



School of Applied Science

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The School offers seven courses in food, chemical and life sciences, aimed at nurturing a passion for science and research in you, and preparing you for a rewarding career in the vibrant food, F&B, healthcare, chemical and life sciences industries, as well as further studies. Our ability-driven curriculum strives to develop in you competence, character and change-readiness to enable you to stay relevant and competitive in a rapidly changing global world.

Learning at the School of Applied Science is practical, immersive and engaging. Through Problem-based Learning (PBL), the Student Internship Programme, Differential Research Programme (DRP), major projects and practicum at our learning enterprises (frozen desserts factory, animal clinic and food outlets), you will develop critical thinking as well as interpersonal and problem-solving skills that are vital for success in the dynamic global economy. A strong emphasis on hands-on applications means that you will get the opportunity to integrate and apply your knowledge and skills in a real work environment. In addition, the online delivery mode, in the form of interactive course materials and e-lectures, enables you to access online resources and learn at your own pace and convenience.

The School also encourages your participation in competitions and involvement in programmes such as the Overseas Community Projects and the Student Leadership Programme. These, together with core subjects such as Leadership: Essential Attributes & Practice (LEAP) and Communication Skills, provide our students with a holistic curriculum. To keep abreast of the latest developments, the School has carved out niche areas in applied research that contribute to the professional growth of its staff and enhance students' learning. Some of the areas of research or student projects are in Traditional Chinese Medicine, membrane technology, plant technology, proteomics, microbiology and immunology, nanotechnology, analytical services, aquaculture, environment and water technology, baking science and technology, hydroponics and applied food science and nutrition research. These research projects, often undertaken with industrial involvement, open up a common ground for multi-disciplinary technical teams to collaborate and innovate.

Centres of Excellence

Agilent Partner Laboratory @ TP

This Lab brings together cutting-edge chemical analytical and bio-analytical technologies from Agilent and resources from TP to help businesses, in particular those that develop, manufacture or distribute traditional medicine and food products. Chemists at this Lab are able to conduct tests to screen, detect, identify and quantify chemicals in ingredients and products at various stages of the chain – from product innovation to quality control, from trace substance screening and identification to product authentication.

Centre for Aquaculture & Veterinary Science

The new Centre for Aquaculture and Veterinary Science (CAVS) will provide students with engaging and experiential learning in skills related to animal wellness, veterinary care and support for pet animals, research on marine and freshwater species for growth and development as well as animal model studies for biomedical research.

Centre of Innovation for Complementary Health Products

The recently established Centre of Innovation (COI) for Complementary Health Products (CHP), is supported by SPRING Singapore under its Capability Development Scheme (Technology Innovation) - Infrastructure. The establishment of the COI is a major milestone in TP's journey of supporting the modernisation of the complementary health products industry through technology innovation. In line with the national agenda, the COI will focus on Traditional Medicine research and product development related to ageing. It will

benefit the CHP industry by providing consultancy and technical services, conducting training for the CHP workforce, and developing shared facilities and resources for CHP enterprises.

Centre for Applied Nutrition Services (CANS)

With an integrated team of experts, this Centre provides consultancy services in food, nutrition and culinary applications to the various food and health-related industries. The Centre's facilities include the Applied Nutrition Research Facility, Glycemic Index Research Unit and the Food and Culinary Applied Research Facility.

Centre for Renewable Resources

The School's Renewable Resources Technology capability is broadly divided into three capabilities: Green Materials, Water Technology and Biofuels. Through industry and joint research projects, the Centre for Renewable Resources aims to help companies reduce the cost of disposal or treatment of their solid waste or wastewater. At the same time, a valuable and usable product may be created in the process. This is particularly important in Singapore where resources are scarce and cost of disposal is extremely high.

Centre for Molecular Diagnostics

The Centre for Molecular Diagnostics (CMD) is a "makerspace" serving the Surge Research and Education (SuRE) Programme, Biological Testing Domain & Biosensor Domain. It focuses on creating point-of-care (POC) diagnostics and setting testing standards. The Centre is currently growing capabilities in real-time PCR, NGS, MALDI-ToF-MS, OIA wafer/paper-based low cost diagnostics, BioDot, etc.

A key contributor to the School's Research, Innovation and Enterprise activities, the Centre also supports the SkillsFuture initiative by strengthening pre-employment training for industry, as well as continuing education training (eg in the areas of biological testing and biosensor workshops). Industry partnership and projects include: OIA Food Toxin Test Kit (DSO/MINDEF/NEA), Continuous Flow Microfluidics (DSO, EHI, NEA, SIMTech), Multiplex Diagnostic Kit for Malaria (MOE-TIF), Kidney Panel Markers & Gout (MOE-TIF), and Thermo Fisher Scientific (biological testing capability partner).

Glycemic Index Research Unit

This facility is Singapore's first Glycemic Index Research Unit (GIRU) and is equipped to conduct in vivo analysis of the glycemic index (GI), insulinemic index (II), and glycemic response of various foods. The facility also offers consultancy services in the area of nutrition research, GI testing and has also the capacity to conduct nutrition intervention studies.

KoolWerkz Learning Enterprise

An off-campus training factory for ice cream production, KoolWerkz provides a hands-on training approach for entrepreneurship development. Together with TP's Entrepreneurship Centre, it offers learning opportunities to all TP students in technical or business-related fields. Here, students learn about ice cream processing, inventory management, Hazard Analysis and Critical Control Point (HACCP), quality control and assurance, logistics and marketing functions as in real business scenarios.

TP Animal Clinic

The TP Animal Clinic, licensed by the Agri-Food & Veterinary Authority in May 2011, serves to provide real-life training for Veterinary Technology students. Working under close supervision of our veterinarian staff, the students prepare the animals for sterilisation as well as provide essential veterinary assistance required for pre-and post-surgery and anaesthesia procedures. The students are also directly involved in animal monitoring and recovery. Apart from offering animal sterilisation services to the public, both the Cat Welfare Society and SPCA work closely with the TP Animal Clinic on stray animal sterilisations.

The Village Café Learning Enterprise

Situated at the Glocal Connect Village, this alternative F&B training ground allows students to practise productivity in a real F&B business model through the use of technology, innovative product design, and effective cost control. This café provides a cool and cosy ambience that serves quality food incorporating elements of different cultures.

Applied Food Science & Nutrition



What's in your favourite snack of crisps or instant noodles? Why do food manufacturers add chemicals to our packaged food? Can food really help us feel and look good?

Study this course if you want the answers to these questions. Step into the world of food science and nutrition, and appreciate the science behind food and how its components react with each other and impact our health. With there being such a huge variety of food around us, discover the role food plays in our wellbeing, and how it impacts our nation's health status too.

With rising concerns about the impact of our diet on our health in later years, there is a big demand for tasty yet healthier foods. Applying the scientific knowledge of both food science and nutrition, and receiving practice-oriented training, you will gain the necessary competence to embark on a career in the food, nutrition and the healthcare industries.

The food science and technology subjects will equip you for the challenging food industry in developing innovative, healthier and safer foods – through the use of the latest processing technology, functional food ingredients and techniques of preservation. The nutrition and health-related subjects will provide you with

the knowledge and skills to create and evaluate healthier meals for different population groups, assess their nutritional status, develop nutrition education programmes, and understand the management of diet-related diseases.



TP's student interns are able to work independently with minimum supervision. They possess good technical knowledge and are able to carry out assignments competently. They demonstrate good service awareness and work well in the team throughout the attachment period.

Ms Sharon Suniega
R&D Manager
Lacto Asia Pte Ltd

Career Opportunities

Our graduates can embark on a career in the food, nutrition and healthcare industries. You may be employed as a nutrition executive, dietetic technologist, nutrition educator, food laboratory analyst, R&D executive, QA/QC executive, food microbiologist, or food hygiene officer in food operations.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
TP Fundamentals Subjects	: 40 credit units
Diploma Subjects	
Core Subjects	: 63 credit units
Elective Subjects	: min 17 credit units
Total Credit Units Completed	: min 120 credit units

Application

Apply during the Joint Admissions Exercise following the release of the GCE O Level results. For other categories of local applicants, please refer to the section on “Admission and Requirements”. For international students, please refer to the section on “Information for International Students”.

Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

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 subjects:	Grades 1 - 6
Biology, Biotechnology, Chemistry, Combined Science, Food & Nutrition, Physical Science, Physics/ Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)	
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).*

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3024	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1004	Basic Microbiology	1	3
ACH1007	Organic & Biological Chemistry	1	4
ACH1009	Principles of Inorganic & Physical Chemistry 1	1	4
AFS1001	Food Chemistry	1	5
AMA1003	Mathematics for Applied Science	1	3
AMA1004	Statistics for Applied Science	1	3
ANT1001	Science in Food Preparation	1	4
ANT1002	Basic Nutrition & Food	1	4
AFS2002	Food Preservation & Quality Assurance	2	4
AFS2007	Food Additives	2	4
AFS2009	Sensory Science	2	4
ANT2001	Nutrition Across the Life Span	2	5
ANT2009	Community Health & Nutrition	2	4
ANT2010	Principles of Biochemistry & Physiology for Nutrition	2	4
AMP3014	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH2004	Principles of Instrumental Analysis	2	4
AFS3005	Food Processing & Packaging	3	5
ANT3001	Nutrition in Disease	3	5
ANT3004	Practical Sports Nutrition	3	4

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Food Safety in Product Development</u>			
AFS2008	Applied Food Sanitation	2	3
AFS3006	Product Development & Marketing	3	3
AFS3007	Food Safety	3	3

Baking & Culinary Science



Future Master Chefs, take note! If you dream of creating the perfect dish, sweet or dessert, stop dreaming and let science help you. Take the guesswork out of baking and culinary work and uncover the science behind the recipes and techniques that you do: from tempering chocolate, reducing sauces to roasting the perfect duck. With your scientific knowhow, you'll be able to create innovative dishes as well as mouth-watering desserts for the food and beverage industry.

This course will teach you to scientifically evaluate the sensory and food quality aspects of the dishes you prepare. Right from your first year, comprehensive hands-on training on culinary and baking sets your foundation before moving on to an intensive yet interactive second year with more advanced techniques and skill-based experiences that are coupled with the explained science. The curriculum encompasses chemistry, microbiology, food safety, product development, as well as baking and culinary technology. Part of the uniqueness of this course is that you will undergo a truly Asian culinary experience with a touch of your local heritage too.

During the third year, you will apply your acquired knowledge and skills to manage and operate various real-life F&B Learning Enterprises on campus, as well as undergo a 20-week internship to gain and further develop your career-specific skills in the diverse food and beverage (F&B) industry or food ingredient companies. The course also hones your entrepreneurial skills to help you embark on your own business ventures.



Great training is the foundation of professionalism, and TP culinary students exemplify what it means to be the product of a great educational programme. With a higher standard of professionalism, culinary knowledge and technical skills development, these students bring a unique combination of confidence, dedication and ability to the job, making them an invaluable asset to any culinary team.

Chef Toni Robertson
Executive Chef
Mandarin Oriental, Singapore

Career Opportunities

Our graduates are well-positioned to join the F&B industry as junior chefs, baking technologists or food product R&D executives. They can also choose to work in the baking, food service and food consultancy industries as well as in other supporting industries dealing with food ingredients. Graduates with a strong desire to pursue higher degrees may move on to universities that offer culinary science, as well as food service or culinary arts management courses.

Graduation Requirements

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

Application

Apply during the Joint Admissions Exercise following the release of the GCE O Level results, as well as directly through the Early Admissions Exercise (EAE). Candidates who are shortlisted through the EAE will be required to undergo an interview to which they should bring portfolios of their work in culinary as evidence of their passion and creativity. The process seeks to determine the aptitude and attitude such as commitment and enthusiasm of the candidate for the culinary arts. For other categories of local applicants, please refer to the section on “Admission and Requirements”. For international students, please refer to the section on “Information for International Students”.

Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

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Minimum Entry Requirements

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

Note:

- *Students are required to work in non-halal certified kitchens and facilities, as well as handle various ingredients such as meats (including pork and their by-products); emulsifiers and gelling agents of animal origin; as well as alcohol-based products. Students may not necessarily consume these ingredients but will be required to evaluate and assess their physical/ chemical properties.*
- *Students must be prepared to work in a fast-paced and warm environment of the various commercial grade kitchens. To ensure compliance on food and workplace safety, applicants with any medical conditions including physical disabilities should make a declaration and obtain pre-enrolment medical clearance.*
- *Students are also required to purchase uniform sets, safety shoes, bakery and knife sets and textbooks. These are not included in the tuition fees.*

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3025	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABC1001	Food & Culture	1	3
ABC1006	Fundamental Culinary Skills	1	5
ABC1008	Principles of Culinary Science	1	3
ABC1009	Fundamental Baking Skills	1	3
ABC1010	Food Safety Fundamentals	1	3
ACH1007	Organic & Biological Chemistry	1	4
AFS1001	Food Chemistry	1	5
ANT1002	Basic Nutrition & Food	1	4
ABC2015	Baking & Pastry Practicum	2	6
ABC2017	Food Service Technology Application	2	4
ABC2018	Asian Cuisines Practicum	2	7
ABC2020	Western Cuisines Practicum	2	5
ABC2021	Baking & Confectionery Science	2	3
AFS2007	Food Additives	2	4
ABC3008	Product Development in Food Service	3	4
AMP3015	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>F&B Enterprise</u>			
ABC3006	Baking & Culinary Operations	3	7
ABC3009	Food Service Principles of Management	3	2

Biomedical Science



Play a part in assisting clinical diagnosis, and in the research and development of new methods for the diagnosis, treatment and prevention of diseases. Study Biomedical Science and you will understand how the human body functions, how diseases occur, and how we can prevent and diagnose them.

Singapore is poised to be a global hub for biomedical and clinical sciences. The local biomedical sciences sector is growing rapidly with increasing foreign direct investment that boosts job opportunities in clinical laboratory testing, clinical trials as well as research and development. Singapore's thrust to be the region's medical hub with world-class healthcare services emphasises the need for quality trained technologists in clinical laboratories and clinical research. This course puts you in demand!

You begin by learning the foundational sciences to understand the biology and chemistry of health sciences. You will study, among other things, the inner workings of living cells, the biological processes involving proteins and enzymes, the structure, parts and functions of the human body, and the world of bacteria, viruses and other microorganisms. You will progress to learn the nature, causes and progression of human diseases, our biological responses

and defences, and diagnosis so that appropriate treatment can be provided. You will ultimately build your strength in the testing, diagnosis, management and prevention of diseases.

This course emphasises learning through established collaborative training with industry/research institutions/hospitals, taught by experienced teaching/research staff and industry practitioners. The compulsory structured internship carried out concurrently with major projects helps you to experience working life and allows you to apply theory to practice. Interns are involved in real industry projects, evaluating new clinical laboratory equipment or diagnostic test kits.



We are impressed by the quality of TP's students who are attached to SGH pathology laboratories annually. They demonstrate enthusiasm, commitment, diligence and a positive attitude throughout the period of their attachments. The skills that they have acquired in the laboratories will put them in good stead to commence work almost immediately as laboratory or medical technologists in hospitals and clinical laboratories upon graduation. With more hospitals being developed and a rapidly ageing population, there is a very strong demand for graduates embarking on such careers.

Dr Alvin Lim Soon Tiong
 Assistant Director, Department of Pathology, SGH
 Director of Allied Health Education,
 SingHealth Duke-NUS Pathology Academic Clinical Programme
 Adjunct Associate Professor,
 Duke-NUS Graduate Medical School Singapore
 Adjunct Associate Professor,
 School of Biological Sciences, NTU

Career Opportunities

Our graduates can work as medical technologists or laboratory technologists in hospital/clinical laboratories, medical research centres, and central testing laboratories. They can also work as assistant clinical research co-ordinators at clinical research organisations. Those who enjoy being at the forefront of technology can work as product application specialists, or sales and marketing executives of medical/diagnostic products and devices.

Graduation Requirements

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

Application

Apply during the Joint Admissions Exercise following the release of the GCE O Level results. For other categories of local applicants, please refer to the section on "Admission and Requirements". For international students, please refer to the section on "Information for International Students".

Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

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Minimum Entry Requirements

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

Note: Applicants with partial or complete colour appreciation deficiency are not eligible to apply.

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3026	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABT1001	Cell Biology	1	4
ABT1003	Biomolecules	1	5
ABT1004	Molecular Genetics	1	5
ACH1009	Principles of Inorganic & Physical Chemistry 1	1	4
AMA1003	Mathematics for Applied Science	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1004	Basic Microbiology	1	3
ABM2013	Immunology	2	4
ABM2014	Clinical Chemistry	2	5
ABM2016	Biological Data Analysis	2	5
ABM2017	Histopathology	2	5
ABT2013	Molecular Biology	2	4
ABT2015	Mammalian Cell Technology	2	3
ACH2004	Principles of Instrumental Analysis	2	4
AMB2006	Medical Microbiology	2	4
AMP3006	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Laboratory Medicine</u>			
ABM3006	Blood Banking	3	3
ABM3009	Haematology	3	3
ABM3010	Laboratory Management & Quality Assurance	3	3
<u>Free Electives</u>			
APH3004	Pharmaceutical Manufacturing Technology	3	4
APH3011	Current Good Manufacturing Practice & Process Improvement	3	4

Biotechnology



Genes, molecular biology, cloning, cell technology, immunology, drug discovery, diagnostic development, biochemical analysis, health and disease research – do these terms excite you? Do you want to acquire life science skills that will make you globally competitive? Do you want a career that involves new biological discoveries and novel applications of knowledge? If so, this course is for you!

This course trains you to be a research or laboratory technologist supporting the growing life science industry. The Singapore Government has targeted the life science industry to be our fourth pillar of economic growth, and has invested heavily to make Singapore the regional life sciences hub. As a result, research technologists are increasingly in demand in disease biology, diagnostics and therapeutics. At the same time, more manpower is also needed for research activities on economically important plants and animals so as to increase our food yield.

In your first year, you will develop a solid foundation in basic biology and chemistry. The second year trains you in the diploma specialisation subjects through a well-integrated sequence of modules on cellular and molecular biotechnology. A hands-on approach forms the core basis of training, during which you will acquire

a repertoire of research skills in the areas of molecular biology, mammalian cell technology, biochemistry, microbiology, genomics, proteomics, plant biotechnology, immunology and other key supporting technology essential for biomedical and scientific laboratory and industry. The elective subjects that you will take in the third year will allow you greater specialisation in your selected field, especially in the areas of translational biomedical research or bioinformatics.

You will eventually develop a solid broad-based foundation in life sciences that will maximise your career and future educational options. To further hone your technical skills, you will undergo a six-month attachment either locally or overseas in the biotechnology and biomedical industries.



I am impressed by the diligence and inquisitive nature of students from this course and would gladly accept them without any qualms for any suitable projects in future.

Dr Yang Yuansheng
Research Scientist
Bioprocess Technology
Institute,
A*STAR

Career Opportunities

Our graduates have found work in research institutions (both A*STAR and non-A*STAR), universities, hospitals, biotechnology companies and also government ministries and statutory boards. You may also work as a laboratory technologist assisting in pre-clinical trials at contract research organisations, or in laboratory operations and maintenance at research and teaching institutions, or even hospitals. Graduates interested to be technical support officers can also work in aquaculture and agro-technology parks and farms. Your solid broad-based training will also enable you to be employed as a marketing or product specialist for life sciences instruments and products. The laboratory skills and knowledge gained by our graduates are applicable worldwide.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
TP Fundamentals Subjects	: 40 credit units
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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).*

Course Structure

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LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3027	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

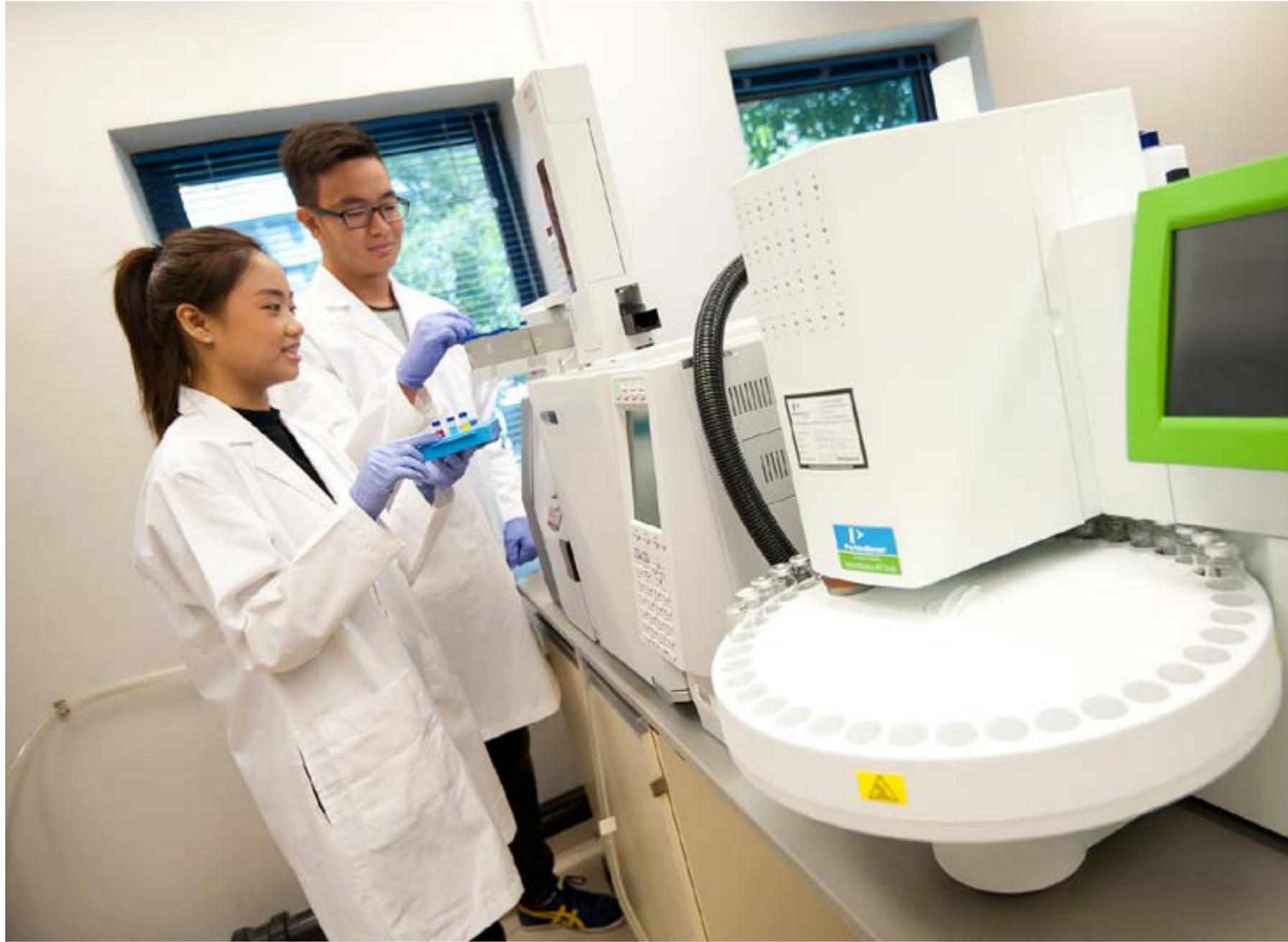
SUBJECT CODE	SUBJECT	LEVEL		CREDIT UNITS
ABT1001	Cell Biology	1	4	
ABT1003	Biomolecules	1	5	
ABT1004	Molecular Genetics	1	5	
ACH1009	Principles of Inorganic & Physical Chemistry 1	1	4	
AMA1003	Mathematics for Applied Science	1	3	
AMB1002	Human Anatomy & Physiology	1	5	
AMB1004	Basic Microbiology	1	3	
ABM2013	Immunology	2	4	
ABM2016	Biological Data Analysis	2	5	
ABT2006	Analytical Biochemistry	2	5	
ABT2009	Plant Cell Technology	2	5	
ABT2013	Molecular Biology	2	4	
ABT2014	Metabolic Biochemistry	2	4	
ABT2015	Mammalian Cell Technology	2	3	
AMB2006	Medical Microbiology	2	4	
AMP3013	Major Project	3	8	

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Translational Biomedical Research</u>			
ABT3019	Stem Cells & Tissue Engineering	3	3
ABT3026	Molecular Diagnostic Development	3	3
ABT3027	OMICs & Recombinant Technology	3	3
<u>Bioinformatics</u>			
ABT2017	Scripting in Bioinformatics	2	3
ABT3023	Sequence Analysis	3	3
ABT3024	Structural Bioinformatics	3	3
<u>Free Electives</u>			
APH3004	Pharmaceutical Manufacturing Technology	3	4
APH3011	Current Good Manufacturing Practice & Process Improvement	3	4

Chemical Engineering



Oil refinery giants, major manufacturers of petrochemicals, specialty chemicals and pharmaceutical giants all have a strong presence in Singapore. These companies, rooted in such diverse fields, have one thing in common — they rely on chemical engineers in all aspects of their operations.

Chemical engineers are involved in the manufacture of products such as fuel, cosmetics, petrochemicals, plastics, processed foods and medicine so that we can enjoy and reap the benefits of scientific discoveries. They hold crucial responsibilities in the process industry such as running plant operations, designing reactors and process equipment, improving efficiency as well as looking into the safety and environmental aspects of processes.

This course will equip you with knowledge and skills in chemistry and analytical chemistry, and laboratory techniques so that you will be well trained to do research and testing for the Chemical and Pharmaceutical Industry. Moreover, you will be trained in chemical process technology, occupational safety and health, as well as environmental technology, so that you will be able to operate and optimise manufacturing systems that produce the products that we use every day in a safe and environmentally friendly way.

The extensive scope of this course will prepare you for higher education. Besides the National University of Singapore and Nanyang Technological University, students can also enrol in the Singapore Institute of Technology for further studies. You will have opportunities for local or overseas internships at multinational corporations and reputable institutions.



Students and graduates from this course are responsible and inquisitive. They have a good understanding of process engineering and are able to perform their task well with minimum supervision.

Lim Kiah Siang
Training Manager
Petrochemical Corporation of Singapore (Pte) Ltd

Career Opportunities

Trained to be versatile, you can conduct research or testing in laboratories, or be involved in production and technical sales in a broad range of companies in various industries. Specifically, you can embark on a rewarding career in Singapore's world-leading energy and chemical industry. Alternatively, you can consider a fulfilling career in the fast growing pharmaceutical and biotechnology industry, which produces medicines used by doctors worldwide to improve patients' quality of life.

Graduation Requirements

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

Application

Apply during the Joint Admissions Exercise following the release of the GCE O Level results. For other categories of local applicants, please refer to the section on "Admission and Requirements". For international students, please refer to the section on "Information for International Students".

Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

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 subjects:	Grades 1 - 6
Biology, Biotechnology, Chemistry, Combined Science, Food & Nutrition, Physical Science, Physics/ Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)	
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 Ingggris).*

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3028	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

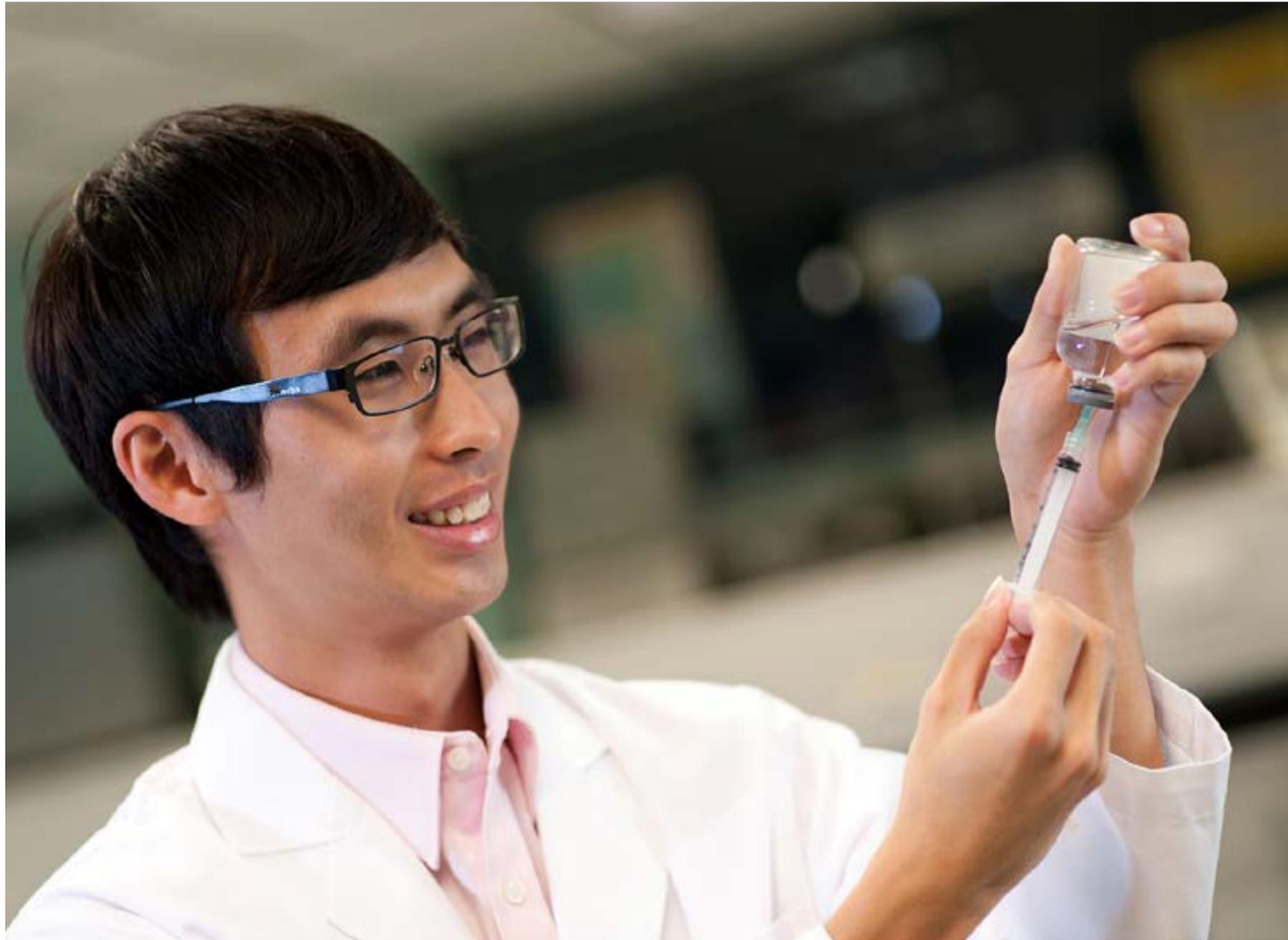
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1004	Basic Microbiology	1	3
ACE1002	Thermodynamics	1	4
ACE1006	Mass & Energy Balance	1	4
ACH1008	Principles of Organic Chemistry	1	4
ACH1009	Principles of Inorganic & Physical Chemistry 1	1	4
ACH1010	Principles of Inorganic & Physical Chemistry 2	1	4
AMA1006	Engineering Mathematics 1	1	4
AMA1007	Applied Mathematics	1	3
ACE2002	Environmental Technology	2	4
ACE2009	Occupational Safety & Health	2	4
ACE2011	Unit Operations 1	2	4
ACE2012	Unit Operations 2	2	4
ACE2013	Chemical Reaction Engineering	2	4
ACE2014	Productivity Improvement	2	2
ACE2015	Process Control & Instrumentation	2	4
ACH2004	Principles of Instrumental Analysis	2	4
AMA2002	Engineering Mathematics 2	2	3
AMP3008	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Applied Chemistry</u>			
ACE3012	Chemical & Material Testing	3	4
ACH3005	Laboratory Analysis & Management	3	5
<u>Chemical Processing</u>			
ACE3004	Plant Safety & Loss Prevention	3	4
ACE3013	Petrochemical Plant Processes	3	5
<u>Pharmaceutical & Biologics Technology</u>			
APH3014	GMP in Pharmaceuticals/ Biologics	3	4
APH3015	Biopharmaceutical Processing	3	5

Pharmaceutical Science



Do you have a passion to safeguard health by making quality drugs and imparting knowledge on the safe use of medicines? If so, this course is for you! You will learn about the effects of medicines on the human body and how they work to cure diseases, and acquire the knowledge and skills required to design, analyse, manufacture and market new therapies for diseases.

With a rapidly growing ageing population and higher incidence of lifestyle-related illnesses such as Type 2 diabetes and heart diseases, there is an increase demand for healthcare services, pharmaceutical and biologic drugs. Singapore has positioned herself to be a regional biomedical hub and has committed S\$3.7 billion to the biomedical industry, attracting leading biopharmaceutical companies to make Singapore their global manufacturing base and creating many job opportunities in these industries. In addition, with new hospitals, polyclinics and nursing homes in the pipeline, there will also be an unprecedented need for pharmacy technicians and pharmacists in Singapore to work in this industry.

This course will build your foundation in chemistry and biology, and equip you with the knowledge and core skills in

pharmacy practice, pharmaceutical and biopharmaceutical technologies and analysis. You will learn specialised subjects related to drug action on diseases, medicine legislations and patient counselling to prepare you for work in pharmacies. You will also learn about pharmaceutical manufacturing and bioprocessing technologies and good manufacturing practice.

In your third year of study, you can choose to specialize either in the Pharmacy Practice or Pharmaceuticals and Biologics elective cluster, where you will deepen your knowledge in these areas and apply your skills in the relevant fields during the six-month enhanced internship programme. You will be able to take up an internship position at hospitals, retail pharmacies, pharmaceutical manufacturing industry, or QC and research laboratories in Singapore or overseas. The internship enables you to apply theory to practice on real industry projects. During the course of your study, you can also take part in research projects offered by the school or research institutes in various research topics such as pharmaceutical science, analytical science, biologics and traditional medicine.

As part of the government's SkillsFuture initiatives to encourage continuing education and skill mastery, Continuing Education and Training (CET) programmes such as the Attach-and-Train for Biologics Sector and Advanced Diploma in Pharmaceutical Sciences as well as many other modular courses have been launched, providing ample opportunities for our Diploma in Pharmaceutical Science graduates to deepen and upgrade their skills.



The students from Temasek Polytechnic are generally well-rounded in terms of communication skills and clinical knowledge. The curriculum is well-balanced enough to provide sufficient coverage as well as depth to adequately equip the students for the internship programme.

Esther Ang Pei Jing
Outpatient Pharmacy
KK Women's & Children's Hospital

Career Opportunities

Graduates can work as pharmacy technicians in hospitals, community and retail pharmacies, QA/QC assistants to conduct analysis and quality checks on finished pharmaceutical products or production technicians to manufacture drugs in the pharmaceutical and biopharmaceutical industry. For the research-inclined, you can also join research institutes or pharmaceutical companies to assist in research work on drug development and clinical trials. You can also embark on a career in technical sales and marketing for pharmaceutical and health products.

Graduation Requirements

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

Application

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Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

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

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Biology, Biotechnology, Chemistry, Combined Science, Food & Nutrition, Physical Science, Physics/ Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)	
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 Ingggris).*

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3029	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABT1001	Cell Biology	1	4
ACH1007	Organic & Biological Chemistry	1	4
ACH1009	Principles of Inorganic & Physical Chemistry	1	4
AMA1004	Statistics for Applied Science	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1004	Basic Microbiology	1	3
APH1001	Principles of Pharmacology	1	3
APH1002	Basic Pathology & Immunology	1	3
APH1003	Introduction to Pharmacy Practice	1	3
AMB2007	Pharmaceutical Microbiology	2	3
APH2001	Pharmaceutical Analysis 1	2	4
APH2009	Pharmacy Practice 1	2	5
APH2010	Pharmacy Practice 2	2	4
APH2011	Bioprocess Technology & Analysis	2	3
AMP3012	Major Project	3	8
APH3004	Pharmaceutical Manufacturing Technology	3	4
APH3011	Current Good Manufacturing Practice & Process Improvement	3	4
APH3012	Pharmaceutical Analysis 2	3	4

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Pharmacy Practice</u>			
APH2012	Pharmaceutical Legislation, Marketing & Management	2	5
APH3013	Health Management in Patient Care	3	4
<u>Pharmaceuticals and Biologics</u>			
APH2013	Pharmaceutical Unit Operations	2	4
APH3015	Biopharmaceutical Processing	3	5

DIPLOMA SUBJECTS – ELECTIVE SUBJECTS

Students can also opt to take the following elective subjects when offered.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH1010	Principles of Inorganic & Physical Chemistry 2	1	4
ABT2013	Molecular Biology	2	4
ACE2009	Occupational Safety & Health	2	4
ACE2015	Process Control & Instrumentation	2	4

Veterinary Technology



Achieve your life-long dream of developing vaccines or treatment for animals suffering from diseases or working with animals in the veterinary, aquaculture and wildlife conservation, pet, animal theme park and scientific research communities.

Get a head start by assisting in real life animal sterilisations at TP's licenced TP Animal Clinic and, through our unique collaboration with Mount Pleasant Veterinary Group (2008) Pte Ltd and other animal hospitals, you will be clinically trained in all aspects of veterinary practice. With our intensive and practical training, you will graduate as a technically competent and much sought-after veterinary or animal technologist.

In our pursuit to find cures for human and animal diseases, animal models are used in research and pre-clinical trials. All these make responsible and humane animal care and use extremely important. Moreover, the growing importance of aquaculture for food productivity and for meeting the local consumer needs for seafood and fish, will ensure your expertise will be very much in demand in the years ahead.

This course focuses on establishing a solid foundation in the basic and applied animal sciences for meeting the needs of the veterinary, scientific research, wildlife conservation, aquaculture and pet

retail industries. The practice-oriented programme equips you with specialised skill sets that will prepare you well as responsible and competent veterinary/ animal technologists.

Other than veterinary diagnostics, surgery and anaesthesia assistance, animal nutrition and health, aquaculture and bio conservation, you will also learn about molecular and cellular techniques as well as humane care and use of laboratory animals for scientific and veterinary research. Your technical competency is further honed through a minimum five-month internship either locally or overseas in animal facilities and research institutions, animal or conservation parks, veterinary hospitals/ clinics and other animal-related organisations.



We are very happy with students from your course as they have better attitude towards learning and working compared to all the others whom we have had before.

Dr Lisa Park
Chief Scientific Officer
PWG Genetics Pte Ltd

Career Opportunities

Our graduates can work in scientific research, wildlife and marine conservation, aquaculture, pet service and related industries, or the veterinary centres. You may be employed as a veterinary technologist in veterinary clinics/ hospitals, or as an animal welfare education officer/ assistant, animal health inspection assistant or animal care and management officer in animal welfare organisations, Agri-Food and Veterinary Authority of Singapore, animal quarantine centres and pet shops. You can also work as a biologist, veterinary technician, animal management officer or aquarist at River Safari, Wildlife Reserves Singapore, Underwater World in Sentosa and Marine Life Park in Resorts World Sentosa.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
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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 Ingggris).*

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ACS1005	Communication & Information Literacy (IComm)	1	2	
ACS1006	Workplace Communication (WkComm)	1	2	
ACS1007	Persuasive Communication (PComm)	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
IED1001	Innovation & Entrepreneurship	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TFS1002	Global Studies	1	3	
TFS1003	Managing Diversity at Work*	1	3	
TFS1004	Global Citizenship & Community Development*	1	3	
TFS1005	Expressions of Culture*	1	3	
TFS1006	Guided Learning	1	3	
ASI3030	Student Internship Programme	3	16	

* Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1004	Basic Microbiology	1	3
ABT1003	Biomolecules	1	5
ACH1009	Principles of Inorganic Chemistry 1	1	4
AMA1004	Statistics for Applied Science	1	3
AVT1004	Wildlife Ecology & Conservation	1	2
AVT1006	Animal Anatomy & Physiology	1	4
AVT1007	Animal Nutrition, Feeds & Feeding	1	4
AVT1008	Developmental Biology	1	3
AVT1009	Animal Care, Husbandry & Behaviour	1	3
AVT2006	Veterinary Immunology	2	3
AVT2009	Veterinary Pharmacology & Toxicology	2	3
AVT2012	Molecular & Cell Technology	2	4
AVT2016	Animal Diseases & Clinical Pathology	2	4
AVT2017	Aquatic Care, Health & Diseases	2	3
AVT2018	Clinical Diagnostic Techniques	2	4
AVT2019	Clinical Practicum	2	3
AVT2020	Surgery, Anaesthesia & Veterinary Practices	2	4
AVT2021	Molecular Genetics & Genomics	2	4
AMP3011	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVE CLUSTER SUBJECTS

Students will be required to read an Elective Cluster offered by the School and complete a minimum of 9 credit units. The Elective Cluster to be offered by the course, and the subjects under this Cluster, are summarised below.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Veterinary</u>			
AVT3010	Animal Breeding & Reproduction	3	4
AVT3011	Laboratory Animal Science & Technology	3	5
<u>Aquaculture</u>			
AVT3012	Aquaculture Product Quality & Safety	3	4
AVT3013	Aquaculture Technology	3	5

Subject Synopses

ABC1001 Food & Culture

This subject equips you with the necessary knowledge of the different types of cuisines in selected countries, the ingredients used, and the foods and alcoholic beverages used in major festivals and celebrations in these countries. It also provides an understanding of the important roles of food in culture such as its association with religious beliefs, collective identities, symbolism, and the arts. This subject provides the cultural backdrop to enhance the understanding of food use and is relevant to other subjects in the course.

ABC1006 Fundamental Culinary Skills

This subject covers various cooking techniques such as sautéing, broiling, poaching, simmering, panfrying, and deep-fat frying. Knife skills, operation of equipment, purchasing, receiving and storage of food will also be covered. In addition, the fundamentals of ingredients applications in various recipes and proper food hygiene practices will be taught.

ABC1008 Principles of Culinary Science

This subject illustrates the principles of food science in culinary application, emphasising the functional and structural properties of food constituents and their behaviour during food preparation. This subject will also discuss concepts that underpin everyday cooking.

ABC1009 Fundamental Baking Skills

The subject will cover the fundamental skills for baking and pastry. A variety of baked products will be covered that includes bread, cakes and pastries. Knowledge of equipment and ingredients selection, as well as safety in a baking kitchen will be emphasised.

ABC1010 Food Safety Fundamentals

This subject focuses on the food safety aspects associated with food service operations. It covers the sources of potential food hazards, cleaning and sanitising, pest control and the application of a food safety management system in the food service environment.

ABC2013 Food Service Operations

This subject covers the fundamental knowledge and skills on managing a catering operation. Topics include menu planning, cost management, and purchasing, receiving and storage of food. Other topics include operating kitchen equipment, quantity food production planning and implementation of quality control measures. Kitchen safety and proper food hygiene practices will be emphasised throughout the practicals.

ABC2015 Baking & Pastry Practicum

The subject aims to develop a repertoire of baking and pastry skills with emphasis on the preparation of specialty baked products with the use of commercial baking equipment or specialty ingredients. This subject will also include more advanced technical skills in pastry and confectionery.

ABC2017 Food Service Technology Application

This subject is designed to provide the knowledge and skills necessary to produce foods using various technologies to support production efficiency in the food service. Engineering concepts in relation to catering technology will also be highlighted.

ABC2018 Asian Cuisines Practicum

This subject aims to provide practice in the preparation, presentation and evaluation of common dishes from various Asian regions with focus on Chinese and South East Asia. It will also require the demonstration of culinary skills during kitchen practicum on the preparation of stocks, sauces, soups, salads, fruits/vegetables, grains, eggs, poultry, red meat, and seafood. Knowledge on equipment selection and kitchen safety will be emphasised.

ABC2020 Western Cuisines Practicum

This subject aims to provide practice in the preparation, presentation and evaluation of common dishes from various Western regions with focus on French and Italian. This subject will also require the demonstration of culinary skills during kitchen practicum on the preparation of stocks, sauces, soups, salads, fruits/vegetables, grains, eggs, poultry, red meat, and seafood. Knowledge on equipment selection and kitchen safety will be emphasised.

ABC2021 Baking & Confectionery Science

This subject will cover the fundamentals of baking and confectionery science. The topics include flour milling, analytical tests used to evaluate flour quality, functions of ingredients used in various baked and confectionery products and processing methods for various confectionery products.

ABC3006 Baking & Culinary Operations

This subject provides the necessary practical training in quantity food production for a food service operation. You will be required to manage catering processes and/or technologies to scale menu items whilst ensuring food quality and safety.

ABC3008 Product Development in Food Service

This subject provides opportunities to develop new food products in the food service environment. Idea generation techniques, applications of knowledge in food science and nutrition, functionality and selection of food ingredients, food safety, and sensory evaluation are demonstrated through product development projects.

ABC3009 Food Service Principles of Management

This subject focuses on the strategies and tools in managing a food service. It provides the management and operational knowledge in facilities planning and design, production planning, marketing, distribution and their applications in food services. Topics will also include operational and strategic management, human resource and financial management.

ABM2013 Immunology

The subject covers the basic concepts of immunology from components of the immune system to specific and non-specific immune responses to infections as well as aberrant immune activities like autoimmunity and hypersensitivity. It also deals with the use of immune cells and mediators for prophylaxis and treatment of diseases, as well as immunological techniques that are used for diagnosis of diseases and research.

ABM2014 Clinical Chemistry

This subject focuses on the pathophysiological changes in disease and the application of clinical chemistry concepts for diagnosis, prognosis, monitoring and screening of disease.

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.

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.

ABM3006 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.

ABM3009 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.

ABM3010 Laboratory Management & Quality Assurance

This subject covers laboratory management, quality assurance, laboratory automation, statistical methods and safety regulations practised in laboratories. The role of different quality systems monitoring the quality assurance is also included.

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.

ABT1003 Biomolecules

This subject introduces the fundamental principles of biochemistry as well as the essential biomolecules present in biological systems. The structures, properties and interactions of biomolecules will be covered. The basic concepts of bioenergetics will also be introduced to illustrate how these interactions lead to life processes.

ABT1004 Molecular Genetics

This subject teaches both the theoretical knowledge and practical techniques of molecular genetics using the E. coli system as a model. Topics covered include DNA structure, replication, transcription, translation, mutations, and regulation of gene expression in prokaryotes.

ABT2006 Analytical Biochemistry

This subject focuses on the applications of analytical and separation techniques in the field of biotechnology. Basic concepts and techniques for extraction, purification and analysis of biomolecules will be covered.

ABT2009 Plant Cell Technology

This subject covers the theoretical and practical aspects of plant cell technology. Topics covered include micropropagation techniques, callus induction, organogenesis, somatic embryogenesis protoplast isolation and secondary metabolites production.

ABT2013 Molecular Biology

This subject provides you with the basic theoretical and practical knowledge of Molecular Biology. Topics include the molecular biology techniques, gene regulation in eukaryotes, eukaryotic viruses, genetics and cancer.

ABT2014 Metabolic Biochemistry

This subject focuses on the principles of Biochemistry by building on concepts learnt from Organic Chemistry 1 and Biomolecules. You will be introduced to the basics of bioenergetics before progressing to studying energy metabolism pathways and their regulation. The individual pathways will then be integrated together to give you a holistic view of energy metabolism.

ABT2015 Mammalian Cell Technology

This subject provides basic theoretical and practical knowledge of mammalian cell culture. Topics covered include cell culture techniques, prevention and contamination control, working in a tissue culture laboratory and applications of animal cell culture in biotechnology such as hybridoma generation.

ABT2017 Scripting in Bioinformatics

This subject introduces scripting techniques and uses a scripting language to obtain information from bioinformatics databases and analyse large amounts of biological data. Data privacy acts and IT policies at the workplace will also be covered.

ABT3019 Stem Cells & 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.

ABT3023 Sequence Analysis

This subject covers the use of computational tools to mine for biological meaning in genomic DNA. The methods include sequence alignment, motif finding, sequence comparison and gene expression analysis.

ABT3024 Structural Bioinformatics

This subject covers the use of computational tools to analyse protein sequence and 3D structure so as to predict their biological functions and model interactions with other molecules.

ABT3026 Molecular Diagnostic Development

This subject covers diagnostic platforms, techniques and instrumentation as well as assay development, assay criteria (e.g. sensitivity, specificity, limits of detection etc.) and assay validation. It also addresses the regulatory requirements for diagnostic assays and the pathways to commercialisation. An introduction to regulatory and good manufacturing practice (GMP) is included to complete the cycle of lab to market.

ABT3027 OMICs & Recombinant Technology

This subject covers the theory and practice of techniques used to evaluate and manipulate deoxyribonucleic acid (DNA), ribonucleic acid (RNA) and protein. It includes studies on the potential applications, present use and future trends in molecular biotechnology, genomics, transcriptomics and proteomics.

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.

ACE1006 Mass & 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.

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 and pollution control technology, solid waste management, hazardous waste treatment technology, pollution control strategies and environmental monitoring in Singapore.

ACE2009 Occupational Safety & 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.

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.

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.

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. Further studies into the characteristics of batch reactors, mixed-flow reactors and plug-flow reactors will be carried out. Differences in the behaviour of ideal and non-ideal reactors are also highlighted.

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.

ACE2015 Process Control & Instrumentation

This subject covers the basic concepts and principles of process control and instrumentation in chemical process industries. Current journals are used to highlight the latest advancement in process control and instrumentation technologies. Topics include process measuring instruments, basic concept of process control and open and closed-loop control systems. In addition, application of control systems in different aspects of chemical processes is covered.

ACE3004 Plant Safety & 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.

ACE3012 Chemical & Material Testing

This subject provides key concepts of materials technology and their relevance to the chemical process industry. You will also be exposed to various groups of nano materials, their properties and potential applications. Topics include basic concepts of materials property, types of materials, materials corrosion and prevention, and nanotechnology. It also covers the chemistry of water, including acid/base, precipitation and adsorption.

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 and unit operations involved in the production of petrochemicals. It also covers the classification of industrial wastewaters and the strategies for wastewater treatment to meet trade effluent standards and for resource recovery.

ACH1007 Organic & Biological Chemistry

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.

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.

ACH1009 Principles of Inorganic & 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.

ACH1010 Principles of Inorganic & 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.

ACH2004 Principles of Instrumental Analysis

This subject provides the basic knowledge of the principles and applications of some instruments commonly used in chemical industries. Topics include measurement uncertainty, sampling techniques, sample pre-treatment, ultraviolet-visible spectroscopy, gas chromatography, high performance liquid chromatography and atomic absorption spectroscopy.

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.

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.

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.

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.

AFS1001 Food Chemistry

This subject covers the four major components in food, namely water, carbohydrates, fats and oils, and protein. You will investigate the chemical reactions, physical and functional properties of these components.

AFS2002 Food Preservation & Quality Assurance

This subject is an integration of three areas: food quality control, food preservation and food microbiology. It covers basic concepts of food preservation and quality assurance to produce products that comply with standards and legislations with respect to the microbiological, chemical and physical aspects.

AFS2007 Food Additives

This subject covers the main additives commonly used in food manufacture. These include emulsifiers, stabilisers and sweeteners. Food regulations on the use of additives will also be covered.

AFS2008 Applied Food Sanitation

This subject focuses on the sanitation aspects associated with food establishments. Topics covered include hygienic aspects of food premise design and equipment, water sanitation and the appropriate use of cleaning and sanitising chemicals.

AFS2009 Sensory Science

This subject covers topics such as sensory evaluation and statistical analysis of food products, experimental design and rheology.

AFS3005 Food Processing & Packaging

This subject provides a general overview of the current food processing methods used in the food industry. In addition, the processing conditions and equipment for selected food commodities are discussed. This subject also provides an insight into food packaging technology and a brief introduction to process control.

AFS3006 Product Development & Marketing

This subject covers the fundamentals for developing new food products. You will develop food products that fulfil the legislation through the use of suitable ingredients, processing methods and techniques in food preservation. Principles of marketing and product commercialisation will also be covered.

AFS3007 Food Safety

This subject covers important and current food safety aspects of the industry, which include food regulations and legislations, genetically modified foods/ ingredients and cold chain management.

AMA1003 Mathematics for Applied Science

This subject equips you with the basic mathematical techniques that are essential for your course of study. Algebra, differentiation, integration, linear regression and their applications are some topics that are covered.

AMA1004 Statistics for Applied Science

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.

AMA1006 Engineering Mathematics 1

This subject enhances your knowledge of the basic concepts of mathematics and applications in an engineering environment by adopting the problem-solving approach. Topics covered include the types of basic functions, composite and inverse functions, quadratic equations, remainder and factor theorems, partial fractions and basic Calculus.

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.

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.

AMB1002 Human Anatomy & 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.

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.

AMB2006 Medical 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.

AMB2007 Pharmaceutical Microbiology

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.

AMP3006 Major Project (Biomedical Science)

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.

AMP3008 Major Project (Chemical Engineering)

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.

AMP3011 Major Project (Veterinary Technology)

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.

AMP3012 Major Project (Pharmaceutical Science)

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.

AMP3013 Major Project (Biotechnology)

This subject covers the essentials required in completing a project through the process of writing a project proposal, performing investigative studies and data analysis, interpretation of results and reporting of outcomes via written report and project presentation.

AMP3014 Major Project (Applied Food Science & Nutrition)

This subject provides a framework for you to solve practical and/ or technical problems, conduct research work and/ or develop studies through a self-managed project. The scope of the subject includes project proposal, investigative studies, data analysis and interpretation of results, written report and presentation.

AMP3015 Major Project (Baking & Culinary Science)

This subject provides a framework for you to solve practical and/ or technical problems, conduct product development work and/ or develop studies through a self-managed project. The scope of the subject includes project proposal, investigative studies, data analysis, interpretation of results, written report and presentation.

ANT1001 Science in Food Preparation

This subject illustrates the principles of food science and food preparation, emphasising the functional and structural properties of food constituents, their inter-relationships and their behaviour during food preparation. This subject also integrates the science of cooking with the selection, storage and preparation of fresh and processed foods.

ANT1002 Basic Nutrition & Food

Topics covered in this subject include the roles and importance of macro- and micronutrients, energy balance, the nutritive value of food and recent advances in the field of nutrition. You will be provided with basic understanding and application of human nutrition, food and dietary practices in relation to health.

ANT2001 Nutrition Across the Life Span

This subject covers the nutritional requirements of man during his life span. Topics covered include nutrition in pregnancy and lactation, nutrition for the growing years, adults and elderly.

ANT2009 Community Health & Nutrition

This subject focuses on the main public health and nutrition concerns in various community groups, the risk factors involved and the importance of prevention. It covers the steps involved in the planning and delivery of a health and nutrition promotion program. The methods used to assess the health and nutrition status of a community and the appropriate intervention strategies and activities are also discussed.

ANT2010 Principles of Biochemistry & Physiology for Nutrition

This subject focuses on basic biochemistry and human physiology concepts. The regulation of the integrative metabolic pathways involving glucose, lipid and protein, and their link to adenosine triphosphate (ATP) synthesis is covered in detail. Principles of enzymatic reactions, function and disorders of the immune system are covered as well.

ANT3001 Nutrition in Disease

This subject focuses on the medical nutrition therapy of diet-related diseases. It covers the pathophysiology, causes, risk factors, diagnostic criteria and symptoms of obesity, diabetes and dysphagia as well as cardiovascular, renal, liver and gastrointestinal diseases. Basic principles of nutrition support are also included.

ANT3004 Practical Sports Nutrition

This subject focuses on the importance of nutrition for optimal sports performance. It covers nutrition requirements pre-, during and post-exercise for various sports. The roles of macro- and micronutrients in sports performance and recovery will be explained. The efficacy and safety of popular dietary supplements and ergogenic aids available in the market will also be considered.

APH1001 Principles of Pharmacology

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.

APH1002 Basic Pathology & Immunology

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.

APH1003 Introduction to Pharmacy Practice

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.

APH2001 Pharmaceutical Analysis 1

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.

APH2009 Pharmacy Practice 1

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.

APH2010 Pharmacy Practice 2

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.

APH2011 Bioprocess Technology and Analysis

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.

APH2012 Pharmaceutical Legislation, Marketing & Management

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.

APH2013 Pharmaceutical Unit Operations

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.

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.

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.

APH3012 Pharmaceutical Analysis 2

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.

APH3013 Health Management in Patient Care

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.

APH3014 Good Manufacturing Practices 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 self-inspection are among the topics that will be covered.

APH3015 Biopharmaceutical Processing

This subject provides an overview of the biopharmaceutical processing, with emphasis on the unique separation and purification processes applied in the biopharmaceutical industry. Examples of such unit operations include chromatography, membrane chromatography and cross flow filtration. It also covers the fundamental knowledge, applications and legislative requirement of biosafety, biosecurity and risk assessment relating to management of biological and other hazards.

ASI3024 Student Internship Programme (Applied Food Science & Nutrition)

You will be attached to industries related to your course of study – companies in the food, healthcare or catering industries. You will be required to undertake various tasks and activities as discussed with, and agreed by the participating organisations. Besides training in technical knowledge and skills, emphasis is placed on training in desired professional conduct in areas such as communication (both oral and written), teamwork, problem-solving and self-management.

ASI3025 Student Internship Programme (Baking & Culinary Science)

You will be attached to industries related to your course of study – companies in the food industry or food and beverage establishments. You are required to undertake various tasks and activities as discussed with, and agreed upon, by the participating organisations. Besides training in technical knowledge and skills, emphasis is placed on training in desired professional conduct in areas such as communication (both oral and written), teamwork, problem-solving and self-management.

ASI3026 Student Internship Programme (Biomedical Science)

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.

ASI3027 Student Internship Programme (Biotechnology)

For a period of 19-21 weeks, students are attached to industries related to their course of study, for example, biotechnological, biomedical, pharmaceutical and bioenterprise-related industries. Each student is required to undertake various tasks and activities as discussed with, and agreed upon, by the participating organisations. Besides training in technical knowledge and skills, emphasis is placed on training in desired professional conduct in areas such as communication (both oral and written), team-work, problem-solving and self-management.

ASI3028 Student Internship Programme (Chemical Engineering)

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.

ASI3029 Student Internship Programme (Pharmaceutical Science)

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.

ASI3030 Student Internship Programme (Veterinary Technology)

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 address practical problems in the real workplace. Emphasis is also placed on training of process skills and professional conduct such as teamwork, time management, and interpersonal, written and oral communication skills.

AVT1004 Wildlife Ecology & Conservation

This subject covers the principles of ecology as well as ecosystems and the study of plant and animal distributions including their interactions with one another and their environment. Theoretical and practical skills used in the study of conservation biology in relation to nature and marine conservation would also be covered.

AVT1006 Animal Anatomy & Physiology

This subject covers an introduction to veterinary anatomy related to systematic, applied and comparative anatomy. It also covers veterinary physiology in relation to anatomy, using the basic principle of form and function, to explain the functions of the various organ systems.

AVT1007 Animal Nutrition, Feed & Feeding

This subject focuses on concepts and principles of nutritional requirements for both aquatic and selected domestic animals. Students would also learn formulation techniques, principle of feed processing technology, feed ingredients and feed additives for application in growth and development, health, physical performance and appearance.

AVT1008 Developmental Biology

This subject covers embryology and organogenesis with emphasis on the fundamental developmental processes shared by vertebrate embryos. Topics covered include gametogenesis, meiosis and fertilisation, embryonic stages of development and/ or mechanism of differentiation that encompass cleavage, germ layer formation, neurulation, axonal specificity and organ formation, embryonic and adult stem cells, sex determination, metamorphosis and ageing.

AVT1009 Animal Care, Husbandry & Behaviour

This subject focuses on animal welfare and care of companion animals and selected animals. Care for the young and senior animals would be covered. Handling techniques with basic understanding of animal behaviour under normal conditions and stress would also be emphasised as part of animal care and behavioural management.

AVT2006 Veterinary Immunology

This subject covers immunology of animals including fish. Topics covered include an overview of the immune system across species, organs involved, structure and function of immunoglobulins, and cell mediators of immunity, normal immunity in animals, as well as dysfunction of the immune system. The major histocompatibility complex (MHC), antigen processing and presentation, cell signalling molecules (cytokines), complement system, immune responses to infection and immunopathologies (hypersensitive reactions), serological testing, biology of B-cells and T-cells, antigen-antibody interactions, transplantation and tumour immunology.

AVT2009 Veterinary Pharmacology & Toxicology

This subject covers the basic principles and knowledge of pharmacology and toxicology. Topics include an introduction to pharmacology, pharmacodynamics, pharmacokinetics and toxicology.

AVT2012 Molecular & Cell Technology

This subject is designed to provide theoretical and practical knowledge in the areas of molecular biology and cell culture technology. It covers techniques and applications used to assess and manipulate deoxyribonucleic acids (DNA), ribonucleic acids (RNA) and proteins in veterinary medicine and aquaculture, with an emphasis on diagnostic and transgenic technology. The subject also introduces you to basic cell culture techniques as well as its potential applications in developing in vitro-grown tissue and organs for veterinary medicine. You will also be exposed to recent advances and future trends in molecular biology and cell culture technology such as the use of CRISPR/Cas9 in the development of transgenic/knockout animals.

AVT2016 Animal Diseases & Clinical Pathology

This subject covers an introduction to animal diseases of veterinary significance. Topics include pathogenic agents, their modes of action, and the observed symptoms. It also covers principles of pathology including etiology, cause and termination of disease other than fundamental knowledge on general and systemic pathology.

AVT2017 Aquatic Care, Health & Diseases

This subject covers knowledge and skill training in care and husbandry, disease detection, identification and prevention for common freshwater and marine aquatic species.

AVT2018 Clinical Diagnostic Techniques

This subject covers knowledge and skill training on various types of veterinary diagnostic procedures. Topics include clinical chemistry and haematology, skin examination, faecal analysis, urinalysis, cytology and other techniques of relevance to working veterinary clinics and animal hospitals. Techniques on basic necropsy or post-mortem procedure, histochemical and histological techniques will also be covered.

AVT2019 Clinical Practicum

This subject will enable students acquire and perform a variety of medical procedures in small animal practice setting. Students will perform skills in anaesthesia, surgical assisting, veterinary practice management, radiography, sample collection and laboratory analysis, reception, patient assessment and treatment administration. Students will be attached on and off site veterinary clinics or hospitals.

AVT2020 Surgery, Anaesthesia & Veterinary Practices

This subject covers the principles of surgery and anaesthetic management for laboratory and selected companion animals. Topics covered include anaesthetic administration, monitoring and recovery from anaesthesia, basic suturing skills, preoperative preparations and postoperative care of animals. Fundamentals on good dispensing practice, simple patient counselling skills, record keeping and veterinary reception would also be covered.

AVT2021 Molecular Genetics & Genomics

This subject is designed to provide basic theoretical and practical knowledge of molecular genetics and genomics. It covers fundamental concepts of the molecular composition and structure of deoxyribonucleic acids (DNA), ribonucleic acids (RNA) and the gene. You will be introduced to the concept of the central dogma of biology, DNA replication and gene expression. The subject will also introduce you to techniques of DNA sequencing and use of basic bioinformatics tools for DNA analysis. You will also be introduced to whole genome sequencing and its application in personalised veterinary medicine. The subject also includes studies on the potential applications, present use and future trends in molecular genetics and genomics.

AVT3010 Animal Breeding & Reproduction

This subject covers animal breeding programmes, reproduction fundamentals and techniques. You will also be introduced to analysis and experimental design in animal breeding.

AVT3011 Laboratory Animal Science & Technology

This subject focuses on care, animal behaviour, handling and husbandry requirements of small and large animals often used as animal models for study. You will also acquire experiential learning through husbandry rotations at animal facilities. Techniques used in animal model study will also be introduced

AVT3012 Aquaculture Product Quality & Safety

This subject provides students with knowledge and skill based training in harvest and post-harvest processes and food product quality and safety. The importance of good culture environment and postharvest technology on fishery product quality and safety will be emphasised. Innovative technology for enhancing aquatic health and better quality produce will be covered.

AVT3013 Aquaculture Technology

This subject focuses on good aquaculture practices and management, culture systems, breeding, reproduction and technology important for sustainable aquaculture. Topics covered include water quality management, feed and feeding management, hatchery, larviculture, grow-out and broodstock, breeding and reproduction. Basic engineering principles and system design applicable for aquaculture will also be emphasised. Students will receive hands-on training in farm operation and management.

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.

IED1001 Innovation & Entrepreneurship

The Innovation & Entrepreneurship subject is designed for learners from all disciplines to embrace innovation in either their specialised field or beyond. You will first be introduced to the Design Thinking framework and learn how to 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. In addition, commercial awareness will be imbued in you through the LEAN Startup framework, idea crystallisation, prototype building, customer testing and validation, refinement of business model canvas, and crowdfunding/crowdsourcing avenues.

LEA1011/1012/1013 Leadership: Essential Attributes & Practice (LEAP)

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.

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.

MCR1001/MCR1002/MCR1003 Career Readiness

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. It aims to cultivate the necessary attitudes, skills and knowledge to conduct yourself professionally, adapt and respond to the changing job market environment.

TFS1002 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.

TFS1003 Managing Diversity at Work

You will examine your own identity, study different forms of diversity and apply strategies to inspire positive collaboration in a diverse workplace. Through a residential stay, you will have the opportunity to experience living and working with peers from different backgrounds.

TFS1004 Global Citizenship & Community Development

This subject highlights the inter-connectedness of the world today, bringing about what it means to be a Global Citizen. You will gain an awareness of the impacts of globalisation and the concepts of social responsibility and sustainable community development. This subject also challenges you to be actively engaged in a social or environmental project.

TFS1005 Expressions of Culture

Whether telling stories, building monuments or celebrating rites of passage, expressions of culture are at the core of cultural diversity. In this subject, everyday objects, artistic creations and popular culture are explored as ways of understanding the values and beliefs of a society. You will explain the role of cultural heritage stakeholders and learn to conduct cultural story-telling. By taking this subject, you will benefit by acquiring a greater understanding and appreciation of the complexities surrounding our cultural assets.

TFS1006 Guided Learning

This is a subject where you will be free to pursue an area of interest through a self-directed approach, guided by staff. You will be expected to demonstrate a sense of curiosity for learning, initiate an opportunity to acquire knowledge and skills, and reflect on your learning journey throughout the subject.