Chemical Engineering

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.

Your Journey

Year 1

You will begin your journey in the exciting field of chemical engineering by learning basic chemical processing principles. You will also understand how chemicals are processed into everyday products.

Year 2

You will find out how crude oil is refined into its various uses such as petroleum, plastics and toiletries. You will then apply fundamental knowledge you have acquired to chemical processes needed for oil refining, pharmaceutical drug manufacturing and more.

Year 3

This is the year to hone your skillsets in the real world by immersing yourself in your internship with either chemical processing or pharmaceutical manufacturing industries - the two major chemical engineering industries in Singapore.

ENTRY REQUIREMENTS

To be eligible for consideraon f or admission, applicants must obtain 26 points or be er 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.

Minimum Entry Requirements

English Language (EL1)*	Grades 1-7
Mathematics (E or A)	Grades 1-6
One of the following Science subjects:	Grades 1-6
• Biology • Biotechnology • Chemistry • Combined Science • Food & Nutrition • Physics/Engineering Science • Science (Chemistry, Biology) • Science (Physics, Biology) • Science (Physics, Chemistry)/Physical Science	
Any two other subjects, excluding CCA	

** 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

Chemical Engineering

COURSE STRUCTURE

TP Fundamentals (TPFun) Subjects

Subject code	Subject	Level	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 Message, Audience, Purpose and Strategy (MAPS) when writing and delivering oral presentations.	1	2
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 Message, Audience, Purpose and Strategy (MAPS) will be covered.	1	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 Message, Audience, Purpose and Strategy (MAPS) will also be applied when engaging in verbal and written communication.	1	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.	1	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.	1	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	1
LEA1012	Leadership: Essential Attributes & Practice 2 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	1
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	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.	1	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	1

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	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	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.	1	3
AGS1003	Managing Diversity at Work* 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.	1	3
AGS1004	Global Citizenship & Community Development* 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.	1	3
AGS1005	Expressions of Culture* 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.	1	3
TGL1001	Guided Learning 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.	1	3

ASI3028	Student Internship Programme This programme involves a compulsory attachment at a chemical or chemical-related company. It will enable you to apply knowledge and skills to solve practical problems and develop studies or product formulations. Emphasis will be placed on the development of skills such as teamwork, safety awareness, written and oral communication skills.	3	16

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

Core Subjects

Subject code	Subject	Level	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.	1	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.	1	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.	1	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.	1	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.	1	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.	1	4

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.	1	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.	1	3
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.	2	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.	2	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.	2	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.	2	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.	2	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	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.	2	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.	2	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.	2	3
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.	3	8

Diploma Subjects - Elective Cluster Subjects

Applied Chemistry

Subject code	Subject	Level	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.	3	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.	3	5

Chemical Processing

Subject code	Subject	Level	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.	3	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.	3	5

Pharmaceutical & Biologics Technology

Subject code	Subject	Level	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.	3	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.	3	5

Graduation Requirements

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