Courses Description (catalog)

Deic 101 – Islamic Creed and Contemporary Doctrines 2(2-0-0)
Course Description (catalog): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

Deic 301 – Contemporary Cultural Issues 2(2-0-0)
Course Description (catalog): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

Deic 317 – Islamic Morals and Ethics 2(2-0-0)
Course Description (catalog): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

Deic 318 – Economic System in Islam 2(2-0-0)
Course Description (catalog): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

Deic 401 – Social System in Islam 2(2-0-0)
Course Description (catalog): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce, …), Family problems and remedies (women's work, alimony, stewardship, …). Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

Deic 418 – Political System & Human Rights in Islam 2(2-0-0)
Course Description (catalog): Political system: definition, characteristics, State building blocks: homeland, society, authority, goals of state, foundations of state, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it. Students are required to memorize part of the holy Quran. Two 1-hour lectures per week.

Math 144 – Calculus I 4(4-0-0)
Course Description (catalog): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four 1-hour lectures per week

Math 145 – Calculus II 4(4-0-0)
Course Description (catalog): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. Four 1-hour lectures per week.

Math 240 – Differential Equations 3(3-0-0)
Course Description (catalog): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three 1-hour lectures per week.

Math 244 – Multivariate Calculus 3(3-0-0)
Course Description (catalog): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. Three 1-hour lectures per week.

Phys 140 – General Physics I 3(3-0-0)
Course Description (catalog): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three 1-hour lectures per week.

Phys 141 – General Physics II 3(3-0-0)
Course Description (catalog): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three 1-hour lectures per week.

Phys 144 – General Physics I Lab. 1(0-0-3)
Course Description (catalog): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. 3 hours Lab per week.

Phys 145 – General Physics II Lab. 1(0-0-3)
Course Description (catalog): This course introduces students to the basic electrical measurements techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught. 3 hours lab per week.

Chem 140 – General Chemistry I 3(3-0-0)
Course Description (catalog): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids. Three 1-hour lectures per week.

Chem 142 – General Chemistry II 3(3-0-0)
Course Description (catalog): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. Three 1-hour lectures per week.

Chem 143 – General Chemistry Lab.   1(0-0-3)
Course Description (catalog): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, Le Chatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid (Ka), principle involved in complexometric titrations, hardness of water and its determination. Co-requisite(s): Chem 142. 3 hours Lab per week.

Chem 242 – Physical Chemistry   3(3-0-0)
Course Description (catalog): Molecular kinetic theory of gases, First law of thermodynamics, Thermo chemistry, Second and third laws of thermodynamics, Free energies, Phases and solutions, Phase Equilibrium, Chemical equilibrium, Surface Chemistry. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Chem 243 – Organic Chemistry   3(3-0-0)
Course Description (catalog): Introduction, nomenclature of organic compounds, chemical bonding, isomers, aromatic and aliphatic hydrocarbons, olefins, acetylenes, cycloalkanes, stereoisomers, halogenated organic compounds, reactions of free radicals, alcohols, ethers, epoxides, thiols, sulfides, synthetic polymers. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Bio 140 –Biology   3(3-0-0)
Course Description (catalog): The course is designed to enhance students' knowledge to understand basic biological processes including the followings: The energy in the cellular work, Cellular respiration, Photosynthesis, Cell reproduction, various pattern of inheritance, DNA replication, Gene Regulation, DNA Technology and Evolution. Three 1-hour lectures per week.

CS 204 – Engineering Programming   3(3-0-0)
Course Description (catalog): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators and arrays in classes; recursive functions. Three lectures per week. Projects that will require lab work will be assigned weekly. Three 1-hour lectures per week. Prerequisite(s): Math 144.

Mgt 292 – Management Fundamentals & Skill   3(3-0-0)
Course Description (catalog):   The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behaviour - Communication . Three 1-hour lectures per week.

Eng 133 – English Composition I   2(2-0-0)
Course Description (catalog): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized, and include a topic sentence with a controlling idea, supporting details, and a conclusion. Students write multi-draft compositions for a variety of practical and academic purposes. Students improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. Two 1-hour lectures per week. Prerequisite(s): English course offered by Preparatory-year Deanship.

Eng 134 – English Composition II   2(2-0-0)
Course Description (catalog): This course develops writing skills from the paragraph level to the level of the essay. It concentrates on the essential form and function of the writing unit (paragraph or essay) in order to prepare the ground for the academic essay. Specific types of composition are practiced: chronological, cause-effect, comparison/contrast and argumentation. In addition, work on paraphrase and summarizing is undertaken, along with back-up work in some specific structure areas. Two 1-hour lectures per week.

Eng 137 – Technical Writing   2(2-0-0)
Course Description (catalog): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two 1-hour lectures per week. Prerequisite(s): Eng 134.

Eng 138 – Fundamentals of Speech Communication   2(2-0-0)
Course Description (catalog): A study of communication theories as applied to speech; practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. Two 1-hour lectures per week. Co-requisite(s): Eng 134.

Engr 100 – Introduction to Engineering   1(1-0-0)
Course Description (catalog): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One hour lecture per week.

Engr 105 – Engineering Computing & Skills   2(2-0-0)
Course Description (catalog): Problem solving skills and computing using Matlab. Two 1-hour lectures per week. Co-requisite(s): Math 145.

Engr 106 – Engineering Graphics   2(1-0-3)
Course Description (catalog): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting with engineering applications using 2-D drawing. This course is divided in to two sections: drafting (sketching) and CAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is a drawing software package used to create two dimensional engineering drawings. 4 hours per week.

Engr 206 – Electric Circuits   3(3-0-0)
Course Description (catalog): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. Three 1-hour lectures per week. Prerequisite(s): Phys 141.

Engr 310 – Numerical Methods   3(3-0-0)
Course Description (catalog): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. Three 1-hour lectures per week. Prerequisite(s): Math 240 & CS 204.

ChE 201 – Principles of Chemical Engineering   3(3-0-0)
Course Description (catalog): Use of basic mathematical concepts, physical laws, stoichiometry, and the thermodynamic properties of matter to obtain material and energy balances for steady and unsteady state systems including those with chemical reaction. Three 1-hour lectures per week. Prerequisite(s): Phys 140.

ChE 203 – Chemical Engineering Thermodynamics I   3(3-0-0)
Course Description (catalog): The course is intended to cover the following subjects: thermodynamics concepts and definitions (states, properties, systems, control volume, processes, cycles, units, tables of properties), work and heat, first law, internal energy and enthalpy, conservation of mass, steady–state and uniform state processes, second law, reversible processes, entropy, Clausius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

ChE 204 – Process Fluid Mechanics   3(3-0-0)
Course Description (catalog): The course is intended to cover fluid statics, continuity equation, Bernoulli's equation, flow measuring devices, fluid friction of flowing systems, momentum balance, pump types and pump performance curves. Three 1-hour lectures per week. Prerequisite(s): ChE 201. Co-requisite(s): Math 240.

Engr 205 – Material Science 3(3-0-0)
Course Description (catalog): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials; phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely used engineering metals, alloys, polymers, composites & ceramics. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Engr 223 – Engineering Mechanics 3(3-0-0)
Course Description (catalog): Engineering Mechanics, covering both statics and dynamics. Topics include vector algebra, force systems, free-body diagrams, equilibrium of particles and rigid bodies, kinematics of particles and rigid bodies, Newton's laws applied to particles and rigid bodies, friction. Three 1-hour lectures per week. Prerequisite(s): Math 145 & Phys 140.

ChE 301 – Chemical Engineering Thermodynamics II 3(3-0-0)
Course Description (catalog): Properties of ideal and non-ideal vapors and liquids, ideal and non-ideal vapor-liquid equilibria, ideal and non-ideal liquid-liquid equilibria, equilibria of chemical reaction systems, electrolytic solutions, surface thermodynamics, solid phase thermodynamics. Three 1-hour lectures per week. Prerequisite(s): ChE 203.

ChE 302 – Process Heat Transfer 3(3-0-0)
Course Description (catalog): The course is intended to cover the modes of heat transfer, steady-state heat conduction, unsteady-state heat conduction, principles of convection, natural and forced convection, radiation heat transfer, boiling and condensation and design of heat exchangers and heat transfer equipments. Three 1-hour lectures per week. Prerequisite(s): ChE 204.

ChE 303 – Separation Processes I 3(3-0-0)
Course Description (catalog): The course is intended to cover analysis and design of unit operations involving: particulate solids handling and storage, screening and classification, size reduction processes, filtration, settling, centrifugation and fluidization. Three 1-hour lectures per week. Prerequisite(s): ChE 204.

ChE 304 – Reaction Engineering 3(3-0-0)
Course Description (catalog): Rate laws and stoichiometry, kinetics and mechanisms of homogeneous and heterogeneous reactions, analysis of kinetics data, design of ideal isothermal and nonisothermal reactors. Three 1-hour lectures per week. Prerequisite(s): ChE 301.

ChE 305 – Chemical Process Industries 3(3-0-0)
Course Description (catalog): Fundamentals of chemical industries. Water treatment, industrial gases; inorganic acids, petroleum and petrochemicals, ceramic, cement and glass industries; fertilizers industries, oil and fat, soap and detergents; pigments and surface coating industries. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 306 – Chemical Process lab I 1(0-0-3)
Course Description (catalog): Experiments selected from fluid mechanics, heat transfer and separation processes I courses. Three hours Lab. per week. Prerequisite(s): ChE 303 & ChE 302.

ChE 307 – Biochemical Engineering 3(3-0-0)
Course Description (catalog): Introduction of chemical engineers to the basic concepts of biochemical engineering; application of chemical engineering skills to the analysis, design, and mitigation of hazards of biologically based processes; kinetics, heat and mass transfer, and thermodynamics as they apply to enzyme catalysis, microbial growth, bioreactor design, and product recovery and safety. Three 1-hour lectures per week. Prerequisite(s): Bio 140. Co-requisite(s): ChE 304.

Engr 307 – Engineering Economics 3(3-0-0)
Course Description (catalog): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three 1-hour lectures per week. Prerequisite(s): Engr 100.

ChE 308 – Mass Transfer 3(3-0-0)
Course Description (catalog): The course is intended to cover the following subjects: Molecular Diffusion, Unsteady State Mass Transfer, Mass Transfer Coefficients, Mass Transfer across interfaces, Analogy between momentum, heat and mass transfer, Mass transfer between phases, Membrane Separation. Three 1-hour lectures per week. Prerequisite(s): ChE 302.

ChE 401 – Separation Processes II 3(3-0-0)
Course Description (catalog): The course is intended to cover the fundamentals and the design-related issues of the following separation techniques: Absorption, Binary and Multi-component distillation, Liquid-liquid Extraction, and Leaching. Three 1-hour lectures per week. Prerequisite(s): ChE 308.

ChE 402 – Plant Design 3(3-0-0)
Course Description (catalog): Design of chemical processes including process flow sheet preparation, equipment selection and design, materials of construction and corrosion, utilities, plant location and plant layout, process economics, profitability analysis, optimum operating conditions, computer aided design, design optimization, health, safety and environment aspects. Three 1-hour lectures per week. Prerequisite(s): Engr 307 & ChE 308. Co-requisite(s): ChE 401 & ChE 410.

ChE 403 – Separation Processes III 3(3-0-0)
Course Description (catalog): Evaporation, Humidification and Dehumidification, Drying, Adsorption, Crystallization. Three 1-hour lectures per week. Prerequisite(s): ChE 401.

ChE 404 – Process Dynamics & Control 3(3-0-0)
Course Description (catalog): Introduction to control systems, modeling of steady and unsteady-state behavior of chemical processes, transfer functions, dynamic behavior of first and second order systems, basic components of control systems, design and analysis of feedback control systems related to chemical engineering processes. Three 1-hour lectures per week. Prerequisite(s): Math 240 & ChE 304.

ChE 405 – Chemical Engineering Lab. II 1(0-0-3)
Course Description (catalog): Experiments selected from reaction engineering and thermodynamics courses. Three hours lab per week. Prerequisite(s): ChE 301 & ChE 304.

ChE 406 – Chemical Engineering Lab. III 1(0-0-3)
Course Description (catalog): Selected experiments from separation processes II, separation processes III and process dynamics and control courses. Three hours lab per week. Co-requisite(s): ChE 403 & ChE 404.

ChE 410 – Computer Aided Process Design Lab. 1(0-0-3)
Course Description (catalog): Usage of commercial process simulation packages; Aspen One TM, CHEM CAD, SuperPro or others in Process flow sheet simulation, Properties estimation, Equipment sizing, Process optimization, Process synthesis. Three 1-hour lectures per week. Co-requisite(s): ChE 402.

ChE 430 – Polymer Engineering 3(3-0-0)
Course Description (catalog): The course is intended to cover: Definition of polymers, Classification of polymers, Effect of chemical structure on polymer properties, Microstructure of polymers: crystallinity, orientation, molecular conformation, Relation between microstructure and physical properties of polymers, Polymerization methods, Polymerization techniques, Molecular weight characterization, Polymer processing: Extrusion, Injection molding, Blaw molding, Thermoforming, film blowing. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 432 – Petroleum Refining Engineering 3(3-0-0)
Course Description (catalog): Origin, occurrence and constituents of petroleum,. Crude oil analysis. Petroleum products and their uses. Crude oil distillation. Chemical reactions and refinery operations of delayed coking, catalytic reforming and isomerization, catalytic cracking, hydrorteating, catalytic hydrocracking, alkylation. Product blending and production of lubricating oil. Asphalt technology. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 495 – Senior Design I 2(2-0-0)
Course Description (catalog): This is the first course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of chemical component/system design from concept through final design and implementation. Emphasis on teamwork, project management, testing through simulation or prototype, oral and written communications. Two 1-hour lectures per week. Prerequisite(s): Senior Standing. Co-requisite(s): ChE 402.

ChE 496 – Senior Design II 2(2-0-0)
Course Description (catalog): This is the second course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of a chemical component/system design from concept through final design and implementation. Emphasis is on teamwork, project management, testing through simulation, oral and written communications. Three 1-hour lectures per week. Prerequisite(s): ChE 495.

ChE 407 – Chemical Engineering Optimization   3(3-0-0)
Course Description (catalog): The course is intended to cover: Survey of continuous optimization problems. Structure and formulation of optimization problems in chemical engineering. Unconstrained optimization problems. Linear programming. Introduction to constrained optimization. Solution of constrained optimization problems. Selected applications in chemical engineering. Software packages in optimization. Three 1-hour lectures per week. Prerequisite(s): Engr 310.

ChE 420 – Experimental Design and Data Analysis   3(3-0-0)
Course Description (catalog): The course is intended to cover: Review of Statistical distributions, Simple comparative experiments, Experiments with a single factor, Analysis of variance, Randomized blocks, Latin squares and related designs, Incomplete block designs, Factorial designs, Two-level fraction factorial designs, Multi-factor experiment and nested designs. Three 1-hour lectures per week. Prerequisite(s): Engr 310.

ChE 421 – Corrosion Engineering   3(3-0-0)
Course Description (catalog): The course is intended to cover: Electrochemical and metallurgical aspects of corrosion, Forms of corrosion, Modern theory of corrosion and its application, Iron and steel corrosion, Corrosion prevention, Case studies. Three 1-hour lectures per week. Prerequisite(s): Engr 205.

ChE 431 – Natural Gas Engineering   3(3-0-0)
Course Description (catalog): Current and prospective energy situation, sources of natural gas, characterization of natural gas. exploration and production of natural gas. This course will cover the design and operations of systems related to the hydrocarbon gases and liquids for industrial and commercial applications. Unit operations of gas processing including compression, transportation, acid gas removal, gas liquefaction, cryogenic distillation. The concentration of their components by absorption and fractionalization procedures. Gas processing products and economics, conversion of natural gas. Use of computer aided design and economic evaluation of natural gas equipment and facility designs. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 433 – Petrochemical Industries   3(3-0-0)
Course Description (catalog): Physical and chemical properties of raw materials, Processes used in the manufacture of petroleum-based chemicals; application of scientific and engineering principles involved in the production of hydrogen, alcohols, olefins. aromatics, aldehydes, ketones, acids, rubber, and other polymers. Three lectures per week. Prerequisite(s): ChE 305.

ChE 441 – Intro. to Environmental Engineering   3(3 -0-0)
Course Description (catalog): The course covers the following topics: Concepts and terminology. Sources and impacts of water pollutants. Conventional water and wastewater treatment processes. Sources and impacts of air pollutants. Air pollution control through gas cleaning devices. Solid waste classification, handling and ultimate disposal. Three 1-hour lectures per week. Prerequisite(s): ChE 303.

ChE 442 – Industrial Water Treatment   3(3-0-0)
Course Description (catalog): Water Sources, Impurities and Chemistry. External Treatment. Boiler Water Systems. Cooling Water Systems. Pretreatment of Cooling Water Systems. Control of corrosion, deposits and scale. Three 1-hour lectures per week. Prerequisite(s): ChE 305.

ChE 443 – Industrial Wastewater Treatment   3(3-0-0)
Course Description (catalog): Sources, characteristics and treatment techniques for wastewater generated from various industrial categories. Three 1-hour lectures per week. Prerequisite(s): ChE 303.
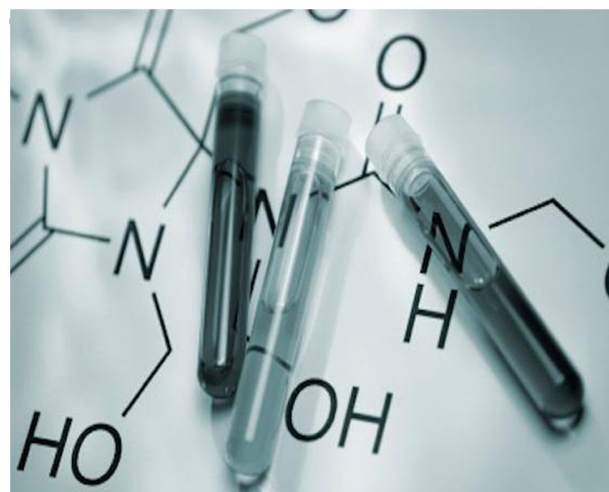
ChE 444 – Water Desalination   3(3-0-0)
Course Description (catalog): Water sources and characterization, Water chemistry, Water Treatment Processes. Scale Formation problems and pretreatment requirements. Desalination Processes: Thermal Desalination Processes, Membrane Processes. Post treatment of product water. Three 1-hour lectures per week. Prerequisite(s): ChE 305.

ChE 452 – Air Pollution and Control   3(3-0-0)
Course Description (catalog): Students will learn about the economic, social and health implications of air pollution. Several examples of air pollution will be presented and discussed. Students in this course will learn about the methods of air pollution control and the design techniques used to create these technologies. Students will learn the sources, types and characteristics of air pollution. Students will demonstrate knowledge of air quality standards and other legislation containing air pollution. After completing this course, students should be able to identify the common types of air pollution, the main environmental regulations for air pollution, and the engineering alternatives for the control of air pollution. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 481 – Undergraduate Research I   3(3-0-0)
Course Description (catalog): This course is designed to enhance an undergraduate curriculum in chemical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. Three 1-hour lectures per week. Prerequisite(s): None, but student's project may have specific pre-requisites that student's research advisor should identify before student enrolls in this class.

ChE 483 – Special Topics I   3(3-0-0)
Course Description (catalog): The course covers special topics in an area of chemical engineering. Given on demand. Three 1-hour lectures per week

Engr 399 – Engineering Training   (0 credits)
Course Description (catalog): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Prerequisite(s): Department Approval.

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