

# Pharmaceutical Science

## OVERVIEW



There's so much more to pharmaceutical science than the dispensing of medication.

You'll learn about the effects medicines have on the human body and how they help to treat diseases as you go on to pick up the required skills to process prescriptions and perform patient counselling in pharmacies. Specialised subjects in pharmaceutical analysis and current good manufacturing practices will also prepare you for a potential career in pharmaceutical industries.

Your industry readiness will be further enhanced as you undertake an internship programme following a specialisation in either Pharmacy Practice or Pharmaceuticals & Biologics.

With new hospitals and polyclinics in the pipeline and numerous pharmaceutical giants choosing Singapore as their manufacturing base, the future for graduates has never been brighter!

### Your Journey

## Year 1

Begin your journey with understanding how the human body works and how diseases occur. Build your foundation in chemistry which is essential in drug development and analysis. You will learn the principles of drug action and acquire patient counselling skills.

## Year 2

Continue to build on your clinical drug knowledge and hone your patient counselling skills. Apply your fundamental knowledge in the analysis of drug substances and products. Learn about Current Good Manufacturing Practice, an essential skillset in the pharmaceutical industry.

# Year 3

Deepen your knowledge and skills in pharmacy practice or pharmaceuticals and biologics manufacturing. Continue your learning journey through on-the-job training where you get to apply your skillset in a real work environment and learn from industry practitioners.

## 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.

### 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
<ul style="list-style-type: none"> <li>• Biology</li> <li>• Biotechnology</li> <li>• Chemistry</li> <li>• Combined Science</li> <li>• Food &amp; Nutrition</li> <li>• Physics/Engineering Science</li> <li>• Science (Chemistry, Biology)</li> <li>• Science (Physics, Biology)</li> <li>• Science (Physics, Chemistry)/Physical Science</li> </ul>	
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

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## COURSE STRUCTURE

### TP Fundamentals (TPFun) Subjects

Subject code	Subject	Level	Credit Units
ACS1005	<p>Communication &amp; Information Literacy</p> <p>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.</p>	1	2
ACS1006	<p>Workplace Communication</p> <p>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.</p>	1	2
ACS1007	<p>Persuasive Communication</p> <p>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.</p>	1	2
GCC1001	<p>Current Issues &amp; Critical Thinking</p> <p>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.</p>	1	2

AIN1001	<p><b>Innovation &amp; Entrepreneurship</b></p> <p>The Innovation &amp; 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.</p>	1	2
LEA1011	<p><b>Leadership: Essential Attributes &amp; Practice 1</b></p> <p>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.</p>	1	1
LEA1012	<p><b>Leadership: Essential Attributes &amp; Practice 2</b></p> <p>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.</p>	1	1
LEA1013	<p><b>Leadership: Essential Attributes &amp; Practice 3</b></p> <p>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.</p>	1	1
LSW1002	<p><b>Sports &amp; Wellness</b></p> <p>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.</p>	1	2
MCR1001	<p><b>Career Readiness 1</b></p> <p>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.</p>	1	1

MCR1002	<p>Career Readiness 2</p> <p>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.</p>	1	1
MCR1003	<p>Career Readiness 3</p> <p>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.</p>	1	1
AGS1002	<p>Global Studies</p> <p>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.</p>	1	3
AGS1003	<p>Managing Diversity at Work*</p> <p>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.</p>	1	3
AGS1004	<p>Global Citizenship &amp; Community Development*</p> <p>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.</p>	1	3
AGS1005	<p>Expressions of Culture*</p> <p>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.</p>	1	3
TGL1001	<p>Guided Learning</p> <p>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.</p>	1	3

ASI3029	<p>Student Internship Programme</p> <p>This programme involves attachment at companies related to your course of study in the pharmacy, pharmaceutical and biopharmaceutical industries. You are expected to undertake various activities discussed with and assigned by the participating host organisations. The programme enables you to apply knowledge and skills acquired in the course of your study to solve practical problems in the real workplace. Emphasis is also placed on training of transferable skills such as teamwork, interpersonal, written and oral communication skills.</p>	3	16
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\* Students must choose to take either one of these three subjects or TGL1001 Guided Learning.

## Core Subjects

Subject code	Subject	Level	Credit Units
ABT1001	<p>Cell Biology</p> <p>This subject covers the biology of cells of higher organisms, including structure-function relationships of cellular membranes and internal organelles, cell cycle and nuclear division, transport mechanisms and cell communication, cell motility and the cytoskeleton and cell death. Basic laboratory skills involving the study of cell structures with the use of cell staining techniques and microscopy will also be introduced in this subject.</p>	1	4
ACH1007	<p>Organic and Biological Chemistry</p> <p>This subject covers basic knowledge of organic chemistry, constituents of biological systems, their properties and significance to biological science. Topics covered include general organic chemistry, carbohydrates, proteins and enzymes, and lipids.</p>	1	4
ACH1009	<p>Principles of Inorganic and Physical Chemistry 1</p> <p>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.</p>	1	4
AMA1004	<p>Statistics for Applied Science</p> <p>This subject provides you with the basic statistical techniques that are essential for your course of study. Topics covered include basic probability and distributions, basic statistics, sampling distribution, hypothesis testing, analysis of variance and chi-square testing.</p>	1	3
AMB1002	<p>Human Anatomy and Physiology</p> <p>This subject provides you with a basic understanding of human anatomy and physiology. Topics include anatomy of human organs and organ systems and their functions.</p>	1	5
AMB1004	<p>Basic Microbiology</p> <p>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.</p>	1	3

APH1001	<p>Principles of Pharmacology</p> <p>This subject covers the basic principles and knowledge of pharmacology and toxicology. Topics include overview of the drug developmental process, pharmacodynamics, pharmacokinetics, and an overview of toxicology.</p>	1	3
APH1002	<p>Basic Pathology &amp; Immunology</p> <p>This subject introduces general and systemic pathology and the understanding of basic clinical chemistry for screening and monitoring of diseases. Topics include disease mechanisms, structure and functional abnormalities and common clinical chemistry tests.</p>	1	3
APH1003	<p>Introduction to Pharmacy Practice</p> <p>This subject introduces the services provided by pharmacy technicians at hospital and community pharmacies. Topics include drug information resources, good dispensing practice and management of common conditions in therapeutic areas such as nutrition, ophthalmology, otolaryngology and respiratory.</p>	1	3
AMB2007	<p>Pharmaceutical Microbiology</p> <p>This subject covers the applications of microbiology in the pharmaceutical industry and focuses on the microbiological testing of pharmaceutical products and equips students with the skills to perform aseptic dispensing techniques.</p>	2	3
APH2001	<p>Pharmaceutical Analysis 1</p> <p>This subject equips students with the knowledge on the basic principles and applications of analytical instruments and techniques commonly used in the pharmaceutical industries and analytical laboratories, and the technical skills required to operate instruments for analysis. Basic concepts of laboratory quality management system will also be covered.</p>	2	4
APH2009	<p>Pharmacy Practice 1</p> <p>This subject equips students with the knowledge and practices on handling clinical enquiries, making appropriate clinical recommendations, processing prescriptions and patient counselling in the therapeutic areas such as dermatology, gastroenterology, endocrinology and infectious diseases.</p>	2	5
APH2010	<p>Pharmacy Practice 2</p> <p>This subject equips students with the knowledge and practices on handling clinical enquiries, making appropriate clinical recommendations, processing prescriptions and patient counselling in the therapeutic areas such as cardiovascular, musculoskeletal, neurology and psychiatry.</p>	2	4
APH2011	<p>Bioprocess Technology &amp; Analysis</p> <p>This subject aims to equip students with the basic knowledge and technical skills to perform mammalian cell culture for upstream biopharmaceutical processes. The subject also covers the molecular and analytical techniques used in the biopharmaceutical industry to measure the quantity and quality of biological products.</p>	2	3

AMP3012	<p>Major project</p> <p>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.</p>	3	8
APH3004	<p>Pharmaceutical Manufacturing Technology</p> <p>This subject equips you with the fundamental knowledge of pharmaceutical downstream manufacturing processes. Topics covered include industrial aspects of drug production, manufacturing techniques and packaging technologies. It also covers solid, liquid and gaseous dosage formulation design and characterisation. The importance of cGMP and the associated regulatory aspects are also covered.</p>	3	4
APH3011	<p>Current Good Manufacturing Practice &amp; Process Improvement</p> <p>This subject covers the fundamental knowledge and applications of Current Good Manufacturing Practice (cGMP) in the pharmaceutical and biopharmaceutical industries. Topics include an overview of cGMP, documentation and record keeping, contamination control, in-process control, validation, and introduction to process improvement techniques.</p>	3	4
APH3012	<p>Pharmaceutical Analysis 2</p> <p>This subject covers the knowledge and applications of pharmacopeia test methods to evaluate the quality of active drug substances and finished pharmaceutical products. This subject also provides further knowledge on gas chromatography and high performance liquid chromatography including method development and optimization for various applications such as stability testing of pharmaceuticals. Students will perform test samples analysis, interpretation of test results and data analysis.</p>	3	4

## Diploma Subjects – Elective Cluster Subjects

### Pharmacy Practice

Subject code	Subject	Level	Credit Units
APH2012	<p>Pharmaceutical Legislation, Marketing &amp; Management</p> <p>The subject provides an overview of legislations affecting the pharmaceutical industry. The subject is also designed to provide students with an understanding of basic marketing concepts, tools and techniques pertaining to the commercialisation of pharmaceutical products. Basic business operations of hospital and retail pharmacies will also be included.</p>	2	5
APH3013	<p>Health Management in Patient Care</p> <p>This subject focuses on the knowledge, communication and facilitation skills to promote medication adherence, use of health screening and monitoring devices, as well as lifestyle modifications for health and disease management. Students will also be introduced to complementary health approaches and trends in healthcare delivery.</p>	3	4

### Pharmaceuticals and Biologics



Subject code	Subject	Level	Credit Units
APH2013	<p>Pharmaceutical Unit Operations</p> <p>This subject emphasises the application of engineering principles in the unit operations commonly employed in the upstream, pharmaceutical industry. Topics covered include reagent handling, dissolution, extraction, distillation, crystallisation, filtration and drying. The subject also covers the various fractionation processes and mechanical operations including solids handling, sieving, milling and comminution. Commonly used equipment in pharmaceutical manufacturing will also be introduced.</p>	2	4
APH3015	<p>Biopharmaceutical Processing</p> <p>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.</p>	3	5

## Graduation Requirements

Cumulative Grade Point Average	min 1.0
TP Fundamental Subjects	40 credit units
Diploma Subjects - Core Subjects - Elective Subjects	71 credit units min 9 credit units
<b>Total Credit Units Completed</b>	<b>min 120 credit units</b>