Medical Biotechnology

OVERVIEW

The future of medicine relies on biotechnology—and what better way than to discover or invent something that is useful to human health? With research and development leading to new discoveries, your knowledge of key concepts in cell technology, molecular analysis, microbiology technology, biochemical analysis and clinical diagnostics will improve healthcare and our everyday lives.

Now that emerging technologies are trending, your understanding of stem-cell therapy, point-of-care diagnostic testing and personalised medicine research could acquire you the scientific skills to help doctors save lives! Not to mention, with the relevant practical skills, you'll be on your way to underpin a career in research or clinical environment.

Your Journey

Year 1

You will build a strong foundation in science. The knowledge and skills are obtained through conceptualised learning and you will not only understand why they are needed, but how to apply them in different situations.

Year 2

You will learn specialised knowledge and skills related to biomedical research and clinical laboratory practice. In the fourth semester, you are able to choose from either of the two options, Personalised Medicine Research or Medical Laboratory Technology.

Year 3

Experience work-based learning by applying what you've learnt in real projects. You will be ready to work in research or clinical laboratories, and other biomedical companies. You can also choose to level up your skills with many further education options.

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
• 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).*

Note: *Applicants with complete Colour Appreciation Deficiency are not eligible to apply.*

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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

ASI3026	Student Internship Programme This programme involves attachment at industries related to your course of study. 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.	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
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
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
ABT1001	Cell Biology 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.	1	4
AMT1001	Biochemistry This subject introduces the fundamentals of organic chemistry and the essential biomolecules present in biological systems. The structures and properties of biomolecules, as well as the basic concepts of bioenergetics will also be introduced to illustrate how these interactions lead to metabolism.	1	5
AMT1003	Molecular Biology The subject covers the fundamentals of deoxyribonucleic acid (DNA), flow of genetic information, ribonucleic acid (RNA), as well as how processes like replication, transcription and translation operate in prokaryotes and eukaryotes. Basic practical knowledge and molecular laboratory techniques will be introduced.	1	5
AMB1002	Human Anatomy and Physiology 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.	1	5

AMT1002	Cell Technology This subject provides basic theoretical and practical knowledge of mammalian cell culture. It covers the requirements for establishing and maintaining cell cultures both in the laboratory and in large-scale operations. It also discusses the important applications of the cell culture technique in the biological and medical sciences.	1	3
ABM2016	Biological Data Analysis This subject covers the basics of biostatistics and application of statistics in clinical practices by converting clinical and laboratory experiences into quantitative statements. The topics covered include using statistical tools to summarize data, test for differences between test groups, analyse rates and proportions, establish or validate confidence intervals, and testing for trends. It also covers the application of biostatistics in different clinical cases. The topics covered include t-test, ANOVA and non-parametric tests.	2	5
AMT2002	Molecular Diagnostic Technology This subject covers molecular techniques in analysing DNA, RNA and proteins, as well as diagnostic platforms and instrumentation, which includes assay development, assay criteria and assay validation. It also addresses the regulatory requirements for diagnostic assays and the pathways to commercialization.	2	5
AMT2001	BioAnalytical Technology This subject focuses on the applications of immunological, analytical and separation techniques in the field of medical biotechnology. Basic concepts and techniques for extraction, purification and analysis of biomolecules will be covered. An introduction to good manufacturing practice (GMP) is included.	2	5
AMT2003	BioApplication This subject will cover the practices of good documentation and laboratory management, laboratory reagent preparation and research skills. This subject will provide opportunities for conceptualization of medical biotechnology related project, experimental design and project implementation.	2	4
AMP3017	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 Option Subjects

Personalized Medicine Research Option

Subject code	Subject	Level	Credit Units
APM2001	Stem Cells and Tissue Engineering This subject covers an overview of the concepts of tissue engineering, stem cells, biomaterials and a review on extracellular matrix, followed by topics on cell-cell and cell-matrix interactions at both the theoretical and experimental levels.	2	5

APM2002	Synthetic Biology This subject provides the fundamentals of DNA assembly and regulation of gene expression, as well as basic engineering principles to design biological systems and biofactories. It covers the laboratory techniques on genome editing, sequence analysis, as well as the potential applications of synthetic biology in medical biotechnology.	2	5
APM2003	Systems Biology This subject provides an overview of genomes, transcriptomes, proteomes, metabolomes and other omics information to profiling of health and disease. Genome sequencing techniques, as well as bioinformatics and computational analysis will be introduced.	2	5

Medical Laboratory Technology Option

Subject code	Subject	Level	Credit Units
ABM2014	Clinical Chemistry This subject focuses on the pathophysiological changes in disease and the application of clinical chemistry concepts for the diagnosis, prognosis, monitoring and screening of diseases.	2	5
ABM2017	Histopathology This subject introduces the basic knowledge of general and systemic pathology, as well as structural and functional abnormalities of organs and organ systems. Basic principles and skills related to histopathological diagnosis will also be covered.	2	5
AMB2008	Clinical Microbiology This subject covers the host-microbe interactions with emphasis on infectious diseases in humans. It includes various modes of transmission, diagnosis, prevention and control of infectious diseases caused by bacteria, viruses, fungi and parasites.	2	5

Diploma Subjects - Elective Cluster Subjects

Clinical Laboratory Practice

Subject code	Subject	Level	Credit Units
AMT3001	Blood Banking This subject covers the theoretical, practical and clinical aspects of blood transfusion. Emphasis is given on the application of immunologic principles as applied to blood grouping, antibody screening, identification and compatibility testing. It also stresses the importance of laboratory quality control and clinical considerations in transfusion practices.	3	4

AMT3002	Haematology This subject covers theoretical foundations and practical skills in haematology. It includes development of blood cells, diseases and disorders related to blood as well as bone marrow. It focuses on screening, diagnosis, prognosis and monitoring of haematological diseases and disorders.	3	5

Translational Medical Science

Subject code	Subject	Level	Credit Units
AMT3003	Translational Medical Science This subject equips students with knowledge and skills in conducting translational medical research projects. It covers designing, planning, experimenting, and touble shooting skills for translational medical research projects. It also introduces various data analysis and reporting skills.	3	9

Free Elective Subjects

Subject code	Subject	Level	Credit Units
APH3004	Pharmaceutical Manufacturing Technology 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.	3	4
APH3011	Current Good Manufacturing Practice & Process Improvement 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.	3	4

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**