DIPLOMA IN CHEMICAL ENGINEERING (T33)

Course Overview

Chemical Engineering brings together mathematics, chemistry, physics, biology and engineering to literally build the world. It plays a huge part in the process of creating products like food, drink, medicine, cosmetics, plastic and fuel.

Today, chemical engineering also plays a key role in addressing worldwide starvation, disease and poverty, as well as in the development of alternative technologies to combat lead pollution and the greenhouse effect.
So if you are an analytical problem-solver who enjoys trouble-shooting, look no further, this is the course for you.

Entry Requirements

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

Subject	Grade
English Language (ELT)*	1-7
Mathematics (E or A)	1-6
One of the following Science subjects: • Biology • Biotechnology • Chemistry • Combined Science • Food & Nutrition • Physics/Engineering Science • Science (Chemistry, Biology) • Science (Physics, Biology) • Science (Physics, Chemistry)/Physical Science	1-6

Any two other subjects, excluding CCA	
2021 Planned Intake	**150**
Net ELR2B2 aggregate range (2021 JAE)	**5 - 15**

** Sijil Pelajaran Malaysia (SPM)/ Unified Examination Chinese (UEC) holders must have a minimum of grade 6 for the relevant English Language subject (e.g. Bahasa Inggeris).*

See also the minimum entry requirements for:

- ITE Certificate Holders
- International Students

What You'll Learn

YEAR 1

Your journey into the exciting field of chemical engineering begins with learning basic chemical processing principles. You will also understand how chemicals are processed into everyday products.

TP Fundamentals (TPFun) Subjects

Subject Code	Subject	Credit Units
ACS1005	**Communication & Information Literacy** In this subject, you will learn how to conduct research for relevant information and validate information sources. You will also learn to recognise and avoid plagiarism, and follow standard citation and referencing guidelines when presenting information. In the course of learning, you will be required to plan, prepare and present information appropriately in written and oral form. You will also be taught to consider the **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) when writing and delivering oral presentations.	**2**
ACS1007	**Persuasive Communication** In this subject, you will be taught how to use persuasive language in written documents. You will be required to use information to your advantage to verbally communicate and convince an audience about your idea, product or service. Skills such as persuasive vocabulary, language features, graphical illustrations, tone and style would also be covered. The **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) will also be applied when engaging in verbal and written communication.	**2**

	GCC1001	**Current Issues & Critical Thinking** This subject presents you with a panoramic view of current local and global issues, which may have long term implications for Singapore. You will learn to apply critical thinking tools to examine current issues, support your views with relevant research and up-to-date data, articulate an informed opinion and mature as civic-minded individuals.	**2**	
	AIN1001	**Innovation & Entrepreneurship** The Innovation & Entrepreneurship subject is designed for learners from all disciplines to embrace innovation in either their specialised fields or beyond. You will first learn the Design Thinking framework, where you will develop problem statements and ideate solutions. Next, you will discover the tools for prototyping and innovation, such as 3D printing and laser cutting, at TP's Makerspace+ facility. Finally, you will acquire commercial awareness through the LEAN Startup framework of idea crystallisation, prototype building, customer testing and validation, refinement of business model canvas, and crowdfunding or crowdsourcing avenues.	**2**	
	LEA1011	**Leadership: Essential Attributes & Practice 1** LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.	**1**	
	LSW1002	**Sports & Wellness** This subject will help you develop both the physical and technical skills in your chosen sports or fitness activities. Through a structured curriculum that facilitates group participation, practice sessions and mini competitions, you will learn to build lifelong skills such as resilience, leadership, communication and teamwork. Physical activity sessions will be supplemented by health-related topics to provide you with a holistic approach to healthy living.	**2**	
	MCR1001	**Career Readiness 1** This Career Readiness programme comprises three core subjects - Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.	**1**	
	AGS1002	**Global Studies** This subject provides essential skills and knowledge to prepare you for an overseas experience. You will examine the elements of culture and learn the key principles of cross-cultural communication. In addition, you will gain an appreciation and awareness of the political, economic, technological and social landscape to function effectively in a global environment.	**3**	

Core Subjects

Subject Code	Subject	Credit Units
AMB1004	**Basic Microbiology** This subject investigates the important fundamentals of microbiology and its relevance to the food, biomedical and biotechnology industries. It covers the types of microorganisms, their cultivation and growth as well as their control.	3
ACE1002	**Thermodynamics** This subject investigates the scientific principles and techniques which are the basic laws of chemical engineering thermodynamics. Further studies into the first and second law of thermodynamics, energy analysis, Gibbs free energy, phase equilibrium and chemical reaction equilibrium will be included.	4
ACE1003	**Mass and Energy Balance** This subject examines the scientific principles and techniques involved in material and energy balances which are the fundamentals of chemical engineering. Topics include the understanding of units, dimensional analysis and material balance with emphasis on application. Ideal and non-ideal gas laws, gas mixtures and psychometrics will also be studied in relation to engineering applications.	4
ACH1008	**Principles of Organic Chemistry** This subject covers basic concepts in organic chemistry which correlate the structure of organic molecules with their properties of the functional groups. Topics covered are classification of organic compounds, structure and properties of alkanes, alkenes, alcohols, aldehydes and ketones, carboxylic acids, amines and stereochemistry. Emphasis will be placed on the applications of organic compounds and their derivatives, and their impact on chemical-related industries.	4
ACH1009	**Principles of Inorganic and Physical Chemistry 1** This subject covers the basic theory and practical knowledge of inorganic and physical chemistry. Topics include fundamentals of chemistry, atomic structure and chemical bonding, stoichiometry and equilibria concepts of a chemical reaction.	4
ACH1010	**Principles of Inorganic and Physical Chemistry 2** This subject covers theoretical and practical knowledge of inorganic and physical chemistry. Topics include ionic equilibria and calculations, chemical kinetics, chemistry of transition elements and electrochemistry.	4

	Subject Code	Subject	Credit Units	
^	**AMA1006**	**Engineering Mathematics 1** This subject enhances your knowledge of the basic concepts of mathematics and applications in an engineering environment by adopting the problemsolving approach. Topics covered include the types of basic functions, composite and inverse functions, quadratic equations, remainder and factor theorems, partial fractions and basic Calculus.	**4**	^
^	**AMA1007**	**Applied Mathematics** This subject equips you with the basic applied mathematical concepts and techniques that are essential for your course of study. Topics include the application of statistics and mechanics. The section on statistics covers investigations into basic statistics, sampling distribution, hypothesis testing and analysis of variances. The section on mechanics includes investigations into statistics, kinematics, Newton's Laws of Motion, circular motion and impulses.	**3**	^

** Students must choose to take either one of these three subjects or TGL1001 Guided Learning.*

YEAR 2

You will find out how crude oil is refined into everyday products such as petroleum, plastics and toiletries. With the fundamental knowledge you have acquired, you will apply them to chemical processes needed for oil refining, pharmaceutical drug manufacturing and more.

TP Fundamentals (TPFun) Subjects

	Subject Code	Subject	Credit Units	
^	**ACS1006**	**Workplace Communication** In this subject, you will be taught how to conduct effective meetings while applying team communication strategies and the skills for documenting meeting notes. You will be required to write clear emails, using the appropriate format, language, tone and style for an audience. You will also be taught to communicate appropriately in and for an organisation when using various platforms. In all aspects, the principles of applying **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) will be covered.	**2**	^
^	**MCR1002**	**Career Readiness 2** This Career Readiness programme comprises three core subjects – Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.	**1**	^

	AGS1003	**Managing Diversity at Work***	**3**	
		This subject explores the concepts of identity, diversity and inclusion at the workplace. It examines the relationship between identity and diversity, the benefits and challenges of diversity and the strategies that promote inclusion and inspire collaboration in a diverse workplace. Examples of the elements of diversity covered in this subject include nationality, generation, ethnicity and gender. A one week residential stay is mandatory for this subject.		
	AGS1004	**Global Citizenship & Community Development***	**3**	
		Students will examine the meaning and responsibilities of being a Global Citizen, in order to contribute towards a more equitable and sustainable world.? In addition, students will learn how sustainable solutions can support community development, and, execute and critique a community action plan that addresses the needs of a specific community/cause.		
	AGS1005	**Expressions of Culture***	**3**	
		This subject provides a platform for an understanding of culture and heritage through modes of expression. Students will be introduced to global and local cultures via everyday objects, places and human behaviour seen through time and space. Students will explore issues and challenges in culture and heritage sustainability in community, national and global contexts.		
	TGL1001	**Guided Learning**	**3**	
		The subject introduces students to the concepts and process of self-directed learning in a chosen area of inquiry. The process focusses on four stages: planning, performing, monitoring and reflecting. Students get to plan their individual learning project, refine and execute the learning plan, as well as monitor and reflect on their learning progress and project. The learning will be captured and showcased through a curated portfolio. The self-directed learning project will broaden and/or deepen a student's knowledge and skills.		
	LEA1012	**Leadership: Essential Attributes & Practice 2**	**1**	
		LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.		

Core Subjects

Subject Code	Subject	Credit Units
ACE2002	**Environmental Technology** This subject provides you with the basic scientific knowledge related to environmental problems and environmental control technology. Topics include water treatment, air pollution, solid waste management, hazardous waste treatment technology, pollution control strategies and environmental monitoring in Singapore.	**4**
ACE2009	**Occupational Safety and Health** This subject covers health issues and safety at the workplace. The section on health examines the causes of occupational diseases and their respective controls (heat stress/ strain, ventilation, noise and industrial lighting). The section on safety explores topics like machinery safety, electrical safety, hazards of fire and explosion, housekeeping and material handling, personal protection equipment and legislation concerning occupational safety and health.	**4**
ACE2011	**Unit Operations 1** This subject is a development from basic engineering principles and covers both Newtonian and non- Newtonian flows, basic equations, fluid flow in pipes and fittings as well as fluidisation and filtration. It also covers the principles and operations of pumps, compressors and their performances. Practicals are included to enhance understanding.	**4**
ACE2012	**Unit Operations 2** This subject investigates the fundamental scientific principles and techniques in chemical engineering. Selected unit operations which involve diffusion and gas-liquid mass transfer (absorption and humidification), gas-liquid mass transfer (batch and continuous distillation) and liquid-liquid mass transfer (extraction) are discussed.	**4**
ACE2013	**Chemical Reaction Engineering** This subject examines the scientific principles behind the kinetics of chemical reactions and techniques which are the basic principles of chemical engineering.	**4**
ACE2014	**Productivity Improvement** This subject introduces the concepts and principles of productivity and how it can benefit organizations, in particular, the chemical, pharmaceutical and biologics industry.	**2**
ACE2015	**Process Control and Instrumentation** This subject covers the basic concepts and principles of process control and instrumentation in chemical process industries. Topics include process measuring instruments, basic concept of process control and open and closed-loop control systems.	**4**

^	**ACH2004**	**Principles of Instrumental Analysis** This subject provides the basic knowledge of the principles and applications of some instruments commonly used in chemical industries.	**4**	^
^	**AMA2002**	**Engineering Mathematics 2** This subject, a continuation of Engineering Mathematics 1, equips you with the advanced concepts of engineering mathematics that can be applied to an engineering environment using a problem-solving approach. Topics include types of arithmetic and geometric series, convergence, matrices and transformations, trigonometry and differential equations.	**3**	^

In your third year, you will gain practical work experience with a company in the chemical processing or pharmaceutical manufacturing industries - the two major chemical engineering industries in Singapore.

YEAR 3

TP Fundamentals (TPFun) Subjects

	Subject Code	Subject	Credit Units	
^	**ASI3028**	**Student Internship Programme** This structured programme is designed to link your learning with the real work environment. You will be placed in organisation(s) with opportunities to apply the concepts and skills acquired in the course of your study. Besides reinforcing technical concepts and mastering of skills in areas that you have been trained, the practical training will enable you to build important skills such as problem-solving, communication, teamwork, and to cultivate good attitude and a strong work ethic.	**16**	^
^	**LEA1013**	**Leadership: Essential Attributes & Practice 3** LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.	**1**	^
^	**MCR1003**	**Career Readiness 3** This Career Readiness programme comprises three core subjects – Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.	**1**	^

Core Subjects

Subject Code	Subject	Credit Units
AMP3008	**Major Project** This subject provides a framework for you to solve practical problems, conduct research work and/ or develop studies, through a self-managed project. The scope of the subject includes project proposal, investigative studies, analysis, interpretation of results, written report and presentation.	8

Diploma Subjects - Elective Cluster Subjects

Applied Chemistry

Subject Code	Subject	Credit Units
ACE3012	**Chemical & Material Testing** This subject provides key concepts of materials technology and their relevance to the chemical process industry. Topics include basic concepts of materials property, types of materials, materials corrosion and prevention, and nanotechnology.	4
ACH3005	**Laboratory Analysis & Management** This subject covers the basic principles and applications of some specialized instruments used in analytical laboratories as well as applications of data analysis, method validation, and test method development. It also provides an introduction to laboratory management guidelines and systems, as well as the technical requirements of an accredited laboratory.	5

Chemical Processing

Subject Code	Subject	Credit Units
ACE3004	**Plant Safety and Loss Prevention** This subject examines plant and process safety. Emphasis will be on risk assessment, hazard analysis and the concept of loss prevention in the chemical plant.	4
ACE3013	**Petrochemical Plant Processes** This subject covers the production of petrochemicals from various sources, the basic chemistry of petrochemicals, their usefulness and applications. You will also learn about raw materials and their building blocks and the various processes involved in the production of petrochemicals.	5

Pharmaceutical & Biologics Technology

	Subject Code	Subject	Credit Units	
^	APH3014	**GMP in Pharmaceuticals/ Biologics** This subject provides the fundamental knowledge and applications of cGMP in the pharmaceutical and biologics manufacturing industries. An overview of cGMP, quality systems, documentation and record keeping, laboratory controls, validation and selfinspection are among the topics that will be covered.	4	^
^	APH3015	**Biopharmaceutical Processing** This subject provides an overview of biopharmaceutical processing. It also covers the fundamental knowledge, applications and legislative requirement of biosafety, biosecurity and risk assessment relating to management of biological and other hazards.	5	^

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	min 1.0
TP Fundamentals Subjects	40 credit units
Diploma Subjects - Core Subjects	71 credit units
Diploma Subjects - Elective Subjects	min 9 credit units
Total Credit Units Completed	min 120 credit units