

UNIVERSITI MALAYSIA PAHANG

**FACULTY OF
CHEMICAL AND
PROCESS
ENGINEERING
TECHNOLOGY**



UNDERGRADUATE PROSPECTUS 2022/2023

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY WITH HONOURS

CONTENTS

- CURRICULUM STRUCTURE
- PROGRAMME EDUCATIONAL OBJECTIVE (PEO)
- PROGRAMME OUTCOMES (PO)
- COURSE SYNOPSIS

CURRICULUM STRUCTURE

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY WITH HONOURS

Year	First Year		Second Year		Third Year		Fourth Year	
Semester	First	Second	First	Second	First	Second	First	Second
COURSES	BTK1153 Professional Ethics & Society	BTK1143 Physical Chemistry	BTK2214 Computer Programming for Technologist	BTK2252 Mass Transfer	BTK3214 Separation Process I	BTK3254 Environmental & Sustainable Technology	BTK4214 Plant Automation	BTK4912 Industrial Training
	BTK1113 Analytical Chemistry	BTK1224 Static & Strength of Materials	BTK2223 Chemical Process Principles	BTK2263 Heat Transfer	BTK3223 Plant Utilities	BTK3263 Separation Process II	BTK4224 Plant Troubleshooting and Maintenance	
	BTK1132 Chemistry Laboratory	BTK1253 Thermodynamics	BTK2232 Electrical Technology	BTK2274 Computer Aided Design and Process Simulation	BTK3253 Process Management and Economics	BTK3274 Process Instrumentation and Control	BTK4716 Final Year Project II	
	BTK1163 Organic Chemistry	BTK1243 Fluid Mechanics	UGE2002 Technopreneurship	BTK2244 Numerical Methods	BTK3243 Chemical Plant Safety	BTK3714 Final Year Project I	BTK38*3 Elective III	
	UHC1012 Falsafah dan Isu Semasa	BUM2113 Applied Mathematics	UHL2422 English for Technical Communication	BTK2284 Chemical Reactor Technology	BTK38*3 Elective I	BTK38*3 Elective II		
	BUM1223 Calculus	UHL2412 English for Academic Communication	BUM2413 Applied Statistics	UHL2432 English for Professional Communication	UHF2021 Foreign Language II			

	UQA2**2 Co-Curriculum		UHF1011 Foreign Language I		UHC2022 Ethnic Relations			
			UHS1022 Soft Skills					
TOTAL CREDIT PER SEMESTER	18	18	19	19	19	18	17	12
OVERALL TOTAL CREDIT FOR GRADUATION	140							

**ELECTIVE COURSES FOR
BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY WITH HONORS**

No	Code	Course	Credit Hour
1	BTK3873	Operation Management	3
2	BTK3843	Food Engineering Technology	3
3	BTK3863	Oleo Chemical Technology	3
4	BTK3813	Petroleum Refining & Petrochemical Technology	3
5	BTK3823	Bioprocess Technology	3
6	MKK7313	Chemical Product Design & Management	3
7	MKK7183	Managing Business Intelligence	3
8	MKK7173	Finance For Entrepreneurship Decision	3
9	MKK7163	Catalytic Reaction Engineering	3
10	MPP7143	Logistics and Operation Management	3
11	MPP7113	Project Management	3
		Total Credit Hours (3 Courses)	9

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO	Statement
PEO1	Graduates who are able to apply science and engineering technology in solving problems related to chemical engineering technology
PEO2	Graduates who practice their chemical engineering technology knowledge in process plant.
PEO3	Graduates who display leadership qualities in their workplace
PEO4	Graduates who engage life-long learning and demonstrate strong ethical values towards society and environment.

PROGRAMME OUTCOMES (PO)

PLO	Statement
PLO1 (<i>Cognitive Domain</i>)	Knowledge: apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to defined and applied engineering procedures, processes, systems or methodologies (C)
PLO2 (<i>Cognitive Domain</i>)	Problem analysis: Identify, formulate, research literature and analyses broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialization (C)
PLO3 (<i>Cognitive Domain</i>)	Development of solutions: Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (C)
PLO4 (<i>Psychomotor Domain</i>)	Investigation: Conduct investigations of broadly-defined problems; locate, search and select relevant data from codes, databases and literature, design and conduct experiments to provide valid conclusions (P)
PLO5 (<i>Psychomotor Domain</i>)	Modern Tool Usage: Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering activities, with an understanding of the limitations (P)
PLO6 (<i>Affective Domain</i>)	The Engineer and Society: Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice (A)
PLO7 (<i>Affective Domain</i>)	Environment and Sustainability: Understand the impact of engineering technology solutions in societal and environmental context and demonstrate knowledge of and need for sustainable development (A)
PLO8 (<i>Affective Domain</i>)	Ethics: Understand and commit to professional ethics and responsibilities and norms of engineering technology practice (A)
PLO9 (<i>Affective Domain</i>)	Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse technical (A)
PLO10 (<i>Affective Domain</i>)	Communications: Communicate effectively on broadly-defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (A)
PLO11 (<i>Affective Domain</i>)	Project Management and Finance: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments (A)
PLO12 (<i>Affective Domain</i>)	Lifelong Learning: Recognize the need for and have the ability to engage in independent and life-long learning in specialist technologies (A)

COURSE SYNOPSIS

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY WITH HONOURS

BTK1113 Analytical Chemistry

Synopsis

The syllabus covers the basic knowledge and application of sample and data handling, calibration techniques, data evaluation and quality of analysis in analytical laboratory. It also deals with separation techniques and its basic application such as GC and HPLC. The introduction to the theory and application of spectroscopic techniques used in chemical analysis such as UV-Vis and FT-IR are discussed. The student also will assigned in group to analyse a sample and prepare a report for the laboratory work.

Course Outcomes

- CO 01 Describe the concepts of analytical chemistry and evaluate the analytical data.
- CO 02 Solve problem related to basic analytical chemistry concepts such as gravimetry and titration.
- CO 03 Explain the concept and application of analytical equipment such as GC, HPLC, UV-Vis and FTIR.
- CO 04 Practically recognize analytical equipment based on the theories learn in class.

BTK1213 Professional Ethics & Society

Synopsis

This subject introduce to the students about engineering technologist profession, behaviour, professionalism and ethics as professional. Those are very important in their careers as engineering technologist or technical executive as well as their services given to public or to the community. The topics in this subject are engineering technology overview, engineering technologist as a profession, engineering ethics, communication, management skill, philosophy of engineering, engineering contribution and innovation in engineering. This knowledge and skill might be required in their future career to ensure their services give a positive impact to the society. By completing this subject the student should understand the professional body involved in their

careers and also understand how to obtain the professional membership in the future. In this subject also required the student to expose to the community/charity activities. The student required to propose their community service works by utilizing their knowledge/skill in sciences & technology.

Course Outcomes

- CO 01 Appraise the knowledge in societal, legal and environmental issues in the contexts of engineering technologist.
- CO 02 Valuing the relationship between science, technology and engineering.
- CO 03 Adapt ethical competent, well performed and understand the engineering ethics philosophy.

BTK1132 Chemistry Lab

Synopsis

In chemistry laboratory the students are responsible to conduct the basic physical, organic and analytical chemistry experiments such as solubility, miscibility, chemical equilibrium, buffer and pH changes, calorimetry, solvent extraction, gravimetric, UV-VIS spectrometer, FTIR, DSC and gas chromatography. At the end of experiments, the students should be able to inculcate the critical thinking and able to work in safe working condition.

Course Outcomes

- CO 01 Applied all physical, organic & analytical chemistry theory in laboratory
- CO 02 Practice all the basic science and analytical chemistry knowledge in operation of analytical chemistry equipment.
- CO 03 Demonstrate each analytical equipment base on the theories applied in analytical chemistry
- CO 04 Revise any minor/major malfunction of equipment, incorrect step/ result & troubleshoot it

BTK1143 Physical Chemistry

Synopsis

This course discusses some introductory to thermodynamics in physical chemistry followed

by continuation topics related to liquids and their mixtures, principles of chemical equilibrium and rate of reactions. The solid surfaces including their applications will also be discussed in this course. The development of key skills is facilitated by a program of tutorials and practical.

Course Outcomes

CO 01 Explain the principles of thermodynamics and surface phenomenon concept related to applied physical chemistry.

CO 02 Apply and analyze the basic thermodynamics and surface phenomenon concept to solve the problem

CO 03 Ability to communicate effectively and presenting in related with thermodynamic and surface phenomenon

BTK1243 Fluid Mechanics

Synopsis

This module will introduce students to the principles of fluid mechanics. Students will apply these principles to the solution of engineering problems such as pipe sizing and the selection of system components such as valves and pumps. The module goal is to enable the student to develop the knowledge and analytical skills in solving practical problems of fluid mechanics, through applications to system design and performance studies.

Course Outcomes

CO 01 Apply the fluid principles, Bernoulli's equation, continuity equation, fluid properties in various applications.

CO 02 Analyse the fluid systems in real pipe line systems and fluid machines.

CO 03 Demonstrate theoretical and experimental data in oral presentation and written lab report in order to understand the fundamental concept of fluid mechanics.

BTK1253 Thermodynamics

Synopsis

This subject is designed to introduce the basic concept in thermodynamics. Topics that will be covered in this subject include the properties of pure substances, thermodynamics system, the First Law of Thermodynamics for closed systems, open systems and their application in steady-flow and unsteady-flow processes, The Second Law of

Thermodynamics, entropy, introduction to refrigeration, heat engine, and heat pump.

Course Outcomes

CO 01 Discover the state of properties from property diagram and obtaining data from property table.

CO 02 Solve energy balance for both closed and open system using the First Law of Thermodynamics.

CO 03 Analyze cyclic devices (heat engine, heat pump and refrigerator), steady flow devices and isentropic processes using the Second Law of Thermodynamics.

CO 04 Recognize the relationship between thermodynamics behavior and properties via experimental work and laboratory report.

BTK1163 Organic Chemistry

Synopsis

This course discusses the fundamental theory of the properties, synthesis and organic reactions where use the functional group as framework as a basic level courses with an organic chemical content. It is also focuses on the key concepts of organic chemistry through a study of the reactions of selected nonfunctional and functional groups. Emphasis is placed on the underlying mechanistic pathways that are involved and the stereochemistry of the molecular structure is also considered.

Course Outcomes

CO 01 Explain the common organics structures, properties, synthesis and reactions of aliphatic hydrocarbons and alcohol groups.

CO 02 Demonstrate the properties, chemicals reactions and steps of mechanism for the synthesis of aromatic hydrocarbons, carbonyl groups and amine

CO 03 Construct the synthesis of organic compounds and identification of their functional groups.

CO 04 Present the compounds that have been synthesize and their applications in team.

BTK1224 Static & Strength of Materials

Synopsis

This subject will introduce students with concept of statics and strength of materials and its application in related engineering field. The topics

covered in this subject are static of particle, static of rigid and deformable bodies, distributed forces, analysis of structure, and stress, strain & deformation. Four laboratory works will be assigned in this subject. By completing the course, students will comprehend the basic mechanisms and applications of statics and strength of materials in related engineering field.

Course Outcomes

CO 01 Apply the basic concepts in statics to solve problems concerning resultant of forces acting on a particle and equilibrium of a particle.

CO 02 Analyse problems involving the equilibrium of a rigid and deformable bodies and use the fundamental principles in statics to solve them.

CO 03 Analyse the internal forces, moment and deformation in materials resulting from the axial stress and strain.

CO 04 Apply the relationship between material behavior and properties via experimental work and laboratory report

BTK2232

Electrical Technology

Synopsis

This course is designed to introduce the electrical system principles and electrical hazards. The principles that will be covered in this course includes Ohm's law, Kirchhoff's law, current divider rule and circuit analysis. Students are also expose to the principle of transformer and bridge circuit for instrumentation. A part of that, students are also need to carry out a simple project in order to assess their understanding on the basic electrical principles.

Course Outcomes

CO 01 Describe the concepts of electrical system and its components.

CO 02 Analyse electrical circuit problems.

CO 03 Analyse bridge circuit for instrumentation.

CO 04 Recognise the concepts of electrical principle using AC/DC electrical system and circuit simulator.

BTK2214

Computer Programming for Technologist

Synopsis

This module will introduce students to

programming course that uses MATLAB to illustrate general concepts in computer science and programming. MATLAB is a special-purpose language that is an excellent choice for writing moderate-size programs that solve problems involving the manipulation of numbers. The design of the language makes it possible to write a powerful program in a few lines. Student will become familiar with general concepts in computer science, gain an understanding of the general concepts of programming, and able to apply the knowledge to troubleshoot/diagnose and maintain computer system involving related engineering equipment computer interfaces.

Course Outcomes

CO 01 Identify the programming platform environment, built-in functions, user defined functions, and etc for computer programming in application software.

CO 02 Demonstrate basic programming concepts and skills needed for basic problem solving using application software.

CO 03 Demonstrate the ability to develop and execute a functional written computer program.

BTK2223

Chemical Process Principles

Synopsis

This course aims to equip students with basic chemical engineering principles such as different unit systems, unit conversion and process variables determination. This knowledge will then be applied extensively for material and energy balances for single or multiple unit operations of non-reactive and reactive chemical processes.

Course Outcomes

CO 01 Solve the variables and properties related to material and energy balance problems.

CO 02 Analyse the material balance of process nonreactive and reactive systems.

CO 03 Analyse the energy balance of process nonreactive and reactive systems.

CO 04 Able to measure the concepts of mass and energy balance data obtained from the laboratory experiments

BTK2244

Numerical Methods

Synopsis

This subject teaches the techniques by which

mathematical problems are formulated so that they can be solved with arithmetic operations. Topics covered in this subject are roots of equation, systems of linear algebraic equations, optimisation, curve fitting, numerical differentiation & integration, ordinary differential equation and partial differential equation. Some software packages are introduced to empower the students in problem solving.

CO 01 Analyze a process employing numerical methods.

CO 02 Apply numerical methods as a problem-solving tool.

CO 03 Construct optimisation & numerical methods problem by using software packages

BTK2252

Mass Transfer

Synopsis

The objective of this course is to provide students with the concepts and principles of mass transfer. This course will emphasize on the principles of the mass transfer in gases, liquids, biological solutions and gels, and solids. Subsequently, the principles of unsteady-state convective mass transfer will be covered at the end of the course. The students will be exposed to the procedure for general problem solving and its application on real system.

Course Outcomes

CO 01 Demonstrate an understanding the concept of mass transfer in diffusion phenomena in gas, liquid, solid, biological solution and gel systems.

CO 02 Solve problems related to diffusion and convection mass transfer in steady/unsteady state system.

CO 03 Practice the concept of mass transfer in problems related to unit operation/equipment.

BTK2284

Chemical Reactor Technology

Synopsis

This course introduces brief history and fundamental principles of chemical reactor operations. The use of process variable, stoichiometry and conversion as the important criteria for production aims and reactor operations will be thoroughly discussed. Students will be introduced to various types of traditional and modern reactors such as batch reactors, CSTR, PFR, PBR, Fluidized Bed Reactor, Biochemical

Reactors and Membrane Reactors, and their applications in various types of chemical industries. Operational limitations such as complex flow patterns resulting in non-ideal operation of reactor and how to assess them will also be explained. Additionally, detailed information on non-isothermal reactor will be provided with the spirit to support and encourage better energy management as well as safe operation of chemical reactors.

Course Outcomes

CO 01 Explain the fundamental principle of the operation of chemical reactors in brief towards the development of modern technology used in chemical industries.

CO 02 Relate the use of process variables, stoichiometry and conversion in chemical reactor technology specifications.

CO 03 Compare the performance of different types of reactors for different chemical process industries.

CO 04 Assess the performance of a non-ideal reactors based on experimental data.

CO 05 Display competency in running bench scale and pilot scale reactors.

BTK2263

Heat Transfer

Synopsis

The objective of this course is to provide students with the concepts and principles of heat transfer. This course will emphasize on the principles of the heat transfer in steady state by conduction, convection and radiation. Students will be exposed for general problem solving and its application on heat exchanger. Three laboratory works on shell & tube heat exchanger and plate heat will be assigned to this subject. Subsequently, the principles of unsteady-state convective heat transfer will be covered at the end of the course.

Course Outcomes

CO 01 Analyze problems related to the heat transfer principles and fundamentals in steady state and unsteady state.

CO 02 Apply the concept of heat transfer in problems related to unit operation/ equipment (heat exchanger).

CO 03 Relates the principle of heat transfer individually and in team

BTK2274

Computer Aided Design And Process

Simulation

This course is introducing the usage of CAD software, AUTOCAD. Students will be exposed and be familiar with the software environment and utilizing the basic and advanced tools to come out with a standard technical drawing especially in chemical engineering equipment.

CO 01 Demonstrate fundamentals knowledge of CAD software by identifying the capabilities, limitations and procedures for different applications.

CO 02 Analyze the use of various techniques and tools of CAD software in general technical drawing and process simulation.

CO 03 Ability to use the CAD software in basic and advanced working tools mode to create complex technical drawing and basic process simulation.

CO 04 Demonstrate to use of the CAD software effectively in solving problems related to technical drawings for chemical engineering equipments and simulation of selected chemical engineering processes.

BTK3243

Chemical Plant Safety

Synopsis

This course is primarily to expose students with the fundamental concepts, practical aspects and applications of occupational safety and health (OSH) management in process industries. Among others, the students will be taught the OSH legislations that one industry should comply with in order to ensure a safe workplace environment. Students will also be taught on risk assessment through proper safety management, as well as analysing the cause and effects of industrial accidents and proposing for improvement.

Course Outcomes

CO 01 Value fundamentals of technical safety and occupational health in process industries.

CO 02 Explain the various features of safety and health management and legislations.

CO 03 Evaluate OSH aspects in the design and operation of process industries and propose for improvement.

BTK3214

Separation Process I

Synopsis

The objective of this course is to provide students with concepts of separation processes and unit operation in chemical engineering. It will cover the gas-liquid, vapor-liquid and liquid-liquid separation process. By completing the subject, students will understand the basic mechanisms, operations and basic operating parameters of the selected unit operations such as evaporation, distillation, absorption, liquid extraction and leaching.

Course Outcomes

CO 01 Analyse the mechanism of mass transfer, heat transfer, material and energy balance to the major unit operations in chemical industries (Distillation, evaporation, absorption, liquid-liquid extraction and leaching).

CO 02 Estimate equipment specification and sizing.

CO 03 Practice the use of laboratory scale separators by considering appropriate methodology and safety precautions.

BTK3253

Process Management and Economics

Synopsis

This course deals with cost analysis in engineering decision-making, the management aspects and control of complex projects. Engineering economics topics include cost estimation, time value of money, interest formulas and equivalence calculations, measures of investment worth, depreciation and income tax analysis. Engineering project management topics include knowledge on roles and responsibilities, planning, organization, time, cost, risk and quality management.

Course Outcomes

CO 01 Assess the need of chemical engineering graduates when they have to make financial decisions as a team member or project manager.

CO 02 Evaluate theoretical and conceptual basis on which the practice of engineering economics project analysis is built.

CO 03 Apply basic project management concepts and principles through case study.

CO 04 Analyze the economic feasibility of a chemical plant, carried out by examining the capital cost and the manufacturing cost obtained from the cost estimation techniques.

BTK3223

Plant Utilities

Synopsis

A typical chemical plant requires adequate utilities to support a successful operation, such as water, steam, fuel, compressed air, HVAC and fire fighting system. The important units operated to supply utilities include treatment systems, steam boilers, piping networks and generator. Students will learn the importance, function and mechanism of the utilities in the plant. In this course also the student will be carried out the laboratory. The amount of utilities is estimated based on the process condition setting and support required in the plant. This course will additionally offer the practical training to operate and trouble-shoot the unit operations that supply the utilities.

Course Outcomes

- CO 01 Describe the importance, function and mechanism involved in plant utilities systems.
- CO 02 Estimate the plant utilities required to facilitate the operations of the plant.
- CO 03 Display ability to troubleshoot equipment failure related to the utilities system.
- CO 04 Display ethical competent and engineering ethics philosophy

BTK3254 Environmental & Sustainable Technology

Synopsis

This subject is designed to introduce to the students the principle of environmental technology and current environmental problems. Topics include water pollution, wastewater quality management, wastewater treatment, air, solid waste treatment and management. The techniques covered involved in environmental samples testing, and an ability to critically evaluate data from a sampling program. The student will learn how to develop an activity using various strategies to control, reduce and monitor all environmental problems.

Course Outcomes

- CO 01 Identify the effect of pollutants on the environment (atmosphere, water and soil).
- CO 02 Demonstrate analysis of the quality parameter of wastewater sample, solid waste sample and measure air particulate matter.
- CO 03 Value the outcome of environmental project and emphasized on methods in management/treatment of water, air, solid and hazardous waste.
- CO 04 Verify a sustainable technology solution to protect the environment and fulfil

human need for wastewater, solid waste or air pollution issues.

BTK3263 Separation Process II

Synopsis

This course aims to introduce the principles of typical unit operations involved in chemical industries which are drying, adsorption, membrane separation process, crystallization and mechanical-physical separation. Students will be exposed to procedures, general problem solving and applications related to the unit operations stated. Laboratory work will be performed involving selected processes where students will be given the experiment objectives to conduct the experiments in group basis. At the end of this course, it is expected that the students will understand the theories, principles, calculations and basic operating parameters associated with every unit operation.

Course Outcomes

- CO 01 Analyze basic operation parameters associated with drying, adsorption, membrane separation process, crystallization and mechanical-physical separation.
- CO 02 Assemble the concept and solve problems related to drying, adsorption, membrane separation process, crystallization and mechanical-physical separation.
- CO 03 Demonstrate the appropriate skills to operate the equipment related to drying, adsorption, membrane and crystallizer considering the safety and environment precautions.

BTK3274 Process Instrumentation and Control

Synopsis

Process Instrumentation and Control (PI&C) is the branch of engineering that deals with measurement and control. This course provides students with theoretical and practical training in measurement and control of process variables. Topics covered in this subject are introduction to process control, P&ID drawing, process control instrumentations and data transmission and representation..

Course Outcomes

- CO 01 Assess process control systems and justify the selection of different types of field

instrumentations and their applications in process industries.

CO 02 Practice measurement of process variables using different types of field instrumentations.

CO 03 Construct a complete P&ID including alarm system for a particular process or equipment.

CO 04 Value team working and commitment behaviour

BTK3714

Final Year Project I

Synopsis

This course is designed to expose the students to a research/development project. They have to apply all the knowledge they have learned in the program to complete the research project. Students will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor) in group. During the project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, preliminary results, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcomes

CO 01 Propose the project proposal on a chosen/given topic in the relevant area.

CO 02 Defend project proposal in formal oral presentation identifying key outcomes and conclusions.

CO 03 Function effectively as a member or leader in the diversified technical teams.

CO 04 Demonstrate a professional ethics and responsibilities towards the project.

CO 05 Propose financial and costing analysis.

CO 06 Revise relevant information independently and practice curiosity in exploring new information

BTK4214

Plant Automation

Synopsis

This subject is designed as an introduction to process automation. Topics that will be covered in this subject include introduction to automation system; development of empirical dynamic process model; feedback process control;

controller design and tuning; the application of programmable logic controller (PLC), Supervisory control and data acquisition (SCADA) and distributed control system (DCS) in process automation.

Course Outcomes

CO 01 Construct empirical dynamics process model and describe the dynamics behaviour.

CO 02 Evaluate feedback process control, PID design and tuning.

CO 03 Construct process control and PID tuning using PLC and simulated process control.

BTK4726

Final Year Project II

Synopsis

This subject is the continuation of the subject Final Year Project I. In this subject, the students are required to collect and analyze data, propose solution, model the project, analyzing, conduct research, discussion and write the findings and conclusions. At the end of this semester, the students are required to produce a research project report and present it to faculty's evaluation panel.

Course Outcomes

CO 01 Analyze the research problem and construct the solution based on the knowledge of mathematics, sciences and engineering technology fundamentals.

CO 02 Construct project according to the proposed research plan, schedule and estimated cost and solve the problems by using appropriate tools.

CO 03 Evaluate the findings within the scopes and objectives and write the technical paper based on the findings.

CO 04 Defend the research outcomes of project in a formal oral presentation.

CO 05 Demonstrate a professional ethics and responsibilities towards the project.

CO 06 Practice in life-long learning enhancing individual's soft skill through research activities.

CO 07 Practice effectively as a member or leader in the diversified technical teams.

CO 08 Manage project in multidisciplinary environments based on safety regulations

BTK4224

Plant Troubleshooting and Maintenance

Synopsis

The aim of this course is to expose students with maintenance of industrial process plant. Student also will be exposed to the concept of process plant maintenance, standard operating procedures when carrying out maintenance and troubleshooting work. In addition, the mini project and case studies will have industrial involvement for students' exposure.

Course Outcomes

CO 01 Explain the concept of process plant maintenance and its strategies.

CO 02 Construct the reliable processing plant through various strategies to ensure smooth plant operations.

CO 03 Improve the operations of major process equipments and its common operating problems

BTK4912

Industrial Training

Synopsis

In Industrial Training the students should gain insight into industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo and industrial training for a certain period that has been agreed by the faculty during last semester of the fourth academic year. The performance of each student during the periods of his/her industrial training is evaluated by the faculty staff, and the representatives from employer organization.

Course Outcomes

CO 01 Develop effort to apply acquired technical skill for problem solving in the industry.

CO 02 Demonstrate a professional commitment and responsibilities at workplace.

CO 03 Evaluate the outcomes of industrial training in a formal oral presentation.

CO 04 Conduct an analysis on one main issue discovered during industrial training.

BTK3813

Petroleum Refining & Petrochemical Technology (E)

Synopsis

This course exposes the student to the refining and petrochemical industry. Besides, the student will also be able to identify and select the suitable equipment based upon specific conditions and operation in the refinery plant. After understanding

the process and standard operating conditions, they will be able to draw a refinery and petrochemical process plant by using software or simulators such as ASPEN Plus, AutoCAD or Microsoft Visio.

Course Outcomes

CO 01 Identify refinery and petrochemical industry activities

CO 02 Explain the process operation of refinery and petrochemical plant

CO 03 Relate the implementation sustainable concept in the refinery and petrochemical industry

CO 04 Identify issues related to the refinery and petrochemical industry

BTK3823

Bioprocess Technology (E)

Synopsis

This subject introduces the basic concepts of bioreactor operational mode for the bioprocessing industry, emphasizing on the application of transport phenomena in bioreactor, scale up, monitoring and control of bioreactor. The topics include introduction of the unit operations that are commonly employed to separate biological products. An idealized process of bioseparation consists of four phases which are the removal of insoluble products, the isolation of desired biological products or concentration, the purification and lastly, polishing of biological products. The basic methods that will be covered in this course include filtration, centrifugation, cell disruption, precipitation, extraction, adsorption, and chromatography. In addition, an overview on the complete train of bioseparation will also be introduced.

Course Outcomes

CO 01 Identify different bioreactor operational modes for bioprocessing industry

CO 02 Explain the principles of the four phases involved in bioseparation

CO 03 Relate the implementation of sustainable concept to synthesize bioproduct compounds

CO 04 Identify issues related to the bioprocessing industry

BTK3843

Food Engineering Technology (E)

Synopsis

This course is designed to introduce the applications of certain unit operations in the

processing of different types of food products. The principles and methods of dehydration, refrigeration and freezing, are discussed with emphasis on their applications in the processing of food products. The course will also provide an appreciation on the importance of food packaging, food safety and hygiene. Students will also be taught to identify the current problem in the food industry. Plant site visit and case studies in food industries also will be done by students for exposure.

Course Outcomes

- CO 01 Identify current status and future trends of food processing industry in Malaysia
- CO 02 Explain the principles of dehydration, refrigeration and freezing in food products
- CO 03 Relate the implementation sustainable concept in food processing industry
- CO 04 Identify issues related to food production technology

BTK3863 **Oleo Chemical Technology (E)**

Synopsis

This course introduces the oleochemical industry operation. It covers some introduction to oils and fats compositions, vegetable oil/plant mill operations, plant oil refinery process, production of edible products, fatty acid and soap production, as well as biofuel derived from vegetable oil and fats. Various fats and oil analyses will be discussed. Various other oleochemical reactions, process sustainability, environment impact and waste management will be discussed based on specific applications.

Course Outcomes

- CO 01 Identify important activities in oleochemical processing industry
- CO 02 Explain the process operation in the oleochemical industry.
- CO 03 Relate the implementation of sustainable concept in the oleochemical processing industry
- CO 04 Identify issues related to the oleochemical industry

BTK3873 **Operation Management (E)**

Synopsis

This course introduces the operation management. It covers some introduction to competitiveness,

strategy & productivity, forecasting, product and service design, strategic capacity planning for product and services, process selection and facility layout, work design and measurement, location planning and analysis, management of quality, quality control, MRP and ERP, inventory management, JIT and lean management, supply chain management, scheduling and project management.

Course Outcomes

- CO 01 Identify the operation management concept and its importance
- CO 02 Explain operation management concepts applied in chemical process industries
- CO 03 Relate the implementation of operation management for a sustainable process
- CO 04 Identify issues related to the implementation of operation management in the industry

MKK7313 **Chemical Product Design and Management (E)**

Synopsis

This course introduces the chemical product design and management. It includes the extension of chemical engineering design to encompass both process design and product design. The design approach is based on the four-step procedure for chemical product design such as needs, ideas, selection, manufacturing, process improvement and optimization. The waste management from chemical production is also briefly presented. Several case studies in the chemical product design are presented.

Course Outcomes

- CO1 Develop a sample based on chemical product design approach
- CO2 Recognize the phases of the chemical product design and differences from industrial process chemistry
- CO3 Identify the varieties of chemical products in the chemical product design (micro structured products and specialty chemicals)

MKK7183 **Managing Business Intelligence (E)**

Synopsis

This course intends to provide strategies in managing business and making intelligence decision. It focuses on global sourcing of

professional services which covers topics include business process management and outsourcing, business negotiation strategies, business law and ethical and organizational trusts. Students will be exposed to various case studies, locally and internationally.

Course Outcomes

CO1 Evaluate the strategies of managing business intelligence decision in sustaining productive industrial operability and quality management.
CO2 Develop business process management plan.
CO3 Consult a business negotiation effectively.

MKK7173

Finance for Entrepreneurship Decision (E)

Synopsis

This course is designed to examine management accounting and related analytical methodologies for decision making and control in profit-directed organizations, to frame accounting and financial issues, including the broader environment in which an enterprise operates. The purpose of this course is to advance student understanding of how to use financial information to value and analyse, and further aiding for entrepreneurship decision. Key topics in managerial accounting are addressed next. Other topics include Corporate risk management and due diligence, and determinants of cost structure will be highlighted.

Course Outcomes

CO1 Evaluate financial statements for entrepreneurship decision.
CO2 Construct leveraging portfolio for corporate risk assessment.
CO3 Authenticate principles and ethical values in investment decision.

MKK7163

Catalytic Reaction Engineering (E)

Synopsis

The course focuses on heterogeneous catalysts and reactor design. It provides important background on heterogeneous catalysts and encompasses the catalyst design, characterization methods and qualitative and quantitative nature of catalyst deactivation. Approaches for modeling the kinetics of heterogeneous catalytic reactions are covered. The latter part of the course focuses on multiphase reactor design and operation and the interaction of reactions and transport limitations. Particular

attentions are given to catalytic reactors with fixed and fluidized solid phases.

Course Outcomes

CO1 Design catalysts and catalytic reactors based on reaction mechanisms
CO2 Construct the engineering models for transport in multiphase reactors by using rigorous models
CO3 Develop reactor design approach for existing processes

MPP7143

Logistics and Operation Management (E)

Synopsis

This course aims to explore the key issues involved with the design and management of supply chains specifically focusing on supply chains in industrial and operation organizations. Both conceptual topics and quantitative tools are presented in the course.

Course Outcomes

CLO1 Create value through operations and supply chains.
CLO2 Plan and control operations and supply chains.
CLO3 Design the operations environment and supply chain linkages.

MPP7113

Project Management (E)

Synopsis

The aim of the course is to design project management concept in chemical engineering process and industry.

Course Outcomes

CLO1 Articulate the core concepts of project management.
CLO2 Analyze various activities and processes involved in managing an active project.
CLO3 Evaluate project management activities using appropriate tools and methods.

