B.Eng. (Chemical and Biomolecular Engineering)

Description of courses

Year 1 courses

CH1101 Mathematics 1 (3 AU)

CH1104 Materials & Energy Balances (3 AU)
This course introduces material and energy balance concepts, calculations and problem solving skills. Material balance for single and multi-component systems. Energy balance on non-reactive/reactive/transient processes. Computer-aided mass & energy balance calculations.

CH1105 Materials Science (3 AU)

CH1106 Mathematics for Engineers A (3 AU)

CH1107 Mathematics for Engineers B (3 AU)

CH1111 Introduction to Programming (1 AU)

CH1120 Physical Chemistry (2 AU)

CH1131 Bimolecular Engineering I (3 AU)
The course will cover the basic and functional aspects of cellular systems. Analysis of components and their functionality in cellular systems is included in this course. Students will also be exposed to aspects of biotechnology, genetic and metabolic engineering which play an increasingly important role in the new era of chemical engineering.

CH2102 Organic Chemistry & Spectrophotometry (4 AU)
This course introduces organic chemistry and spectroscopy at a more intermediate level. Study main organic reactions. Mechanism of organic transformations. Spectroscopy of organic compounds.

CH2108 Thermodynamics (3 AU)
This course introduces the different energy forms, thermodynamic properties, and their relationships in terms of concepts and applications in close and open systems. Homo-and heterogeneous phases are also considered with single or multiple component systems. In particular, the laws of thermodynamics are applied to solve abstract and real-life problems.

CH1801 Chemical & Biomolecular Engineering Laboratory 1 (1 AU)
Laboratory experiments and projects to provide practical application and understanding of theories relating to chemical engineering, physical and analytical chemistry, biomolecular engineering, materials science.

CH1802 Chemical & Biomolecular Engineering Laboratory 2 (1 AU)
Laboratory experiments and projects to provide practical application and understanding of theories relating to chemical engineering, physical and analytical chemistry, biomolecular engineering, materials science.

HW0110 Effective Communication (2 AU)
The communication process. Intrapersonal and interpersonal communication. Oral and written communication.
Year 2 courses

CH2103 Fluid Systems (4 AU)
This course introduces fluid behaviours in various systems relevant to industrial practice. Mass, energy and momentum balances related to fluid flows. Fluid flow in pipes. Dimensional analysis, Pump and compressors. Differential equations of fluid mechanics.

CH2104 Heat & Mass Transfer in Chemical & Biological Systems (4 AU)
This course introduces fundamentals of heat and mass transfer. Heat transfer by conduction, convection and radiation. Mass transfer mechanisms. Convective mass transfer. Interface mass transfer.

CH2105 Biomolecular Engineering II (3 AU)
The course will cover the basic and functional aspects of biochemical reactions in the cellular systems. Analysis of components and their functionality in cellular systems is included in this course. Students will also be exposed to aspects of biochemical engineering, and metabolic engineering which play an increasingly important role in the new era of chemical engineering.

CH2107 Computational Methods in Chemical Engineering (3 AU)
Introduction to solving mathematical problems via numerical methods. Introduction to computation algorithms and application of the programming packages. Matrix algebra, linear algebraic equations, eigenvalues and eigenvectors, non-linear polynomial equations, function approximation, numerical integration and differentiation, ordinary differential equations, and partial differential equations.

CH2140 Principles of Separation Processes (4 AU)
This course will introduce the principles of separation processes. Particular emphasis will be placed on how thermodynamics and kinetics affect separation processes and how to exploit differences in physical properties to separate constituents of a mixture. The course will focus mainly on classical equilibrium staged separations such as distillation, gas-liquid absorption and liquid-liquid extraction. Introduction will be provided to more advanced processes such as membranes and adsorption.

CH2801 Chemical & Biomolecular Engineering Laboratory 3 (2 AU)
Laboratory experiments and projects to provide practical application and understanding of theories relating to chemical and biomolecular engineering.

CH2802 Chemical & Biomolecular Engineering Laboratory 4 (2 AU)
Laboratory experiments and projects to provide practical application and understanding of theories relating to chemical and biomolecular engineering.

HW0210 Technical Communication (2 AU)
Year 3 courses

**CH3101 Chemical & Biomedical Process Control & Dynamics (4 AU)**
This course introduces the basics of process dynamics and control. Development of linear dynamic models using conservation laws and experimental data. Analysis of dynamic response of process systems modelled using transfer functions. Open and closed-loop stability analysis. Design and analysis of proportional-integral-derivative (PID) controllers. Design of advanced controllers like feedforward and cascade controllers.

**CH3004 Biochemical Engineering (4 AU)**

**CH3141 Particle Technology and Separation Processes (3 AU)**
This course introduces general principles of separation processes and their applications, including recovery of products from pharma- & bio- processes. Particulate technology. Filtration. Crystallization. Drying.

**CH3802 Chemical & Biomolecular Engineering Laboratory 5 (3 AU)**
Laboratory experiments and projects to provide practical application and understanding of theories relating to chemical and biomolecular engineering.

**CH4901 Engineers & Society (3 AU)**

**HW0310 Professional Communication (2 AU)**
Year 4 courses

CH4101 Chemical, Biological & Plant Safety (2 AU)

CH4801 Final Year Design Project (8 AU)
This is the capstone course which utilizes the fundamentals of chemical engineering (material balances, energy balances, transport phenomena, thermodynamics, kinetics, separations, unit operations, and safety) in the design and operation of chemical plants. This course will enable students to undertake and manage projects as a team to its successful completion and to write good technical reports.

CH4903 Environmental Sustainability (3 AU)