



## DIPLOMA IN MEDICAL BIOTECHNOLOGY (T64)

### Course Overview

Have you wondered about the science behind COVID-19 PCR tests? The diagnostic tests are developed by research technologists and used by medical technologists – these are among the many exciting careers that this course prepares you for.

Medical biotechnology uses living cells and cell materials for research to develop more efficient ways of maintaining and improving human health. This course combines theory with hands-on experience to equip you with the skills to become a versatile professional. This diploma is unique in Singapore, as it trains you to work in BOTH biomedical science and biotechnology research and industry.

In Year 3, choose your specialisation in Bioinformatics, Clinical Laboratory Practice, Functional Plant Technology and Translational Medical Research. Thereafter, you will undergo work-based training in these areas and apply your skills and knowledge in related industries during the six-month internship programme which you will undergo either locally or overseas.

Upon graduation, you will be able to work as a research or laboratory technologist in the biomedical sciences industry, at the research and tertiary institutions, hospitals, speciality centres, pharmaceutical and biotechnology companies. You can also become a medical laboratory technologist to meet the growing demand for laboratory support in hospitals, central testing laboratories and private diagnostic laboratories.



#### ONE AND ONLY

Singapore's only medical biotechnology diploma that trains in **BOTH** biomedical science and biotechnology skillsets.



#### MULTI-DISCIPLINARY FOUNDATION

Receive broad-based multi-disciplinary training for an innovative future.



#### CREATING TOMORROW

Get exposed to emerging areas in biomedical science and biotechnology via work-based learning.

# 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 (EL1)*	1-7
Mathematics (E or A)	1-6
One of the following Science subjects: <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>	1-6
Any two other subjects, excluding CCA	
<b>2023 Planned Intake</b>	<b>65</b>
<b>Net ELR2B2 aggregate range (2023 JAE)</b>	<b>3 - 9</b>

\* 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.

# What You'll Learn

YEAR 1





YEAR 2

YEAR 3

TPFUN

You will begin your journey by building a strong broad-based foundation through core subjects ranging from microbiology, cell biology, mathematics to conservation, nutrition and workplace safety.

Core Subjects			
Subject Code	Subject	Credit Units	
AMB1005	<b>Basic Microbiology</b> <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>	4	^
AMT1004	<b>Cell Biology &amp; Biochemistry</b> <p>This subject introduces the biology of cells and the structure-function relationship of cells, cellular membranes and organelles. It covers basic concepts of organic chemistry and the structure-property relationship of essential biomolecules. Basic laboratory skills involving the study of cell structures with the use of cell staining and microscopy techniques, as well as basic biochemical analysis will also be introduced.</p>	5	^
AMA1008	<b>Digitalisation in Applied Science</b> <p>This subject covers the basic concept of data analytics as well as the processes of data cleaning, processing and visualisation of data in the contexts of applied science. Basic coding and fundamental computational thinking constructs such as variables, data type and logic will also be addressed.</p>	2	^
APH1004	<b>Laboratory &amp; Workplace Safety</b>	3	^

	<p>This subject covers an introduction to Good Laboratory Practice, and the identification and classification of biological, chemical, physical and ergonomic hazards at the workplace and laboratories. It also involves the conduct of risk assessment, risk controls and monitoring as well as communication of these risks to all persons involved in compliance with the Workplace Safety and Health (Risk Management) Regulations.</p>		
<b>AMA1003</b>	<p><b>Mathematics for Applied Science</b></p> <p>This subject covers algebra, differentiation, integration and their applications in applied science contexts.</p>	<b>3</b>	
<b>ANT1005</b>	<p><b>Nutrition &amp; Health</b></p> <p>This subject examines the relationship between food, nutrition and health. It provides an introduction to macro- and micro- nutrients in relation to the well-being of the human body. It covers food sources of these nutrients and their interrelationships as well as the use of basic nutritional tools like My Healthy Plate, food composition tables and online nutritional databases for basic nutritional analysis.</p>	<b>3</b>	
<b>ACH1009</b>	<p><b>Principles of Inorganic &amp; Physical Chemistry 1</b></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>	<b>4</b>	
<b>AMA1004</b>	<p><b>Statistics for Applied Science</b></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,</p>	<b>3</b>	

hypothesis testing, analysis of variance and chi-square testing.

YEAR 1

**YEAR 2**

YEAR 3

TPFUN

You will be equipped with knowledge and skills in both biotechnology and biomedical science. Through contextualized learning, you will be able to apply your knowledge and skills in many different life science contexts.

### Core Subjects

Subject Code	Subject	Credit Units	
AMT1002	<b>Cell Technology</b> 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.	3	^
AMT1005	<b>Human Anatomy &amp; Physiology</b> This subject provides you with a basic understanding of human anatomy and physiology. Topics include anatomy of human organs, organ systems and their functions.	4	^
AMT2006	<b>BioAnalytical Technology</b> This subject focuses on the applications of separation, analytical and immunological techniques in the field of medical biotechnology. Basic concepts and techniques for extraction, purification and analysis of biomolecules will be covered. An introduction to current good manufacturing practice (cGMP) is included.	4	^
AMT2007	<b>Molecular Biology</b> The subject covers the fundamentals of deoxyribonucleic acid (DNA), flow of genetic information, ribonucleic acid (RNA), as well as how processes like	5	^

replication, transcription and translation operate in prokaryotes and eukaryotes. Basic practical knowledge and molecular laboratory techniques will be introduced.

**AMT2010**

**Systems and Synthetic Biology**

**5**



This subject provides an overview of gene expression and omics technology. It also addresses the laboratory techniques on genome editing, sequence analysis, as well as the potential applications of synthetic biology in biotechnology.

**AMT2011**

**Tissue Engineering and Regenerative Medicine**

**4**



This subject provides an overview of the concepts of tissue engineering, stem cells and biomaterials. The principles of regenerative medicine and bioprinting will be introduced. It will also address research methodology process skills and the practices of good documentation.

**AMT2012**

**Immunochemistry**

**5**



The subject covers the concepts of immunology, including the components of the immune system, antigen recognition and presentation, antibody structure and function, specific and nonspecific immune responses to infections and pathophysiological changes in disease. It also focuses on immunological techniques and the application of clinical chemistry concepts for the diagnosis and screening of diseases.

**AMT2013**

**Haematology and Blood Banking**

**5**



This subject provides an overview of diseases and disorders related to blood and bone marrow, as well as the application of immunological principles in blood grouping, antibody screening, identification and compatibility testing. It also focuses on screening and diagnosis of haematological diseases

and disorders, with emphasis on quality control and management in haematology and blood banking laboratory.

YEAR 1

YEAR 2

**YEAR 3**

TPFUN

This year, you will get to apply what you have learned so far, in your internship! You will have the opportunity to work in research laboratories, clinical laboratories, or other biomedical companies. There are also many further education options for you to develop more skills.

### Core Subjects

Subject Code	Subject	Credit Units
AMP3020	<b>Major Project</b>  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.	6

## Diploma Elective Cluster Subjects

### Clinical Laboratory Practice

Subject Code	Subject	Credit Units
AMT3001	<b>Blood Banking</b>  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.	4
AMT3004	<b>Clinical Chemistry</b>  This subject focuses on the	5

pathophysiological changes in disease and the application of clinical chemistry concepts for the diagnosis, prognosis, monitoring and screening of diseases.

### Translational Medical Research

Subject Code	Subject	Credit Units
AMT3003	<b>Translational Medical Science</b>  This subject equips students with knowledge and skills in conducting translational medical research projects. It covers designing, planning, experimenting, and trouble shooting skills for translational medical research projects. It also introduces various data analysis and reporting skills.	9

### Bioinformatics

Subject Code	Subject	Credit Units
AMT3005	<b>Bioinformatic Analysis</b>  This subject covers the use of computational tools to mine for biological meaning in genomic DNA using methods include sequence alignment, motif finding, sequence comparison and gene expression analysis. This subject introduces scripting techniques to analyse biological data. It will use a scripting language to retrieve, process and analyse information from bioinformatics databases. Computational tools are also used to analyse protein sequence and 3D structure so as to predict their biological functions and model interactions with other molecules.	9



## Functional Plant Technology

Subject Code	Subject	Credit Units
AMT3006	<b>Plant Cell &amp; Cultivation Technology</b>  This subject provides the knowledge and skills needed for innovative development, cultivation and application of functional plants. It covers the physiological functioning of plants, biotechnological tools for plant improvement, sustainable cultivation technologies and plant based products.	9

YEAR 1

YEAR 2

YEAR 3

**TPFUN**

You will also take this set of subjects that equips you with the crucial 21st-Century life skills you need to navigate the modern world as an agile, forward-thinking individual and team player.

## TP Fundamentals (TPFun) Subjects

Subject Code	Subject	Credit Units
ASI3028	<b>Student Internship Programme</b>  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
ATX1001	<b>Effective Communication</b>  This subject introduces the fundamentals of effective communication. It also covers how to communicate with and convince an audience through writing and speaking	3

tasks. The skills in this subject will include the application of strategies for communication, appropriate vocabulary, language features, visual aids, tone and style. The **Message, Audience, Purpose and Strategy** (MAPS) framework will also be applied when planning and engaging in written and verbal communication. There will be opportunities to communicate and collaborate through active learning activities, apply digital and information literacy skills and build competence through self-directed learning.

**ATX1002**

**Professional Communication**

**3**



This subject covers professional communication skills for the workplace and employability skills in the areas of career preparation. It covers communication and interpersonal skills, including effective virtual communication etiquette, and conducting oneself professionally in the workplace. In addition, essential career preparation skills such as resume writing and interview skills, needed to seek and secure work would be included. The **Message, Audience, Purpose and Strategy** (MAPS) framework would also be applied when engaging in written and verbal communication. There will be opportunities to communicate and collaborate through active learning activities, apply digital and information literacy skills and build competence through self-directed learning.

**GTP1301**

**Current Issues & Critical Thinking**

**3**



This subject covers current issues, including diverse local and global concerns, that will impact lives and may have critical implications for Singapore. There will be opportunities to build competence through self-directed learning, communicate and collaborate in active discussions and objectively analyse issues using digital and information literacy skills and critical thinking scaffolds.

<b>GTP1201</b>	<b>Career Readiness</b>	<b>1</b>	^
<p>This subject focuses on personal management skills. It develops an understanding of one's career interests, values, personality and skills for career success. It covers the necessary knowledge, skills and attitudes needed to succeed in the workplace and achieve professional goals. There will be exposure to apply digital and information literacy skills, build competence through self-directed learning methods, and acquire the skills of being a lifelong learner.</p>			
<b>GTP1202</b>	<b>Career Management</b>	<b>1</b>	^
<p>This subject focuses on career management skills. It covers the importance of workplace readiness skills to adapt and respond to the changing job market environment. Career ownership and continuous learning for lifelong employability will be emphasised. There will be exposure to apply digital and information literacy skills, build competence through self-directed learning, and acquire the skills of being a lifelong learner.</p>			
<b>AGS1002</b>	<b>Global Studies</b>	<b>3</b>	^
<p>This subject provides essential skills and knowledge to prepare students for an overseas experience. They will examine the elements of culture and learn the key principles of cross-cultural communication. In addition, they will gain an appreciation and awareness of the political, economic, technological and social landscape to function effectively in a global environment. The subject prepares students to be responsible global citizens and leaders who can contribute to the global community through effective communication and collaboration.</p>			
<b>GTP1302</b>	<b>Guided Learning*</b>	<b>3</b>	^

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. Students will enhance their problem solving and digital literacy skills through this subject.

**AIN1001**

**Innovation & Entrepreneurship**

**2**



The subject is designed for learners from all disciplines to embrace innovation in either their specialised field or beyond. Learners will be taught to apply the Design Thinking framework to develop problem statements, ideate and identify feasible solutions. Learners will be exposed to several tools for prototyping. In addition, commercial awareness will be imbued in learners through various innovation and entrepreneurship concepts or tools. This subject also prepares students to be self-directed lifelong learners who are digital and information literate. It nurtures communicative and collaborative citizens who can use objective analysis in problem-solving.

**GTP1101**

**Leadership Fundamentals**

**2**



This subject focuses on self-leadership based on the values of integrity, respect, and responsibility. Increasing awareness of self and others will lay the foundations for personal and relationship effectiveness. Consequential thinking, clear articulation of personal values and visions, emphatic listening, and collaboration in serving others are some of the essential skills covered in this leadership journey. There will be

opportunities to build and to apply the concepts of being a values-centred leader.

**GTP1102**

**Leadership in Action**

**1**



This subject focuses on Service Learning as an experiential platform to apply the tenets of Self and Team Leadership. Service Learning will be the capstone project for this subject, which will require an analysis of the diverse needs of the community, collaboration with community partners and demonstration of learning, including key elements of empathy. There will be opportunities to build and to apply the concepts of being a values-centred leader.

**LSW1002**

**Sports & Wellness**

**2**



The subject enables students to build a good foundation for healthy living. Students will have the opportunity to participate in hands-on practical sessions where they will experience and develop both physical and technical skills in their chosen sports or fitness activities. Through a structured curriculum that facilitates group participation, practice sessions and mini competitions, students will be able to build lifelong skills such as resilience, leadership, communication and teamwork. Physical activity sessions will also be supplemented by health-related topics that span the dimensions of health, such as diet, nutrition, stress and weight management, to provide students with a holistic approach to healthy living. This subject also prepares students to be self-directed and accountable for lifelong learning for good health.

**TGS1001**

**Sustainability & Climate Action\***

**3**



This subject prepares students to be responsible global citizens and future leaders who can contribute to the global community. It introduces the topics of sustainability and explores how human societies can act to build a

sustainable future. This subject focuses on the impact of climate change, potential solutions to climate change, and the future of the green economy from global and local perspectives.

\* Students must choose to take either **Sustainability & Climate Action** or **Guided Learning**.

## 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
<b>Total Credit Units Completed</b>	min 120 credit units