	P.	
3	2		2	General Chemistry II (CHE120)
<p>The course aims to provide students of the basic concepts in chemical engineering through exploring the feature of and its wide range applications in social industrial environment. The course topics that are covered including metals</p>				

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and polymers, chemistry of atmosphere; soil chemistry; energy source; Nuclear chemistry; fuel cells; Engineering materials; Fundamentals of crystals structures. Students assumed to develop their skills through working in the lab and weakly requested assignments as well as course project work.

C.H.	L.	T.	P.	Statics and Strength of Materials (CHE122)
3	2		2	

An introduction to the basic static and strength of materials concepts and theorems. It has been designed to provide students with basic knowledge, understanding and skills to analyze and solve engineering design problems. Statics is primarily concerned with the study of forces acting on structural members which are at rest include forces and moments, resultants of force systems, equilibrium of coplanar force systems, centroids, and moments of inertia. Strength of materials primarily deals with analysis of direct stresses and strains, shear stresses and strains, mechanical properties of materials, thermal stresses, torsion, bending stresses, pressure vessels and combined stresses.

C.H.	L.	T.	P.	Computer Programming (C++) (CHE170)
3	2		2	

This course is an introductory course to computer programming using C++. The course aims to provide students of the basic concepts in a structured programming methodology, through exploring the core features of C++ programming language and its wide-range applications in social and industrial environments. The course topics that are covered including: An introduction to problem-solving based on programming, introduction to C++ language & the layout of C++ program, control & repetitive statements, Arrays, and functions. Students assumed to develop their programming skills in C++, through working in computer programming lab and weakly requested assignments, as well as course project work.

المستوى الثاني

الفصل الدراسي الأول

C.H.	L.	T.	P.	Applied Engineering Mathematics (Mathematics III) (MEC223)
3	2	2		

This course aims to introduce students to the main principles of differential equations and integral transformations, as well as their applications in solving mathematical issues in science and engineering. The course covers classification, formation and general and particular solutions of ordinary differential equations, geometric and physical applications, Laplace transform properties and applications; solutions of differential equations using Laplace transform, Fourier series; Fourier transform and Orthogonal Functions. The course focuses on specific applications of differential equations and integral transforms in different engineering problems.

C.H.	L.	T.	P.	لغة عربية II (UNI 104)
2	2			

يتناول هذا المقرر مهارات الكتابة الإبداعية والوظيفية بهدف تعميق قدرات الطلاب على الكتابة وطرائق استخدامها في حياتهم العلمية والعملية، من خلال التعليم والتدريب على تجاوز المشكلات الكتابية في بيئة تعمل على تنمية التفكير الناقد وأساليب الإبداع، وما ينبغي أن

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يتحقق من دقة التعبير الكتابي وأساليبه على المستويين الوظيفي والإبداعي، ويساعد على اكتساب المعرفة وبناء الوعي الثقافي بأهمية الكتابة الصحيحة وتنمية مهاراتها.

C.H.	L.	T.	P.	Organic Chemistry (CHE223)
3	2		2	

This course offers students the opportunity to learn the nature of carbon in organic compounds. It general principles of organic chemistry related to structure, stereochemistry, nomenclature, synthesis, uses, and reactions of alcohols, ethers and aliphatic hydrocarbons; Alkanes, alkynes, alkenes, Cycloalkanes and spectroscopy.

C.H.	L.	T.	P.	Scientific Research Fundamentals (EIT310)
2	2			

The course aims to introduce students to the basic concepts and issues of quantitative and qualitative scientific research. Students will learn the nature and tools of research, the basic components of research process, formulating research questions, research design, elements of analysis research papers, data collection and analysis, conceptualization and measurement, building evidence, research evaluation, documentation and presentation. By the end of the course students submit and present a research course-project on a topic assigned by the course instructor.

C.H.	L.	T.	P.	Physical Chemistry (CHE225)
3	2		2	

This course will introduce the chemical engineering students to the basic concepts of properties of matter, chemical kinetics, orders of reaction rate, chemical equilibrium, methods of expression of KC and KP, phase rule and its application, and Ideal and non-ideal solutions solubility of gases in liquids. Also, the course will provide students with a fundamental grounding in classification, properties and preparation of colloid solutions, study of the surface chemistry, adsorption and types of adsorption, and their characteristics, industrial applications of catalysis, and industrially important compounds. Practical applications accompany the topics of this course.

C.H.	L.	T.	P.	Chemical Engineering Thermodynamics I (CHE233)
3	2	2		

Thermodynamics is an important basic engineering subject where concepts such as systems, boundaries, mass, heat, work and energy are introduced. These concepts are then related using the 1st and 2nd Law of Thermodynamics. In this subject properties of common substances such as water, air and general working fluids are introduced using property tables and basic state equations. These concepts are applied in many engineering equipment, basic refrigeration and power cycles. Such basic concepts are vital because they form the fundamentals for future chemical engineering subjects.

C.H.	L.	T.	P.	Fluid Mechanics for Chemical Engineers (CHE271)
3	2	2		

The course introduces the fundamental principles underlying fluid behavior, hydraulics, hydrodynamics, internal and external flows and its analysis of engineering applications for the design of simple hydraulic components such as pump and turbine. The course covers the physics of fluid, classification of flow, fluid statics, fluid dynamics, the

application of Bernoulli, continuity, and momentum equations, friction flow in pipes includes the use of Moody chart, flow metering, pump, dimensional analysis and similarity.

C.H.	L.	T.	P.	Chemical Engineering Principles I I (CHE231)
3	2	2		

Energy balance for closed and open system and Mechanical energy balance. Use solubility data, miscibility charts, psychrometric charts. Enthalpy and internal energy changes associated with changes in temperature, pressure, mixing, phase change, chemical reaction from appropriate heat capacities, heats of solution, latent heats, and heats of formation or combustion. Balance of non-reactive process and reactive process. Computer-aided energy balance.

الفصل الدراسي الثاني

C.H.	L.	T.	P.	Linear Algebra (Mathematics IV) (MEC224)
3	2	2		

This course aims to introduce students to the main principles of linear algebra and coordinate systems, as well as their applications in solving mathematical problems in science and engineering. The course covers Cartesian, cylindrical and spherical coordinate systems, systems of linear equations; matrices; linear transformations and determinants; eigenvalues; eigenvectors; orthonormal bases; orthogonal matrices and Gram-Schmidt Algorithm. Theoretical class as accompanied with tutorial classes through which application examples of the studied material are provided.

C.H.	L.	T.	P.	Probability & Statistics (EIT210)
3	2	2		

This course aims to provide students with the fundamental knowledge and understanding of the probability theory and statistical analysis. Course topics include types of data, graphs and representation, measures of central tendency and variation, correlation and regression, the principles of probability theory, some types of famous distributions such as Z- distribution, Student t distribution and Chi-Square distribution. In addition, the course focuses on conducting and interpreting statistical experiments using popular statistics packages such as Excel, SAS, SPS or MatLAB.

C.H.	L.	T.	P.	Analytical Chemistry (CHE226)
3	2	1	1	

This course covers an introduction to analytical chemistry, error analysis, analytical quantitative techniques such as volumetric, gravimetric, conductometric measurement methods, and spectrophotometric methods. This course also includes a laboratory experiments that applies the principles and theories of gravimetric, volumetric and spectrometric methods of analysis of different types of samples.

C.H.	L.	T.	P.	الانجليزي التقني (EIT211)
2	2			

This is an English for Specific Purpose (ESP) course for engineering and IT students. The course aimed to give students the specialized technical language, information, and skills needed for their program of study. It presents them with the appropriate English from a variety of technological, engineering and industrial fields. This course also enables students to produce organized reports, formal letters/emails, CVs that conform to technical format/style, audience, vocabulary, grammar and the use of graphics where appropriate.

C.H.	L.	T.	P.	مهارات الاتصال (EIT212)
2	2			

Communication skills are essential to a successful career in Engineering. This communication course for the engineering and it students will enable them to develop the ability to communicate efficiently in English, orally as well as in written, within the field of engineering. Students will also train and develop interpersonal skills such as contributing to discussions, making presentations, reading and synthesizing information, writing reports and working effectively with colleagues and other professionals in the engineering field.

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C.H.	L.	T.	P.	Chemical Engineering Thermodynamics II (CHE232)
3	2	2		
The course aims at covering the basic principles of thermodynamics and the applications of those principles in engineering practice in chemical science. Free energy and chemical potential. Phase equilibrium and properties of solutions. Chemical equilibrium of reactions. Rates of chemical reactions.				
C.H.	L.	T.	P.	Heat Transfer (CHE224)
3	2	2		
The course covers the fundamental concepts of heat transfer; conduction, convection, and radiation. One dimensional conduction heat transfer, forced and natural convection heat transfer. This course also include empirical correlations used to solve heat transfer coefficients for laminar and turbulent forced and free convection, Heat-exchanger types, and Heat- exchanger principles and design.				
C.H.	L.	T.	P.	Industry and Environment (CHE228)
3	2	2		
This course covers introduction to environmental problems and their anthropogenic causes, with emphasis on the causes, effects, and controls of air, water, and land pollution. The political, ecological, economic, ethical, and engineering aspects of environmental pollution and control are discussed. Topics include: water and air pollution, global climate changes, hazardous chemicals, radioactive materials and wastes, and noise pollution and addition to pollution measuring techniques. This will be faculty compulsory courses.				

المستوى الثالث

الفصل الدراسي الأول

C.H.	L.	T.	P.	Petroleum Refinery Engineering I (CHE343)
3	2		2	
This course covers the basic concepts of valuation, characterization and classification of crude petroleum. Physical properties and chemical composition of crude oils. Primary processes, dehydration desalting and de emulsions. Refining techniques, physical separation .Application of chemical engineering to the oil industry. Production details of light, intermediate and heavy cuts using atmospheric, vacuum and steam distillation. Product testing and specifications. Environmental issues.				

C.H.	L.	T.	P.	Chemical Reactions Engineering 1 (CHE333)
3	2	2		
Introduction to reaction engineering. Mole balances, rate Laws and stoichiometry, elementary reaction, steady state & approximation, rate controlling step & analysis of experimental data. Analyze rate of reaction for several types of reaction i.e. parallel, serial & complex reactions. Maximize product selectivity for systems involving multiple reactions.				

C.H.	L.	T.	P.	Numerical Methods for Engineers (CHE377)
3	2		2	
This course introduces the numerical methods and algorithm for solving chemical engineering problems. This course covers the following topics: roots equations, linear equations, curve fitting and interpolation, integration and differentiation methods, and ordinary differential equation solution. All methods are presented within the context of the program engineering problems. This course is very important since it gives alternative solutions for engineering problems where their analytical solutions are very difficult to obtain or do not exist. This course also includes a session of laboratory class.				
C.H.	L.	T.	P.	Technical Reports Writing (CHE373)
2	2			
The intent of this course is to prepare students for the type of professional communication they are likely to engage in during their first jobs after college and beyond. The course will introduce students to various chemical and petroleum industry terms and phrases. The topics covered in this course include researching, organizing, and writing technical reports and proposals; resumes; formal reports; job applications; and business messages. Technical communication and oral presentation Job interview skills will also be covered in this course.				
C.H.	L.	T.	P.	Corrosion Engineering (CHE375)
2	2			
This course covers the basic concepts and principles of corrosion, classification and nature of corrosion processes, thermodynamic and kinetics of corrosion, important process variables in corrosion severity, corrosion in selected environments, corrosion testing and monitoring, corrosion prevention and control. The course provides a basic understanding of the importance of corrosion in industrial settings. This course is program elective course.				
C.H.	L.	T.	P.	Unit Operations (CHE 341)
3	2	2		
This course covers introduction of units and conversions, characterization of particles; filtration, sedimentation, centrifugal separations; thermal operations including evaporation, distillation, drying and crystallization. The course will convey the importance of these areas in unit operations and modern technology, and understand the basic principles governing each area. In the laboratory, the student will develop their abilities to appraise, use and interpret data collected to express mathematically and/or explain the processes phenomena observed				
C.H.	L.	T.	P.	Mass Transfer (CHE 331)
3	2	2		
This course introduces the student to separation processes. It covers the basic principles of mass transfer such as diffusion mass transfer, interphase mass transfer, and mass transfer coefficients. These concepts are then applied to analysis and design the gas absorption and distillation columns.				

الفصل الدراسي الثاني

C.H.	L.	T.	P.	إدارة مشاريع (CIV470)
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برنامج الهندسة الكيميائية

3	2	2		
This course aims to provide students with basic knowledge for managing resources and scheduling, tracking and controlling and completing project within the specific constraints and deadlines. The course will focus on product life cycles, managing, planning, designing and controlling projects, human and logistics resources, systems' maintenance & reliability, industrial safety constraints, tools and techniques of quality cost. Students will develop skills in preparing feasibility studies and identifying elements for a success development of engineering projects.				
C.H.	L.	T.	P.	Petroleum Refinery Engineering I I (CHE 324)
3	2	2		
This course covers the basic concepts of secondary refinery processes . Chemical and thermal conversion processes. Hydrotreatment processes . Catalytic process , cracking , reforming, alkylation and Isomerization, polymerization. Thermo-catalytic process, cracking, vis-breaking and coking, Hydrocracking. Specially operations. Lubricating oil production, Conversion of heavy residues .Traditional and non- traditional asphalt production. Treatment of refinery gas streams. Blending of refinery products. Products testing and quality control.				
C.H.	L.	T.	P.	Process Control & Instrumentation (CHE 346)
3	2	2		
This course covers the basic principles of process control and the instrumentation, mathematical modeling of process control, transfer functions, dynamic behavior of chemical processes, feedback control, dynamic behavior of closed-loop systems, stability analysis, frequency response analysis. Controller design and tuning will also be covered in this course.				
C.H.	L.	T.	P.	Equipment Design (CHE 350)
3	2	2		
The course is cover the selection of materials of construction for process equipment and piping. The selection, specification, and design of the equipment required to carry out the function of these process units (unit operations) are considered in more detail. The transfer of heat to and from process fluids is an essential part of most chemical processes.				
C.H.	L.	T.	P.	Chemical Reactions Engineering II (CHE 334)
3	2	2		
Energy balance for ideal reactors. Non-isothermal reactor design. Multiple steady state and stability of CSTR's. Non-ideal reactors and residence time distribution. Design of heterogeneous reacting systems. Catalysis and catalytic reactors and principles to design slurry and plug flow reactors.				
C.H.	L.	T.	P.	Health & Safety in Chemical Industry (CHE378)
2	2			
Health and safety in chemical industry is applications of process safety and hazards analysis, mitigation, and prevention, with special emphasis on the chemical process industries. Includes source modeling for leakage rates, dispersion analysis, relief valve sizing, industrial hygiene, analysis and design of elements of processes, process equipment associated, fire and explosion, damage analysis, hazards identification, risk analysis, accident investigations, etc.				

C.H.	L.	T.	P.	Separation Processes (CHE 348)
3	2	2		
Introduction to the separation process fundamental involving adsorption processes, humidification operations, measurement of humidity, and membrane separation processes. Design calculations of the processes. Classification of membranes and membrane processes. Membrane resistances and diffusivities. Particle size measurement. Design of equipment involving particulate fluid systems, design of hopper, mixer, cyclone etc. Solids mixing behaviors and methods in overcoming powder segregation.				

المستوى الرابع

الفصل الدراسي الأول

C.H.	L.	T.	P.	Graduation project- I (CHE491)
2			4	
This course aims at enhancing the graduates’ ability to conduct and apply all principals that were studied earlier in the past years in the chemical engineering including filed survey, experimental testing, and designing of projects and systems. To achieve this goal, the graduates are supervised and trained in fields of real chemical engineering projects such as material and energy balance, heat and mass transfer, separation processes, plant design, control operation.				
C.H.	L.	T.	P.	Plant Design (CHE451)
3	2	2		
This course covers of principles of chemical plant design. General plant design considerations: health safety, environmental factors, plant location and plant layout. Chemical engineering drawing using ASPEN HYSYS or ASPEN PLUS or other commercial engineering drawing software. Process flow sheet, process flow diagrams, and piping & instrument diagrams. Economic principles including cost estimation.				
C.H.	L.	T.	P.	Natural Gas Processing (CHE441)
2	2			
This course gives an overview and accurate information of natural gas, characterization and properties of natural gas. Fundamentals of gas processing, the nature of heat and how it implements the process. Gas gathering systems, Gas-oil multistage separation. Gas treatment- Low temperature separation - Gas dehydration – Hydrocarbons recovery. Gas sweetening – Nitrogen removal – Trace-component recovery – Sulfur and carbon dioxide removal. Gas- gas separation. Gas liquefaction. Gas transportation through pipelines, signal-telemetry. Industrial usages. Gas storage.				
C.H.	L.	T.	P.	Advance Separation Processes (CHE461)
2	2			
Introduction to the separation process fundamental. Phase rules and equilibrium concept. Equations involve in unit operations such as distillation, gas absorption and liquid-liquid extraction. Calculation of number of stages and height of column (Single Equilibrium Stages and Flash Calculations ,distillation, and liquid- liquid extraction column).				
C.H.	L.	T.	P.	Chemical Processes Simulation and Economics (CHE463)
3	1		4	
This course introduces the student to principles of chemical processes simulation and cost estimation using chemical engineering ASPEN HYSYS or ASPEN PLUS simulation software package. The course covers principles of chemical process simulation, processes economics including evaluation of fixed and operating costs, depreciation,				

rate of return, discounted cash flow analysis, and profitability analysis. The lab portion of the class provides the students with working experience and applications on computer-aided simulation of chemical-engineering systems for process flow design (steady-state process simulation) and economic analysis.

C.H.	L.	T.	P.	Elective Course 1 (CHE441) Pharmaceutical Industry
3	2	2		

This course illustrates the concepts necessary in the adaptation of engineering principles to pharmaceutical and life sciences-related industries it include definition of Major divisions of pharmacology and the process engineering to produce, develop, and market drugs, and the high throughput characterization and optimization of new pharmaceutical manufacturing systems. It is an elective specify course, for engineers work in biochemistry pharmaceutical industries.

الفصل الدراسي الثاني

C.H.	L.	T.	P.	Graduation project-II (CHE402)
3		3	3	

The aims of this course to provide the student some experience on research in the field of chemical engineering. This course focuses on the graduation project design stages. It enables the students to plan and implement the integrated systems using engineering skills that have been learned during the last years. At the end of this course, students must deliver a project with a major component that has passed through the design, analysis, implementation, testing, and evaluation stages.

C.H.	L.	T.	P.	Petrochemical Engineering (CHE464)
3	2	2		

This course will introduce the chemical engineering students to the sources of petrochemical materials, recent trends in petrochemical industries, the manufacture of unsaturated and saturated petrochemicals of gases, paraffins, olefins and ring compounds. Also, study, polymers and their properties; classification and structure, the polymerization, manufacture and construction of the most important plastics such as rubber, nylon, plastic, polystyrene, polyethylene, polyphenol chloride (PVC). Practical applications accompany the topics of this course.

C.H.	L.	T.	P.	Elective Course 2 (CHE482) Renewable Energy
3	2	2		

Energy and sustainable development, Renewable Energy, Solar, Wind, Hydroelectric Power, Geothermal, Biomass, Ethanol, Ocean Energy. Characterization of biomass, Thermo-chemical conversion Technology involving biomass combustion, biomass gasification, and pyrolysis technology. Biochemical conversion technology-bio-gas. Bio-fuels such as bio-diesel and ethanol production processes.

C.H.	L.	T.	P.	Elective Course 3 (CHE484) Introduction to Biochemical Engineering
3	2	2		

This course illustrates the fundamental of biochemical engineering which involves the application of chemical engineering principles and approaches to biologically – based systems and processes. Thus course also explains the elements of applying microbiology: enzyme and fermentation kinetics, bioreactor design, scale-up and scale-down, downstream processing. It is an elective specify course, for engineers work in biochemistry industries as the food, feed, pharmaceutical, biotechnology, and water treatment industries.

المقررات الاختيارية في البرنامج

الفصل الدراسي الأول

C.H.	L.	T.	P.	Pharmaceutical Process Engineering (ELC481)
3	2	2		
<p>This course illustrates the concepts necessary in the adaptation of engineering principles to pharmaceutical and life sciences-related industries it include definition of Major divisions of pharmacology and the process engineering to produce, develop, and market drugs, and the high throughput characterization and optimization of new pharmaceutical manufacturing systems. It is an elective specify course, for engineers work in biochemistry pharmaceutical industries.</p>				

الفصل الدراسي الثاني

C.H.	L.	T.	P.	Renewable Energy (ELC488)
3	2	2		
Energy and sustainable development, Renewable Energy, Solar, Wind, Hydroelectric Power, Geothermal, Biomass, Ethanol, Ocean Energy. Characterization of biomass, Thermo-chemical conversion Technology involving biomass combustion, biomass gasification, and pyrolysis technology. Biochemical conversion technology-bio-gas. Bio-fuels such as bio-diesel and ethanol production processes.				

C.H.	L.	T.	P.	Introduction to Biochemical Engineering (ELC482)
3	2	2		
This course illustrates the fundamental of biochemical engineering which involves the application of chemical engineering principles and approaches to biologically – based systems and processes. Thus course also explains the elements of applying microbiology: enzyme and fermentation kinetics, bioreactor design, scale-up and scale-down, downstream processing. It is an elective specify course, for engineers work in biochemistry industries as the food, feed, pharmaceutical, biotechnology, and water treatment industries.				