



Bachelor Of Engineering (Chemical)

Chemical engineering is a field that is expanding widely through out the world. The expertise is greatly needed to fulfil the demand for carrying the task that cannot be performed by the mechanical engineers and chemists. This fields has matured and currently covers many aspects of engineering such as systems design and processing of agricultural products, petroleum and petrochemicals, polymers, pharmaceuticals, bio-fuel, biochemical and many more. In the current state of the world, where resources are limited and sustainable development is a major challenge, the requirement for expertise in chemical engineering is even more crucial.

In addition to fundamental fields such as science and mathematics, humanities and social sciences and basic engineering, there are four major areas in the Bachelor of Chemical Engineering course, These are separation technology, reaction engineering, environmental engineering and process systems engineering.

In separation technology, student are exposed to processes and unit operation equipment in chemical engineering. To understand separation processes. a strong grasp on transport phenomena, which include momentum transfer, mass and heat transfer, is necessary. Mass and heat transfer theories are essential in designing or choosing a suitable heat exchanger to be utilized in a chemical plant. Meanwhile, the unit operation subject covers theories and design of major equipment in the separation of liquid-liquid, gas-liquid, solid-liquid and solid-gas system. Among the equipment are distillation, evaporation, drying, absorption, leaching and other separation techniques such as membrane technology and filtration. Knowledge in separation theory and unit operations is necessary in designing an optimum and safe plant.

Chemical engineering also focuses on the thermodynamics and chemical reaction aspects apart from designing a reaction system. Amongst the topics discussed are reaction kinetics in a reactor, types of reactors and reactor design. The students will learn chemical engineering thermodynamics aspects, which elucidate the characteristics of pure fluid, thermal effects, fluid thermodynamics characteristics, homogeneous thermodynamics, phase equilibrium and chemical reaction equilibrium. The knowledge will consequently be used in learning chemical reaction of processes. Another important aspect in chemical engineering is environmental safety. Environmental engineering subjects cover types of air and water pollution, and also analytical method for pollution measurement, waste treatment and waste management. The workers safety aspects will also be introduced.

In process system engineering, mass and energy balances is the fundamental subject. In this subject, the students will be introduces to the processes in chemical engineering as well s the calculation method for mass and energy balances for different processes. This includes the processes that have chemical reactions and also processes with physical transformations only. The skill in calculating mass and energy balances is very important in many other chemical engineering subjects.

The crux of the chemical engineering course is plant design and synthesis, which includes the selection of process, constructing flow sheets, mass and energy balance, detailed design, selection of equipment and raw materials, process control, operational instruction, cost and economics and also environmental and safety aspects in a plant. Students are also required to complete a processing plant design project in groups. Here, all the techniques learn in the previous years will be integrated in proposing a design for an assigned plant.

Apart from chemical engineering theories, students are also exposed to practical aspects of the field. Every area mentioned before has its own practical or laboratory sessions. The students are also required to prepare a project report to train them to integrate technical knowledge with communication and management in carrying out a task. For the group exercise, the students are required to complete a plant design as mentioned before. In addition, students will also carry out a bachelor's level research project, in which they will individually work under the supervision of a lecturer. At the end of the design and research work, the students are required to prepare a thesis and give an oral presentation, which will be evaluated by internal and external examiners.

The UTM curriculum requires students to undergo industrial training fro 10-12 weeks during the semester break after the third year of education. A written report about the work done and experiences during the training must be presented at the end of the training period.