CHE - CHEMICAL ENGINEERING (CHE)

CHE 2113 Applied Chemistry (2-2-3)
Covers quantitative and qualitative aspects of chemical principles, such as gas behavior, thermochemistry, chemical equilibrium, solutions, and electrochemistry. Includes laboratory experiments that reinforce theoretical principles.
Prerequisites: CHM 1103

CHE 2123 Analytical Chemistry (2-2-3)
Provides an introduction to the chemical characterization of samples by both qualitative and quantitative methods. Covers key concepts of data handling and sampling techniques, pH/pOH equilibrium and stoichiometric calculations, titrimetric methods, spectroscopy and chromatography. Special emphasis is placed on performing industry relevant experiments on modern analytical instruments.
Prerequisites: CHM 1103

CHE 2133 Organic Chemistry (2-2-3)
Covers the fundamental principles of organic chemistry including nomenclature, structure and properties of organic molecules, isomerism, reactions and mechanisms. Includes laboratory experiments that reinforce fundamental principles of organic chemistry including synthesis of simple organic compounds methods for the purification and identification of organic compounds.
Prerequisites: CHM 1103

CHE 2202 Chemical Engineering Principles I (2-1-2)
Develops an understanding of, and the necessary skills in, techniques of basic calculations covering essential chemical engineering principles and their applications in industry.
Prerequisites: CHM 1103

CHE 2213 Chemical Engineering Principles II (3-1-3)
Develops an understanding of fundamental chemical engineering principles and their applications. Material and energy balances calculation for non-reactive and chemically reactive systems used in industrial processes are performed.
Prerequisites: CHE 2202, MTH 1203

CHE 2253 Materials and Corrosion (2-2-3)
Introduces the corrosion behaviour of metals and alloys, properties of metallic and non-metallic materials, corrosion types, and corrosion mechanisms. Includes laboratory experiments to reinforce theoretical concepts.
Prerequisites: CHM 1103, PHY 1203
Corequisites: CHE 2113

CHE 2413 Oil and Gas Processing Technologies (2-2-3)
Explains the basics of oil and gas industry, main products, related production processes, use of natural gas, upstream processing of natural gas, and reforming of the components into alkenes. Emphasis is on types of feedstock's, reactions and uses of end products. Performs laboratory experiments of oil and gas samples using standard analysis methods.
Prerequisites: CHM 1103, CHE 2113
Corequisites: CHE 2133

CHE 2422 Petroleum Chemistry Testing (1-2-2)
Provides an introduction to atmospheric and vacuum distillations. Performs laboratory experiments of crude oil sample analysis using standard methods. ASTM methods are used for the analysis of physical and chemical properties of petroleum and gas products.
Prerequisites: CHM 1103, (CHE 2113
Corequisites: CHE 2133

CHE 2453 Fluid Mechanics (2-2-3)
Applies fluid mechanics principles of energy balance, determination of flow regimes, compressible flow, and fluid measurement mechanisms to solve real life problems. Demonstrates metering and pumping of fluids and relevant application to the chemical and petrochemical industries.
Prerequisites: PHY 1103

CHE 2903 Sophomore Design Project (2-2-3)
Requires the formation of a team to propose, plan and design an open-ended process design project. The student team is totally responsible for the completion of the project milestones and course objectives while working under the mentorship of a faculty or industry engineer. The team is evaluated on its ability to coordinate efforts to propose the process design criteria, components, resources, implementation schedule, and estimated cost. Also covers health, safety and environmental aspects related to process plants.
Prerequisites: CHE 2123
Corequisites: CHE 2213

CHE 3313 Chemical Engineering Thermodynamics (2-2-3)
Describes thermodynamic properties of pure substances, properties and the equations-of-state of ideal and real gases to solve thermodynamic problems. Discusses the laws of thermodynamics and chemical thermodynamic principles. Presents a typical thermodynamic cycle on a T-S diagram and calculates the performance of a steam power plant. Includes laboratory experiments to reinforce theoretical concepts.
Prerequisites: CHE 2213, PHY 1103

CHE 3323 Mass Transfer (2-2-3)
Covers the mass transfer operations with the fundamental theories related to industrial applications. Emphasis is made on mass transfer basic operations & laws, equilibrium stage operations, diffusion, gas absorption in packed towers and distillation. Laboratory exercises are performed to illustrate the theory and concepts.
Prerequisites: CHE 3313

CHE 3403 Chemical Heat Transfer (2-2-3)
Covers heat transfer, one of the core subjects in chemical engineering. The principles of heat transfer in solids (heat conduction), forced and natural convection, and radiation are thoroughly covered. Emphasis is placed on problems solving techniques related to heat flow and heat exchangers design. A description of evaporators, furnaces, and boilers, is also included. A series of experiments are designed to reinforce the principles and develop skills for operating heat transfer equipment.
Prerequisites: CHE 2213, CHE 2453

CHE 3413 Unit Operation 1 (2-2-3)
Covers the fundamentals of separation processes used in chemical industries, such as filtration, evaporation, drying, liquid - liquid extraction and multi-component distillation. The concept of fluidisation, size reduction processes and flow through packed beds are also discussed. Laboratory experiments are performed to reinforce theoretical concepts.
Prerequisites: CHE 3403, CHE 3313
Corequisites: CHE 3323

CHE 3513 Equipment and Plant Design (3-1-3)
Provides knowledge of equipment design for chemical processes. Covers the overall procedure of designing a chemical process for various unit operations. It introduces the students to the detailed procedures of equipment design found in most gas and petroleum plants. Special emphasis is also made on mechanical design of the selected equipment.
Prerequisites: CHE 3403, CHE 3323, CHE 3413

CHE 3613 Chemical Reaction Engineering (2-2-3)
Describes the kinetics of chemical reactions and the design and operation of elementary chemical reactors. Details the principles of the kinetics of homogeneous gas and liquid phase reactions and describes the complex kinetic concepts related to chain reactions, and heterogeneous catalysis. Includes laboratory experiments to reinforce the principles of reaction kinetics.
Prerequisites: CHE 3313, MTH 2503
Corequisites: CHE 3323

CHE 4293 Production Engineering (Offshore) (2-2-3)
Describes the gas-oil-water separation techniques and equipment. Differentiate between onshore and offshore oil production facilities together with knowledge of Floating Production Storage and Offloading (FPSO) vessels and use of mooring systems.
Prerequisites: CHE 2413

CHE 4403 Gas Processing (2-2-3)
Covers the fundamentals of the gas processing operations in the petroleum industry. Discusses methods of hydrocarbon exploration and the conditions required for the formation and accumulation of hydrocarbon reserves. An overview of gas processing from exploration up to final production and transportation as well as gas properties calculations is also included. Focuses on the principles of NGL extraction, LPG fractionation and LNG production. Includes some design aspects of major process units.
Prerequisites: CHE 3323, CHE 3413, CHE 3513

CHE 4413 Chemical Process HAZOP and Risk Analysis (3-1-3)
Learns specific approaches and techniques to analyse, assess and manage hazards and risks in chemical process industries. Includes HAZOP and semi-quantitative studies for hazard identification and risk analysis. Gains knowledge on chemical process safety involving accident sequences, methods to eliminate sequence steps and examine statistics to characterise accidents. Reinforces the knowledge through case studies.
Prerequisites: (LSM 1113 or MTH 1113), CHE 3413

CHE 4423 Optimisation and Application in Refinery (2-2-3)
Introduces optimisation principles and linear programming techniques, which serve as a general guide for problem solving in design and operation. Focuses on model development and applications to solve a wide range of process engineering problems using spreadsheet software (Excel or Mathcad). It also introduces the use of commercial software, which is extensively used in the oil, gas and petrochemical industries.
Prerequisites: MTH 2503, CHE 3413

CHE 4433 Petroleum and Petrochemical Processing (2-2-3)
Covers the essential processing operations in a refinery where crude oil is converted into lighter fuels. Discusses the properties of fuels such as motor gasoline, diesel, jet fuel and heating oils. The production, chemistry and marketing aspects of some important petrochemicals are also covered. The theory is supported by several laboratory experiments.
Prerequisites: CHE 2133, CHE 3413, CHE 3613

CHE 4443 Industrial Water and Effluent Treatment (2-2-3)
Covers knowledge on the water quality requirements for industrial use and wastewater quality discharge regulatory norms. Introduces the specific unit operation and unit processes used in industrial water and wastewater treatment including scientific engineering principles on which they are based. Basic concepts of reduce, reuse, recycle of water and wastewater are included. Improves analytical skills through laboratory analysis of water and wastewater samples. Reinforces the knowledge through case studies.
Prerequisites: CHE 2123, CHE 3413

CHE 4613 Chemical Engineering Modelling and Simulation (2-2-3)
Covers simulation of real chemical processes via harnessing the powerful features of chemical engineering packages being applied to modelling, simulation, optimisation, sensitivity analysis, and design.
Prerequisites: CHE 3323, CHE 3403

CHE 4623 Chemical Process Control (2-2-3)
Covers the theory and practical aspects of chemical process control including the development of outline control schemes and troubleshooting base on control related problems. Conventional control methods as well as computer process control are discussed and laboratory sessions will emphasize the basic principles. Examines the role and importance of process control systems and the dynamic behavior of the process. Learns and applies the concept of P, PI and PIP controllers.
Prerequisites: MTH 2503, ELE 2153

CHE 4863 Special Topics in Chemical Engineering (3-1-3)
Presents a theoretical or practical topic proposed by the faculty beyond what is offered in existing courses. Can be repeated for credit.

CHE 4893 Directed Study (3-1-3)
Provides an opportunity to investigate under faculty supervision beyond what is offered in existing courses.

CHE 4902 Capstone Design Project I (1-3-2)
Requires the formation of a team to propose, plan and design a process engineering project. The student team is totally responsible for the completion of the project milestones and course objectives while working under the mentorship of a faculty or industry engineer. The team is evaluated on its ability to coordinate efforts to propose the project design criteria, components, resources, implementation schedule, and estimated cost.
Prerequisites: CHE 3323, CHE 3413, CHE 3613

CHE 4912 Capstone Design Project II (1-3-2)
Consists of the implementation, evaluation, and analysis of the process engineering design project carried forward from the previous semester. Though guided by faculty, the student team is primarily responsible for the completion of the project milestones and course objectives. The course requires the integration and application of technological, organisational, communication, and interpersonal skills by the student team. Accurate analysis, implementation, documentation, and presentation skills form the basis for assessment.
Prerequisites: CHE 4902, CHE 3513, CHE 4613