



School of Applied Science

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The School offers eight 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.

Through Problem-based Learning (PBL), the Student Internship Programme, Differential Research Programme, major projects and practicum at our learning enterprises (frozen desserts factory, plantlet production unit 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 keenly encourages participation in competitions and involvement in programmes such as the Overseas Community Projects and the Student Leadership Programme. These, together with subjects such as Applied Principles for Effective Living, Communication Skills, and Cross-Disciplinary Subjects provide a holistic dimension to the 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 biotechnology, proteomics, microbiology and immunology, nanotechnology, analytical services, environment and water technology, baking science and technology, hydroponics and applied 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

TEMASEK APPLIED SCIENCE RESEARCH CENTRE

This is a 1,400 square-metre centralised location for major research activities in chemical and life sciences within the School. Its state-of-the-art facilities promote inter-disciplinary research among staff and collaborative work with the industry and institutions of higher learning. The centre comprises various laboratory facilities such as Certified Class 10,000 lab, Bio-Safety Labs, Analytical Testing & Services Labs, Nutrition Research Facility and various specialised research labs for Traditional Chinese Medicine, proteomics, fermentation and plant biotechnology.

TEMASEK ANALYTICAL SERVICES FACILITY

Temasek Polytechnic School of Applied Science is the first tertiary institution in Singapore to be awarded accreditation under the Singapore Laboratory Accreditation Scheme (SINGLAS) by the Singapore Accreditation Council (SAC) for its Chemical and Biological Testing Laboratory in April 2009. This recognition is a stamp of approval for its high quality assurance standard in the testing services provided to its customers in the industry. The analytical testing facility is well equipped with a wide range of state-of-the-art analytical instruments, supported by a team of competent staff with multi-disciplinary experience in laboratory quality management, testing and test methods development. The accreditation is granted in the field of Chemical & Biological Testing for 16 test methods for food products and eight methods for Traditional Chinese Medicine. This accreditation adds value to the School's consultancy and technical services offered to partners and collaborators who require high quality analytical testing services.

CENTRE FOR TRADITIONAL MEDICINE (CTM)

The CTM is set up within the School of Applied Science to be a one-stop centre supporting the Traditional Medicine (TM) industry in Singapore as well as the region. The objectives of the CTM are to assist in the modernisation of the TM industry, enhance the knowledge of the TM industry and support government agencies and regulating authorities in TM-related matters. With dedicated project teams, the CTM offers Consultancy Services and conducts Applied Research in TM-related industry aspects. The CTM also promotes TM through its Education Programmes and TM publications.

CHROMATOGRAPHY & MASS SPECTROMETRY RESEARCH FACILITY

This facility serves as a training ground for students conducting project work under the different research schemes offered by the School. It is also used for staff and consultancy projects as well as collaborative projects with other research groups. It is fully equipped with research instruments including High Performance Liquid Chromatography with UV and light scattering detector, Ion-Trapped Liquid Chromatography – Mass Spectrometer (LC-MS) with a nitrogen generator, Flash Chromatography and flow cytometer.

TEMASEK ANIMAL FACILITY

Comprising two workstations, namely the Laboratory Animal workstation and the Aquaculture workstation, this facility provides a conducive training environment for students to learn essential skills related to both aquaculture and laboratory animal science and technology.

BISTRO WALK TRAINING CAFÉ

This contemporary café provides part of the training ground for students to apply their knowledge and skills in managing a real café. Students are not only involved in the planning and preparation of various menu items and baked products; they are also involved in the daily operations of the café. The café offers healthier menu options as well as some recipe dishes specially developed by the students. Being a HACCP Certified F&B outlet, students are also trained to maintain and upkeep the food safety standards there.

CULINARY FACILITY

This specialised facility comprises three culinary laboratories, the Asian kitchen, Bakery/ Pastry kitchen and the Western kitchen. These kitchens are equipped with some of the latest equipment to support training for the culinary as well as scientific/ technological experimentation. Each kitchen is built in its unique style to facilitate learning, and simulate actual commercial kitchen settings, such that students are able to gain extensive hands-on training in fundamental baking and culinary skills.

DELI DELITE TRAINING FOOD KIOSK

This learning enterprise is a training venue for students as well as graduates to operate and manage a takeaway food kiosk outlet. The kiosk offers a range of quick takeaway food and beverage; among them are some all-time favourites such as deli-styled sandwiches, sausages and mash, smoothies and also the popular teppanyaki ice cream, which is produced specially by the School's KoolWerkz training factory. This set up is also managed and operated to simulate that of other commercially run food kiosks to evaluate its commercial viability and sustainability.

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.

FOOD PRODUCT DEVELOPMENT FACILITY

This facility enables the formulation of both processed and ready-to-eat food products like spreads, drinks, baked products, desserts and sauces. It supports the School's frozen dessert capabilities by developing prototypes for our training factory. It also houses both food science and food processing laboratories that allow scaling up of formulations. The facility also houses a sensory evaluation laboratory to conduct consumer testing of prototypes.

NUTRITION ASSESSMENT FACILITY

This facility comprises a counselling and observation room equipped with sophisticated facilities for focus group discussions and nutrition counselling sessions. It allows for anthropometric assessments like skinfold measurement and bioelectrical impedance analysis, and dietary assessments to be conducted. The facility thus serves to provide a realistic training ground for students and has the capacity to undertake nutrition research projects.

ENVIRONMENTAL TECHNOLOGY FACILITY

This facility, housed in the Chemical Pilot Plant in the School, is well equipped to train students in environmental technology and embark on consultancy projects for our industrial partners. Two key areas include water technology and solid waste recycling technology. Students can be involved in interesting projects like development of novel materials for oil spill cleanup, and recycling of plastics, wood and industrial by-products as building materials.

Major equipment includes the NEWater pilot system and the nanofiltration/ reverse osmosis (NF/RO) membrane skid. The facility is also equipped with other conventional water and liquid waste treatment equipment such as jar test units, ion-exchange systems, filter press, activated carbon bed, etc.

NANOTECHNOLOGY RESEARCH FACILITY

This facility is equipped with the basic equipment for the fabrication of inorganic nanoparticles and their surface modification for a variety of applications. It provides staff and students with the opportunity to be directly involved in the emerging field of nanotechnology, ie, R&D at the atomic, molecular or macromolecular levels. It involves creating and using structures, devices and systems that have novel properties and functions due to their small sizes.

PHARMACEUTICAL TECHNOLOGY FACILITY

This facility, designed to meet current good manufacturing practices (cGMP), is complete with a class 100k drug formulation and preparation room, and class 10k aseptic dispensing room. It allows students to experience gowning procedures, secondary pharmaceutical manufacturing of various dosage forms such as syrups, tablets and creams as well as aseptic drug dispensing commonly used in the preparation of parenteral nutrition and chemotherapeutic drugs. The facility is equipped with the necessary utilities and documentation according to regulatory requirements simulating a cGMP certified manufacturing facility.

PROTEOMICS RESEARCH FACILITY

This facility positions the School as a centre for proteomics R&D and training. It is equipped with instruments for protein prefractionation, two-dimensional gel analysis, two-dimensional high performance liquid chromatography, gel spot cutting/processing and protein identification (via MALDI) so as to provide the capability to perform the main steps of a proteomics workflow. It also has the capabilities for molecular and biochemical analysis of the identified proteins.

PLANT TISSUE CULTURE TRAINING FACILITY

This facility serves as a platform for students to acquire knowledge of operation for the mass propagation of tissue culture plantlets in an actual production environment. Here, students are not only trained in specific tissue culture laboratory skills, they are also exposed to the process and workflow in a real-life production environment. In this way, they can better appreciate the industrial applications of different laboratory techniques taught in class.

TP HERB GARDENS

With a collection of more than 120 species of medicinal plants, the gardens are part of the School's comprehensive technical competency development in Traditional Chinese Medicine (TCM). It comprises an open concept garden and a specially designed nursery. It is a useful teaching tool for the identification and classification of plants commonly used in TCM.

TP HYDROPONIC GREENHOUSE

TP Hydroponic Greenhouse is equipped with aeroponics system and different types of hydroponics systems suitable for growing orchids and vegetables. TP is the first to also have developed the chilling technology for growing temperate plants as well as the innovative method of growing orchids using hydroponics. The facility includes amenities for nutrient analysis and preparation of hydroponic nutrient solution, artificial light studies and post-harvesting.

TP ANIMAL CLINIC

The TP Animal Clinic was licensed by the Agri-Food & Veterinary Authority in May 2011. The clinic serves to provide more realistic training for final-year Veterinary Technology students. Working under close supervision of our 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. Both the Cat Welfare Society and Action for Singapore Dogs work closely with the TP Animal Clinic on stray animal sterilisations.



Applied Food Science & Nutrition

What is in your favourite packet of instant noodles? Why do manufacturers use food additives? Can food be used as medicine?

Choose this course if you find these questions intriguing. Enter the world of food science and nutrition to learn the tricks of the trade – how to create innovative food products and provide healthier food choices.

Indeed, with society's greater demand for tasty yet healthier foods, there are rising concerns about the impact of our diet on our health in later years. Applying the scientific knowledge of both food science and nutrition, and receiving the practice-oriented training, you will gain the necessary competence to embark on a career in the food, nutrition and the healthcare industries. Electives are available from the fourth semester for you to specialise in either food science or nutrition.

The food science and technology subjects will enable you to face the challenging food industry to develop 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 design and evaluate healthier meals for different population groups, assess their nutritional status, develop nutrition education programmes, and understand the management of diet-related diseases. The course also hones your entrepreneurial skills to help you embark on your own business ventures or take up challenges in sales and marketing of food and nutrition-related products and services.

The practical training in this course prepares TP students well for the food industry, as shown by their ability to perform tasks diligently. The department has benefitted from their highly positive mindset and creativity and they would definitely be an asset to any future employer.

*Mr Alan Goh
Asst Operation Manager
Product Development
Super Bean International 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.

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".

MINIMUM ENTRY REQUIREMENTS

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

Note: Applicants who do not meet the Science requirement but with Food & Nutrition/ Human & Social Biology may apply through Direct Admissions Exercise (DAE).

**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).*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Subjects	
Core Subjects	: 79 credit units
Elective Subjects	: min 22 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 129 credit units

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3005	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH1002	Organic & Biological Chemistry	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AFS1001	Food Chemistry	1	5
AMA1003	Mathematics & Statistics 1	1	3
AMA1004	Mathematics & Statistics 2	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ANT1001	Science in Food Preparation	1	4
ANT1002	Basic Nutrition & Food	1	4
AFS2001	Food Ingredients	2	4
AFS2002	Food Preservation & Quality Assurance	2	5
AFS2003	Food Preservation & Quality Assurance Project	2	5
AFS2004	Applied Food Sanitation	2	4
ANT2001	Nutrition Across the Life Span	2	5
AFS3001	Food Safety	3	4
AFS3003	Product Development & Marketing	3	5
AMP3001	Major Project	3	8

Diploma Subjects - Elective Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACE2002	Environmental Technology	2	4
ACH2004	Principles of Instrumental Analysis	2	4
ANT2003	Community Nutrition	2	5
ANT2004	Principles of Biochemistry & Physiology for Nutrition	2	5
ANT2005	Food Service Management	2	5
ANT2006	Health & Wellness	2	4
ANT2007	Catering Technology	2	4
AFS3004	Advanced Food Science	3	4
AFS3005	Food Processing & Packaging	3	5
AHE3001	Advanced Food Preparation	3	4
AHE3003	Consumer Resource Management	3	5
ANT3001	Nutrition in Disease	3	5
ANT3002	Applied Nutrition	3	4

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Skill, knowledge, passion, discipline and love for cooking – great values nurtured by the school and lived by the students - the essence of our industry's future. Well done!

*Michael Leibl
(Former) Executive Chef
The Sentosa Resort & Spa*

Baking & Culinary Science

Future Master Chefs, take note. If you dream of creating the perfect dish, stop dreaming and let science help you. Take the guesswork out of baking and culinary work and uncover the science behind the recipes you prepare: from simple sauces to roasting the perfect duck. With your scientific know-how, you'll be able to create innovative dishes for the food and beverage industry.

This course will teach you to scientifically evaluate the sensory and safety aspects of the dishes you prepare. You will undergo comprehensive hands-on training and an intensive and interactive experience. 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.

During the fifth semester, you will undergo a 16-week internship to gain and further develop your career-specific skills in the diverse food and beverage (F&B) industry or food/ ingredients companies. The course also hones your entrepreneurial skills to help you embark on your own business ventures.

CAREER OPPORTUNITIES

Our graduates are well-positioned to join the F&B industry as baking technologists, junior chefs, 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 food or culinary science, as well as culinary management courses.

APPLICATION

Apply during the Joint Admissions Exercise following the release of the GCE O Level results, as well as directly through the Joint Polytechnic Special Admissions Exercise (JPSAE). Candidates who are shortlisted through the JPSAE 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".

Note

With the curriculum emphasis on Asian culinary with science to develop innovative recipes and products, students will be required to handle various forms of food ingredients. These include meats of various sources such as pork and beef (and their by-products); stabilisers/emulsifiers/gelling agents of animal origin; as well as alcohol-based products such as wines, spirits and flavourings. Students may not necessarily consume their developed recipes/products but will be required to evaluate and assess their physical/chemical properties.

Students are also required to purchase uniform sets, safety shoes, bakery and knife sets and textbooks. These are not included in the tuition fees.

MINIMUM ENTRY REQUIREMENTS

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

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Core Subjects	: 97 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 125 credit units

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3004	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABC1001	Food & Culture	1	3
ABC1006	Fundamental Culinary Skills	1	5
ACH1002	Organic & Biological Chemistry	1	5
AFS1001	Food Chemistry	1	5
AMA1005	Mathematics & Statistics	1	3
AMB1003	Basic Microbiology	1	5
ANT1001	Science in Food Preparation	1	4
ANT1002	Basic Nutrition & Food	1	4
ABC2005	Baking Science	2	5
ABC2006	Baking Practicum	2	7
ABC2007	Western Culinary Practicum	2	6
ABC2008	Asian Culinary Practicum	2	12
ABC2010	Basic Food Safety	2	3
ABC2011	Applied Food Safety	2	3
ABC2012	Principles of Food Service Management	2	5
AFS2001	Food Ingredients	2	4
ABC3004	Baking & Culinary Technology Application	3	5
ABC3005	Product Development in Food Service	3	5
AMP3005	Major Project	3	8

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Biomedical Science

Play a part 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 cure and prevent them.

Singapore may well be the next global hub for biomedical 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 science. 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.

Our course emphasises learning through established collaborative training with industry/hospitals, taught by experienced teaching staff and industry practitioners. The compulsory internship in relevant industries carried out concurrently

TP students generate creativity, enthusiasm and self-discipline during their laboratory attachments here at KK Women's & Children's Hospital. Their diligent nature and competency as shown through their project assignments stand them in good stead for future employment.

*Lim Geok Hoon
Senior Manager
Dept of Pathology and Lab Medicine
KK Women's & Children's Hospital*

with major projects helps you to experience real working life and allows you to apply theory to practice on actual industry projects.

CAREER OPPORTUNITIES

Our graduates can work as medical technologists or laboratory technologists in hospital/ clinical laboratories, medical research centres, central testing laboratories and clinical trials units at contract research organisations.

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".

MINIMUM ENTRY REQUIREMENTS

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

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

**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).*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Subjects	
Core Subjects	: 90 credit units
Elective Subjects	: min 8 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 126 credit units

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3003	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1002	Human Physiology & Immunology	1	4
ABT1001	Cell Biology	1	4
ABT1002	Biomolecules	1	4
ACH1003	Organic Chemistry 1	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AMA1003	Mathematics & Statistics 1	1	3
AMA1004	Mathematics & Statistics 2	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ABM2007	Clinical Chemistry	2	5
ABM2008	Histological Techniques	2	3
ABM2009	Fundamentals of Pathology	2	4
ABM2010	Applied Immunology	2	3
ABM2011	Haematology	2	4
ABT2007	Molecular Genetics	2	5
ABT2013	Molecular Biology	2	4
AMB2004	Medical Microbiology	2	4
APH2006	Basic Pharmacology	2	4
ABM3001	Blood Banking	3	4
ABM3004	Laboratory Management & Quality Assurance	3	4
AMP3006	Major Project	3	8

Diploma Subjects - Elective Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH1006	Principles of Inorganic & Physical Chemistry 2	1	5
BRM1002	Principles of Retail Management	1	4
ABT2014	Metabolic Biochemistry	2	4
ABT2015	Mammalian Cell Technology	2	3
ACE2009	Occupational Safety & Health	2	4
ACE2010	Process Control & Instrumentation	2	5
APH2002	Pharmaceutical Chemistry	2	4
BRM2006	Store Management	2	4
ABM3003	Drug Development & Clinical Trials	3	5
APH3005	Bioprocess Technology	3	5
APH3006	Good Dispensing Practice & Pharmacotherapy	3	5
APH3008	Biopharmaceutical Unit Operations	3	4
BMK3007	Principles of Entrepreneurship	3	4
BMK3012	Sales Management	3	4

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.

Biotechnology



The Biotechnology intern we had was an exceptional student – the best I have ever had! His capacity to carry out research is very high. I told him he is welcome back any time. Proteomics is my expertise and he carried out his research project well, far exceeding my expectations.

*Prof Chris Florides
Managing Director
Saturn Biotech Ltd
State Agricultural Biotechnology Centre
Murdoch University*

Genes, molecular biology, cloning, immunology, therapeutics, diagnostics, forensics, health and diseases – do these terms excite you? Are you fascinated about how living systems work? 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 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 both basic and translational research on 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 be trained to develop a solid foundation in basic biology and

chemistry. Over the next two years, you will undergo a well-integrated sequence of modules on cell and molecular biotechnology. A hands-on approach forms the core basis of training, during which you will be exposed to a repertoire of research skills in the areas of laboratory animal science and technology, genomics, proteomics, plant biotechnology, immunology and other key supporting technology essential for biomedical and scientific research. You will eventually develop a solid broad-based foundation in life sciences that will maximise your career and future educational options.

In order to further hone your technical skills, you will undergo a five-month attachment either locally or overseas in the biotechnology and biomedical industries.

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 agrotechnology 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 research skills and knowledge gained by our graduates are applicable worldwide.

ELECTIVE CLUSTERS

Choose from one of the three elective subject clusters in your final year: Research Cluster, Forensic Cluster or Bioconservation Cluster.

MINIMUM ENTRY REQUIREMENTS

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

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Subjects	
Core Subjects	: 95 credit units
Elective Subjects	: min 8 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 131 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".

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3003	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1002	Human Physiology & Immunology	1	4
ABT1001	Cell Biology	1	4
ABT1002	Biomolecules	1	4
ACH1003	Organic Chemistry 1	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AMA1003	Mathematics & Statistics 1	1	3
AMA1004	Mathematics & Statistics 2	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ABM2009	Fundamentals of Pathology	2	4
ABM2010	Applied Immunology	2	3
ABT2006	Analytical Biochemistry	2	5
ABT2007	Molecular Genetics	2	5
ABT2009	Plant Cell Technology	2	5
ABT2013	Molecular Biology	2	4
ABT2014	Metabolic Biochemistry	2	4
ABT2015	Mammalian Cell Technology	2	3
AMB2001	Applied Microbiology	2	5
ABT3012	Genomics & Proteomics	3	3
ABT3013	Recombinant Technology & Bioinformatics	3	4
AVT3003	Laboratory Animal Science & Technology	3	4
AMP3007	Major Project	3	8

Diploma Subjects - Elective Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
AFR2001	Forensic Toxicology	2	4
APH2006	Basic Pharmacology	2	4
ABM3003	Drug Development & Clinical Trials	3	5
ABT3014	Ecology & Biodiversity	3	4
ABT3015	Conservation Biology	3	5
ABT3016	Stem Cells & Tissue Engineering	3	4
AFR3001	Forensic Biological, Chemical & Physical Analysis	3	5
APH3005	Bioprocess Technology	3	5

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Chemical Engineering

TP 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. They also developed a good and happy relationship with our fellow employees.

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

Oil refinery giants, major manufacturers of petrochemicals and 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 to determine the pulse of the process industry.

Chemical engineers are involved in the manufacture of products such as fuel, petrochemicals, cosmetics, 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 process technology, occupational safety and health, analytical chemistry and process engineering principles. It emphasises process engineering, chemistry, and laboratory techniques with practical knowledge of

chemical process technology, petrochemical technology, pharmaceutical manufacturing technology and water and environmental technology. Practical knowledge of process control and laboratory techniques as required by the relevant industries is also included.

The extensive scope of this course will prepare you for higher education well. Besides local universities, students can enrol to SIT (Singapore Institute of Technology) for further studies. The University of New South Wales, University College of London, University of Adelaide and many top overseas universities also offer advanced standing to our graduates. You will have opportunities for local or overseas internships at MNCs and reputable institutions.

CAREER OPPORTUNITIES

Trained to be versatile, you can work in a broad range of companies in various industries. You can embark on a career in the chemical industry, the largest manufacturing industry in Singapore. You can also conduct analytical or research work in laboratories. Alternatively, you can consider a career in pharmaceutical manufacturing companies running the production of pharmaceutical products. The water and environmental industries, technical sales or purchasing also offer excellent prospects.

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".

MINIMUM ENTRY REQUIREMENTS

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

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Subjects	
Core Subjects	: 93 credit units
Elective Subjects	: min 7 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 128 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”.

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3002	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACE1001	Mass & Energy Balance	1	5
ACE1002	Thermodynamics	1	4
ACH1003	Organic Chemistry 1	1	5
ACH1004	Organic Chemistry 2	1	4
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
ACH1006	Principles of Inorganic & Physical Chemistry 2	1	5
AMA1001	Applied Mathematics	1	4
AMA1002	Engineering Mathematics 1	1	5
ACE2002	Environmental Technology	2	4
ACE2007	Unit Operations 1	2	5
ACE2008	Unit Operations 2	2	5
ACE2009	Occupational Safety & Health	2	4
ACE2010	Process Control & Instrumentation	2	5
ACH2004	Principles of Instrumental Analysis	2	4
AMA2001	Engineering Mathematics 2	2	5
AMB2005	Introduction to Biochemistry & Microbiology	2	4
ACE3002	Chemical Reaction Engineering	3	4
ACE3004	Plant Safety & Loss Prevention	3	4
ACE3010	Materials & Nanotechnology	3	4
AMP3008	Major Project	3	8

Diploma Subjects - Elective Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACE2003	Industrial Chemical Processes	2	4
ACE3005	Membrane Separation	3	3
ACE3006	Petrochemical Technology	3	4
ACH3003	Applications of Instrumental Analysis	3	5
AEW3001	Industrial Utilities	3	3
AEW3002	Industrial Wastewater Treatment	3	4
AEW3003	Environmental Management System	3	3
AMA3001	Engineering Mathematics 3	3	4
APH3002	Current Good Manufacturing Practices	3	3
APH3004	Pharmaceutical Manufacturing Technology	3	4
APH3005	Bioprocess Technology	3	5

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Consumer Science & Technology

During the 10-week attachment, the intern from your course worked proficiently and independently and was a great asset to the Home Economics Department. She carried out her duties with enthusiasm and displayed a great sense of responsibility. With her commitment and passion, I have no doubt that she has what it takes to be a good teacher.

*Lim Chek Quay
Home Economics Subject Co-ordinator
Temasek Secondary School*

Motivate. Inspire. Teach.

If you have a passion for food, science, fabric and design, consumer needs and wants, a zest for learning and an interest in nurturing students to reach their potential, you have what it takes to become a Home Economics teacher. Teach the young to value a healthy lifestyle, stretch the dollar, become a confident person and create a happy family. Show them how to manage the food we eat, the money we spend and the clothes we wear.

This course is one of two diploma programmes offered under the Ministry of Education's four-year Home Economics Teacher Training Scheme. Students embarking on this course are equipped with technical skills and scientific knowledge of nutrition, food preparation, food science, textiles, sewing and consumer education to manage the content of Home Economics in secondary schools. Graduating from TP, you will proceed to the National Institute of Education to pursue the diploma course in Education (Home Economics) that trains you in effective pedagogy.

The course incorporates various approaches that develop not only technical knowledge and skills but also life skills such as teamwork, communication, time and conflict management and skills in preparation for the realities of working life. The compulsory internship helps you to experience Home Economics teachers' work in secondary schools.

At TP, you will go through a flexible learning structure where core subjects are taken together with the character education programme, overseas community projects and cross-disciplinary subjects.

This flexibility develops talents and grooms holistic individuals ready to take on the challenge of a changing Singapore education landscape.

CAREER OPPORTUNITIES

With Singapore fast becoming an education hub, a career in teaching will give you a bright future. Graduates with both diplomas will serve as Home Economics teachers in secondary schools.

APPLICATION

Application to this course is administered at the same time as the Joint Admissions Exercise conducted after the release of the GCE O Level results. Applications are to be made online directly to MOE at the following website: www.moe.gov.sg/careers/teach/applying/olevels/#home-economics. Applications must be submitted to MOE within one week of the release of the GCE O Level results.

MINIMUM ENTRY REQUIREMENTS

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

**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).*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 17 credit units
Diploma Core Subjects	: 101 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 127 credit units

SPONSORSHIP

Students admitted into this course will be fully sponsored by MOE. This sponsorship includes course fees as well as a monthly bursary during the first three years. In the fourth year, each student will be appointed to the Education Service as an untrained teacher drawing a salary. In return, students will serve a five-year bond with MOE.

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science1	1	2
ACS1002	Communication Skills for Applied Science2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ASI2001	Student Internship Programme	2	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH1002	Organic & Biological Chemistry	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AFS1001	Food Chemistry	1	5
AMA1003	Mathematics & Statistics 1	1	3
AMA1004	Mathematics & Statistics 2	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ANT1001	Science in Food Preparation	1	4
ANT1002	Basic Nutrition & Food	1	4
DAD1134	Lifestyle Sewing 1	1	4
DAS1106	Textile Fundamentals	1	4
DAS1107	Apparel Design Fundamentals	1	3
AFS2001	Food Ingredients	2	4
AFS2002	Food Preservation & Quality Assurance	2	5
AFS2003	Food Preservation & Quality Assurance Project	2	5
ANT2001	Nutrition Across the Life Span	2	5
ANT2003	Community Nutrition	2	5
ANT2004	Principles of Biochemistry & Physiology for Nutrition	2	5
DAD2135	Lifestyle Sewing 2	2	4
AHE3001	Advanced Food Preparation	3	4
AHE3003	Consumer Resource Management	3	5
ANT3001	Nutrition in Disease	3	5
DAD3137	Decorative Construction	3	4

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Pharmaceutical Science

Why are some medicines labelled as “poison”? How do they work to cure diseases? Join this field and learn about the effects of drugs on the human body. Gain the knowledge and skills required to design, analyse, manufacture and market new therapies for diseases.

Pharmaceuticals accounted for 85 percent of the biomedical science industry output for Singapore in 2010, which grew by another 10 percent for the whole year. Total output hit S\$19.7 billion. Biopharmaceutical manufacturing, with six new plants announced to be set up in Singapore worth S\$2.1 billion, is poised to be the next leading driver of the industry.

The course will train you to join the various sectors of the pharmaceutical and healthcare industries, and lay the foundation for you to become a specialist investigator in criminal forensics. You will learn specialised subjects related to disease, pharmaceutical legislation and marketing, drug action, chemical

and biological analysis, and pharmaceutical manufacturing.

Furthermore, if you have an inclination towards analytical work, or have a passion for a career in forensics, you will have the opportunity to select elective subjects in our new Forensics & Analytical Bioscience specialisation.

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 your diploma course, you can also take part in research projects offered by the School or research institutes in

We were impressed with the enthusiasm, commitment and positive attitude of TP's intern. The cGMP and Pharmaceutical Legislation & Marketing modules covered in your course enabled her to blend into the company's GMP regulated environment easily. They also equipped her to participate actively in discussions and complete related assignments.

*Susan Chan
Regulatory Affairs Manager
Zuellig Pharma Pte Ltd*

various research topics such as pharmaceutical science, analytical science, biologics and traditional medicine.

SPECIALISATION

- Forensics & Analytical Bioscience
- Pharmacy Practice
- Biopharmaceutical Manufacturing

CAREER OPPORTUNITIES

Graduates can work as pharmacy technicians in hospitals or community/ retail pharmacies, QA/QC technologists to conduct quality checks or process technologists to manufacture the drugs in the pharmaceutical industry. For the research-inclined, you can also join one of the research institutes or pharmaceutical companies to assist in research work on drug development and clinical trials, or conduct analytical work. You can also embark on a career in technical sales and marketing for pharmaceutical/ health products, or in forensics as an investigator or a laboratory technologist.

MINIMUM ENTRY REQUIREMENTS

English Language (EL1)*	Grades 1 - 7
Mathematics (E or A)	Grades 1 - 6
One of the following Science subjects:	Grades 1 - 6
Biological Science, Chemistry, Combined Science, Engineering Science, Physical Science, Physics, 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).*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Subjects	
Core Subjects	: 86 credit units
Elective Subjects	: min 12 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 126 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”.

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science 1	1	2
ACS1002	Communication Skills for Applied Science 2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3003	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1002	Human Physiology & Immunology	1	4
ABT1001	Cell Biology	1	4
ABT1002	Biomolecules	1	4
ACH1003	Organic Chemistry 1	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AMA1003	Mathematics & Statistics 1	1	3
AMA1004	Mathematics & Statistics 2	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ACH1004	Organic Chemistry 2	1	4
ABM2009	Fundamentals of Pathology	2	4
ACH2004	Principles of Instrumental Analysis	2	4
AMB2003	Pharmaceutical Microbiology	2	4
APH2004	Pharmaceutical Legislation & Marketing	2	4
APH2005	Introduction to Pharmacotherapeutics	2	4
APH2006	Basic Pharmacology	2	4
APH3002	Current Good Manufacturing Practices	3	3
APH3004	Pharmaceutical Manufacturing Technology	3	4
APH3007	Pharmaceutical Analysis	3	5
AMP3009	Major Project	3	8

Diploma Subjects - Elective Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACH1006	Principles of Inorganic & Physical Chemistry 2	1	5
BRM1002	Principles of Retail Management	1	4
ABT2014	Metabolic Biochemistry	2	4
ABT2015	Mammalian Cell Technology	2	3
ACE2006	Pharmaceutical Unit Operations	2	5
ACE2009	Occupational Safety & Health	2	4
ACE2010	Process Control & Instrumentation	2	5
AFR2001	Forensic Toxicology	2	4
APH2002	Pharmaceutical Chemistry	2	4
BRM2006	Store Management	2	4
ABM3003	Drug Development & Clinical Trials	3	5
ACH3004	Laboratory Accreditation & Automation	3	4
AFR3001	Forensic Biological, Chemical & Physical Analysis	3	5
APH3005	Bioprocess Technology	3	5
APH3006	Good Dispensing Practice & Pharmacotherapy	3	5
APH3008	Biopharmaceutical Unit Operations	3	4
BMK3007	Principles of Entrepreneurship	3	4
BMK3012	Sales Management	3	4

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.



Veterinary Technology

Get a head start by assisting in real life animal sterilisations at TP's fully licenced TP Animal Clinic. With our intensive and practical training, you will graduate as a technically competent and much sought-after veterinary or animal technologist.

Your expertise will be very much in demand in the years ahead. There has been a significant increase in pet ownership in Singapore, and a growing awareness about animal welfare issues. Also, in our pursuit to find cures for human diseases, animals are used as models in research and pre-clinical trials. All this makes responsible and humane animal care and use extremely important.

This course focuses on establishing a good grounding in the basic and applied animal sciences for meeting the needs of the veterinary, biomedical research and pet retail industries. The practice-oriented programme equips students with specialised skill sets

that will prepare them well as responsible and competent veterinary/animal technologists. Other than veterinary diagnostics, surgery and anesthesia assistance, animal nutrition and health, students will also learn about molecular and cellular techniques as well as humane care and use of laboratory animals for biomedical and veterinary research.

Your technical competency is further honed through a five-month internship stint either locally or overseas in animal facilities and research institutions, animal parks, veterinary hospitals/clinics and other animal-related organisations.

The biomedical, pharmaceutical and agricultural industries are growth industries which will need more veterinary technologists to service their expanding businesses. Government-related agencies such as the AVA, research institutes and the Biopolis also have a good demand for veterinary technologists."

*Dr Ngiam Tong Tau
President
Singapore Veterinary Association (2007)*

CAREER OPPORTUNITIES

Our graduates can work in either biomedical research or the veterinary industries. You may be employed as a veterinary technologist in veterinary clinics/ hospitals, or as an animal education officer/ assistant, animal health inspection assistant or technical support officer in animal welfare organisations, Agri-Food and Veterinary Authority of Singapore, animal quarantine centres and pet shops as well as Wildlife Reserves Singapore and Marine Life Park in Resorts World Sentosa. You may also work as an animal technologist in animal facilities at research/tertiary institutions or pre-clinical trial centres. You could also be a sales and marketing executive in pet feed or accessory companies and companies promoting veterinary/scientific equipment.

MINIMUM ENTRY REQUIREMENTS

English Language (EL1)*	Grades 1 - 7
Mathematics (E or A)	Grades 1 - 6
One of the following Science subjects:	Grades 1 - 6
Biological Science, Chemistry, Combined Science, Engineering Science, Physical Science, Physics, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry).	
Any two other subjects, excluding CCA	–

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

**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).*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	: min 1.0
TP Core Subjects	: 19 credit units
Diploma Core Subjects	: 99 credit units
Cross-Disciplinary Subjects	: min 9 credit units
Total Credit Units Completed	: min 127 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".

Course Structure

TP Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ACS1001	Communication Skills for Applied Science 1	1	2
ACS1002	Communication Skills for Applied Science 2	1	2
GCD1001	Applied Principles for Effective Living 1 (APEL 1)	1	1
GCD1002	Applied Principles for Effective Living 2 (APEL 2)	1	1
GCD1003	Applied Principles for Effective Living 3 (APEL 3)	1	1
ACS2001	Communication Skills for Applied Science 3	2	2
ACS3001	Communication Skills for Applied Science 4	3	2
ASI3001	Student Internship Programme	3	8

Diploma Subjects - Core Subjects

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
ABM1002	Human Physiology & Immunology	1	4
ABT1001	Cell Biology	1	4
ACH1002	Organic & Biological Chemistry	1	5
ACH1005	Principles of Inorganic & Physical Chemistry 1	1	5
AMA1005	Mathematics & Statistics	1	3
AMB1002	Human Anatomy & Physiology	1	5
AMB1003	Basic Microbiology	1	5
ABM2009	Fundamentals of Pathology	2	4
ABM2010	Applied Immunology	2	3
ABT2007	Molecular Genetics	2	5
ABT2010	Animal Anatomy & Physiology	2	5
ABT2013	Molecular Biology	2	4
ABT2014	Metabolic Biochemistry	2	4
AVT2001	Clinical Diagnostics 1	2	5
AVT2002	Clinical Diagnostics 2	2	4
AVT2003	Laboratory Safety & Management	2	2
AVT2004	Veterinary Practice Management	2	2
AVT2005	Animal Care & Management	2	5
AVT3001	Animal Health & Diseases	2	5
APH2006	Basic Pharmacology	3	4
AVT3002	Surgical & Anaesthetic Principles	3	4
AVT3003	Laboratory Animal Science & Technology	3	4
AMP3010	Major Project	3	8

Cross-Disciplinary Subjects

Students are required to obtain a minimum of 9 credit units from the list of Cross-Disciplinary Subjects.

Subject Synopses

ABC1001 FOOD & CULTURE

This subject aims to equip 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, pan-frying, 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.

ABC2005 BAKING SCIENCE

This subject covers the fundamentals of baking science. You will investigate the various types of flour derived from milling, the tests used to evaluate the quality of flour, the functions of common and special ingredients used in baking, and baker's mathematics. Processing methods for breads, cakes and pastries will also be covered.

ABC2006 BAKING PRACTICUM

This subject aims to develop your repertoire of baking skills with emphasis on the preparation of lean dough and sweet dough products and cakes and pastries with the use of commercial baking equipment. You will also apply various dough/batter processing methods in the preparation of the products. Knowledge of equipment selection and safety in the bakery will be emphasised.

ABC2007 WESTERN CULINARY PRACTICUM

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

ABC2008 ASIAN CULINARY PRACTICUM

This subject provides practice in the preparation, presentation and evaluation of common dishes from various Asian regions with focus on Chinese and South East Asian dishes. You will apply culinary skills in kitchen practicals which include stocks, sauces, soups, salads, fruits/vegetables, grains, eggs, poultry, red meat, and seafood. Knowledge of equipment selection and kitchen safety will be emphasised.

ABC2010 BASIC FOOD SAFETY

This subject introduces current food safety issues and basic food safety requirements related to food service operations. It covers the potential sources of food hazards and their associated health risks, personal hygiene, hygiene aspects of food premises design, cleaning and sanitation, and pest control in the food service environment.

ABC2011 APPLIED FOOD SAFETY

This partial problem-based learning subject, which focuses on the food safety aspects associated with food service operations, will be delivered in blended e-Learning mode. It covers various types of potential food hazards from different sources, various laboratory techniques used for toxins and pathogens detection, as well as Hazard Analysis and Critical Control Point (HACCP) in food service operations.

ABC2012 PRINCIPLES OF FOOD SERVICE MANAGEMENT

This subject provides you with basic knowledge on the management and operational functions of a food service establishment. It provides the technical and operational knowledge in facilities planning and design, menu planning and their applications in various food establishments. Production planning, quantity food production, food inventory control, human resource and financial management will also be covered.

ABC3004 BAKING & CULINARY TECHNOLOGY APPLICATION

This subject is designed to equip you with the knowledge and skills necessary to produce foods using various technologies such as sous vide, cook-chill/ cook-freeze, and frozen dough technologies. Engineering concepts on heat transfer, freezing, equipment design and selection, and packaging will be highlighted.

ABC3005 PRODUCT DEVELOPMENT IN FOOD SERVICE

This subject provides you with 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.

ABM1002 HUMAN PHYSIOLOGY & IMMUNOLOGY

This subject covers the knowledge of human physiology and basic immunology. It introduces common terms, concepts, fundamental procedures and applications used in both physiology and immunology.

ABM2007 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.

ABM2008 HISTOLOGICAL TECHNIQUES

This subject covers the basic knowledge, principles and skills of histotechnology which include fixation, decalcification, tissue processing, microtomy, frozen sections and staining. It also covers basic diagnostic cytopathology.

ABM2009 FUNDAMENTALS OF PATHOLOGY

This subject introduces the fundamental knowledge of general and systemic pathology. You will learn the nature and cause of diseases, disease mechanisms as well as structure and functional abnormalities of diseased organs and organ systems.

ABM2010 APPLIED IMMUNOLOGY

This subject covers the immunopathology and immunological techniques used in screening, diagnosis and monitoring of diseases. It also deals with the way in which our immune system is manipulated for prevention and treatment of diseases through various immune interventions and approaches.

ABM2011 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.

ABM3001 BLOOD BANKING

This subject provides the basic knowledge of blood banking and covers the theoretical, practical and clinical aspects of blood transfusion. There is emphasis 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.

ABM3003 DRUG DEVELOPMENT & CLINICAL TRIALS

This subject introduces a comprehensive overview of drug discovery, drug development and clinical trial. It includes different approaches to drug design and discovery such as rational drug design and computer aided drug design etc. This subject also incorporates studies involved in the drug development process such as pharmacological and toxicological studies etc. Different phases of clinical trial are also covered. An outline of the roles of GLP, GMP and GCP from the time of drug discovery to the time it enters the market is also provided.

ABM3004 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: structure-function relationships of cellular membranes and internal organelles, cell cycle and cell division; transport mechanisms and cell communication, cell motility and the cytoskeleton and cell death. You will also acquire basic laboratory skills.

ABT1002 BIOMOLECULES

This subject investigates the properties of carbohydrates, lipids and proteins, and their significance in biological systems. It aims to provide an overview of metabolism and emphasises the relationship between anabolism and catabolism, and their role in maintaining life.

ABT2006 ANALYTICAL BIOCHEMISTRY

This subject focuses on the applications of analytical and biochemical techniques in the field of biotechnology. Topics covered include sample pre-treatment, separation techniques, spectrometry, chromatography, and the use of fluorochromes and radioisotopes in biochemical analysis.

ABT2007 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.

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.

ABT2010 ANIMAL ANATOMY & PHYSIOLOGY

This subject covers an introduction to veterinary anatomy related to systemic, 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. There is also a basic introduction to zoology as seen from the veterinary perspective.

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, isolation of primary cell from tissue, working in a tissue culture laboratory and applications of animal cell culture in biotechnology such as hybridoma generation.

ABT3012 GENOMICS & PROTEOMICS

This subject covers the technologies used in global analysis of genes (genomics) and proteins (proteomics). This will include microarrays, real-time PCR, serial analysis of gene expression (SAGE), high-throughput sequencing, labelling technologies, 2D-Gel Electrophoresis, 2D-nano-Liquid Chromatography and mass spectrometry. The principles behind the technologies as well as the data interpretation methods will be strongly emphasised.

ABT3013 RECOMBINANT TECHNOLOGY & BIOINFORMATICS

This subject covers both the theory and practical techniques of bioinformatics and molecular biotechnology. It includes studies on the applications, potential, present and future trends of molecular and protein technology.

ABT3014 ECOLOGY & BIODIVERSITY

This subject covers the principles of ecology as well as the study of plant and animal distributions and their interactions with one another and their environment. It will also cover the effects of environmental factors such as climate and topography that define the habitat for animals and plants. The biodiversity topics will train students on the study of life-forms within an ecosystem which will include genetic diversity, species diversity and ecosystem diversity.

ABT3015 CONSERVATION BIOLOGY

This subject covers theoretical and practical skills used in the study of conservation biology in relation to nature and marine conservation. Topics covered will include trends and process of biodiversity loss, species extinction and preservation, sustainable management of natural systems, species and communities as well as the impact of imbalance in the ecosystem and biodiversity.

ABT3016 STEM CELLS & TISSUE ENGINEERING

This subject covers the principles and methods of stem cells technology and tissue engineering. You will be taught the importance of knowledge integration in life sciences and engineering so as to enhance your understanding of structural-function relationships in normal and pathological mammalian tissues. The isolation and use of stem cells, as well as the development of biological substitutes that restore, maintain or improve tissue function will also be discussed.

ACE1001 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.

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.

ACE2002 ENVIRONMENTAL TECHNOLOGY

This subject provides 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.

ACE2003 INDUSTRIAL CHEMICAL PROCESSES

This subject covers selected chemical processes and operations. Topics include the making of petrochemical raw materials from various sources and studies on the manufacture and uses of industrial gases, adhesives, plastics and pharmaceutical products.

ACE2006 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 are also introduced.

ACE2007 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.

ACE2008 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.

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.

ACE2010 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.

ACE3002 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.

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.

ACE3005 MEMBRANE SEPARATION

This subject covers the fundamental principles of membrane separation operation and maintenance of membrane equipment and its applications for water treatment and wastewater reclamation. Topics include membrane separation principles, membrane types and system configurations, membrane fouling and control, and advanced membrane processes such as diffusion dialysis, electro-dialysis and continuous deionisation, etc.

ACE3006 PETROCHEMICAL TECHNOLOGY

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.

ACE3010 MATERIALS & NANOTECHNOLOGY

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 nanomaterials, their properties and potential applications. Topics include basic concepts of materials property, types of materials, materials corrosion and prevention, and nanotechnology.

ACH1002 ORGANIC & BIOLOGICAL CHEMISTRY

This subject provides the basic concepts in organic chemistry as well as the constituents of biological systems and their properties and significance to biological science. Topics covered include organic chemistry, proteins and enzymes, carbohydrates and lipids.

ACH1003 ORGANIC CHEMISTRY 1

This subject provides the 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 on the applications of organic compounds and their derivatives, and their impact on the chemical related industries.

ACH1004 ORGANIC CHEMISTRY 2

This subject provides the additional concepts in organic chemistry with emphasis placed on reaction mechanisms. Topics covered include nucleophilic substitution and dehydrohalogenation of alkyl halides, structure and properties of derivatives of carboxylic acids, condensation reactions in carbonyl compounds, electrophilic aromatic substitution in aromatic hydrocarbons, phenol and aniline.

ACH1005 PRINCIPLES OF INORGANIC & PHYSICAL CHEMISTRY 1

This subject provides the basic theory and practical knowledge of inorganic and physical chemistry. Topics include fundamentals of chemistry, gas laws, atomic structure, chemical bonding, periodic table and periodicity, nomenclature, stoichiometry and equilibria concepts of a chemical reaction.

ACH1006 PRINCIPLES OF INORGANIC & PHYSICAL CHEMISTRY 2

This subject provides the additional theory and practical knowledge of inorganic and physical chemistry. Topics include ionic equilibria and calculations, chemical kinetics, chemistry of transition elements, electrochemistry and phase equilibria and phase diagrams.

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, UV-visible spectroscopy, gas chromatography, high performance liquid chromatography and atomic absorption spectroscopy.

ACH3003 APPLICATIONS OF INSTRUMENTAL ANALYSIS

This subject provides the additional knowledge of the principles and applications of some specialised instruments used in the analytical laboratory. Topics include atomic and molecular spectroscopic methods, sampling, data analysis, test method development, test method validation and technique development.

ACH3004 LABORATORY ACCREDITATION & AUTOMATION

This subject covers concepts of quality management in the areas of laboratory accreditation and automation. You will be exposed to SAC-SINGLAS accreditation in accordance with ISO/ IEC 17025 standard as well as various relevant standards. Topics on work flow and safety practices in laboratory design and applications of automation in the laboratory, with an emphasis on Laboratory Information Management System (LIMS), will also be covered.

ACS1001 COMMUNICATION SKILLS FOR APPLIED SCIENCE 1

This subject introduces you to the fundamentals of reading and writing in the context of the Applied Science diploma courses. It also covers the basic principles of interpersonal skills that will enhance your ability to work effectively in teams.

ACS1002 COMMUNICATION SKILLS FOR APPLIED SCIENCE 2

This subject hones your public speaking skills and provides you with opportunities for hands-on experiences in the preparation and delivery of successful oral presentations in the context of the Applied Science courses. It also trains you to evaluate a presentation.

ACS2001 COMMUNICATION SKILLS FOR APPLIED SCIENCE 3

This subject introduces the fundamentals of technical project report writing skills. It covers aspects of information literacy skills and equips you with the basic knowledge and skills to present the technical project report in an appropriate format, language and style in the context of the Applied Science courses.

ACS3001 COMMUNICATION SKILLS FOR APPLIED SCIENCE 4

This subject equips you with job application skills, such as writing effective cover letters and resumés to secure job interviews. The interview skills component provides you with tips for successful job interviews. Written communication skills in the context of the Applied Science workplace will also be covered.

AEW3001 INDUSTRIAL UTILITIES

This subject covers the operation and maintenance of common utilities found in the manufacturing industries. Topics include ultrapure water production systems, boiler systems, industrial chillers and cooling towers.

AEW3002 INDUSTRIAL WASTEWATER TREATMENT

This subject covers the classification of industrial wastewaters and the strategies for wastewater treatment to meet trade effluent standards and for resource recovery. Case studies on the unique characteristics and treatment methodology for industries like chemical, semiconductor, pharmaceutical, metal-plating, etc, will be covered.

AEW3003 ENVIRONMENTAL MANAGEMENT SYSTEM

This subject covers an integrated approach to environmental management through the consideration of the potential impact of human activities on the physical and biological environment. Topics include environmental impact assessment, ISO 14001 and environmental resource management.

AFR2001 FORENSIC TOXICOLOGY

This subject aims to develop your understanding of the practice of the application of toxicology from a legal perspective. It will teach you to carry out analytical toxicology tests on biological and non-biological samples. The subject will also cover the pathological observations associated with different drug toxicities, and the common analytical techniques available in the field of forensic toxicology. You will learn how to interpret the data acquired and formulate informed conclusions to appropriate case studies.

AFR3001 FORENSIC BIOLOGICAL, CHEMICAL & PHYSICAL ANALYSIS

This subject covers the application of bioanalytical, chemical and physical analytical techniques in forensics investigation. Topics include the evaluation of evidences, biological fluids, biomolecules produced by the body and skeletal remains with an emphasis on DNA profiling, finger-printing and blood, semen and saliva stains analysis. It also focuses on the use of instrumental techniques such as optical microscopy, microspectroscopy, molecular spectroscopy, chromatography, mass spectrometry and capillary electrophoresis in the analysis of alcohols, illicit drugs and poisons, glass, paints, fibres, explosions and firearms.

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.

AFS2001 FOOD INGREDIENTS

This subject covers the main ingredients/additives commonly used in food manufacture. These include emulsifiers, stabilisers, sweeteners, flavourings, colourings, acidulants, bulking agents, chelating agents and leavening agents. Food regulations on the use of additives are also covered.

AFS2002 FOOD PRESERVATION & QUALITY ASSURANCE

This subject is an integration of three areas: Food Quality Control, Food Preservation and Food Microbiology. You will learn to apply basic concepts of food preservation and quality assurance to produce quality products with respect to microbiological, chemical and physical aspects, hence ensuring food quality and safety for compliance with standards and legislation.

AFS2003 FOOD PRESERVATION & QUALITY ASSURANCE PROJECT

This is a Problem-based Learning subject, integrating three content areas: Food Quality Control, Food Preservation and Food Microbiology.

AFS2004 APPLIED FOOD SANITATION

This subject focuses on the sanitation aspects associated with food establishments. The emphasis is on professional sanitation practices and procedures needed to ensure wholesome and safe food products from processing to consumption. Topics covered include hygienic aspects of food premise design and equipment, water sanitation and the appropriate use of cleaning and sanitising chemicals.

AFS3001 FOOD SAFETY

This subject is delivered in a blended learning mode. The main content areas are foodborne illnesses, food regulations and legislation, the HACCP system, Genetically Modified foods/ ingredients and principles of instrumental analysis.

AFS3003 PRODUCT DEVELOPMENT & MARKETING

This subject provides technical skills training for developing new food products. You will integrate and apply knowledge in nutrition, food chemistry, food legislation, quality control, microbiology, food ingredients and labelling in product development projects. The effects of food preparation, food processing, packaging and marketing are also emphasised.

AFS3004 ADVANCED FOOD SCIENCE

This subject covers specialised topics such as rheology of foods, sensory evaluation of food products, experimental design and statistical analysis. You will be kept up-to-date with some of the more advanced developments in food science.

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.

AHE3001 ADVANCED FOOD PREPARATION

The subject integrates your knowledge and skills in food science and nutrition with food preparation, emphasising the application of food science to the principles of cooking. It incorporates food preparation and food investigation skills.

AHE3003 CONSUMER RESOURCE MANAGEMENT

This subject illustrates the basic concepts and principles of consumer resource management and family life management. It introduces the basis of goal-setting and the management of various consumer resources like money and time, emphasising the various tools used for making effective consumer decisions. In addition, it also illustrates the principles of economics on consumption and the power of advertising and its influences on consumer behaviour.

AMA1001 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.

AMA1002 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.

AMA1003 MATHEMATICS & STATISTICS 1

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 MATHEMATICS & STATISTICS 2

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.

AMA1005 MATHEMATICS & STATISTICS

This subject is designed to equip you with basic mathematical knowledge in calculus and statistics that are essential for the course of study. Topics covered include differentiation and integration, basic probability and distributions, basic statistics, sampling distribution, hypothesis testing, analysis of variance and chi-square testing.

AMA2001 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.

AMA3001 ENGINEERING MATHEMATICS 3

This subject enhances your understanding of advanced mathematical concepts. You will learn to apply these concepts to solve problems related to Chemical Engineering. This subject also provides adequate grounding for further tertiary education. Topics include types of Laplace transform, numerical methods, vectors and complex numbers.

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.

AMB1003 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.

AMB2001 APPLIED MICROBIOLOGY

This subject has a theoretical and practical/ laboratory focus that allows you to build on the basic concepts in microbiology to its application in the fields of food, industry, medicine and environment.

AMB2003 PHARMACEUTICAL MICROBIOLOGY

This subject covers the importance of microorganisms in the manufacture of pharmaceutical products. It includes the applications of antimicrobial agents, sterilisation methods, aseptic dispensing and microbiological testing in the pharmaceutical industry. Laboratory skills for assessing product quality and safety, and the practice of quality assurance, current Good Manufacturing Practice (cGMP) and Good Laboratory Practice (GLP) are also emphasised.

AMB2004 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.

AMB2005 INTRODUCTION TO BIOCHEMISTRY & MICROBIOLOGY

This subject investigates the importance of fundamentals of biochemistry and microbiology. Topics covered for biochemistry include the classes of biomolecules, enzymes and major biochemical pathways like the krebs Cycle and glycolysis. Topics on microbiology include classification of microorganisms, laboratory microbial techniques and microbial nutrition.

AMP3001 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, interpretation of results, written report and presentation.

AMP3005 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.

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.

AMP3007 MAJOR PROJECT (BIOTECHNOLOGY)

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.

AMP3009 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.

AMP3010 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.

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 and their behaviour during food preparation. It also integrates the science of cooking with the selection, storage, purchase and preparation of fresh and processed foods available today. Throughout the subject, careful attention is given to the preservation of major nutrients and palatability of prepared food. Learning experiences are built through basic demonstration of key principles and the application of such principles.

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.

ANT2003 COMMUNITY NUTRITION

This subject focuses on the importance of disease prevention and health promotion in the community setting. It covers the steps involved in the planning and delivery of a nutrition programme. The methods used to assess the nutritional status of a population and the types of nutrition education for the community are also discussed. Basic knowledge in behavioural change models relating to programme design and delivery of nutrition messages in the public setting are included.

ANT2004 PRINCIPLES OF BIOCHEMISTRY & PHYSIOLOGY FOR NUTRITION

This subject provides a basic knowledge of biochemistry and human physiology in relation to nutrition. The content of this subject builds on the knowledge acquired in the year one subjects such as Human Anatomy & Physiology and Basic Nutrition & Food.

ANT2005 FOOD SERVICE MANAGEMENT

This subject focuses on the management strategies in foodservice to enable you to supervise a foodservice operation. It equips you with the technical knowledge and operational know-how in production planning, food inventory control, customer service skills, human resource and financial management and total quality management. Various management information system software will also be incorporated.

ANT2006 HEALTH & WELLNESS

This subject focuses on selected public health concerns, the risk factors involved and the prevention of these health problems. You will apply key procedures involved in the planning and delivery of health promotion programmes.

ANT2007 CATERING TECHNOLOGY

This subject provides you with a basic knowledge on the operational functions of a catering establishment namely: menu planning, operation of foodservice equipment, facilities planning and design, purchasing, receiving and storage of food. It will also equip you with the necessary practical skills in quantity food production and quality control.

ANT3001 NUTRITION IN DISEASE

This subject focuses on the dietary principles and its relevance to the medical nutrition therapy of diet-related diseases. It covers the basic knowledge of the pathophysiology of some diet-related diseases. You will learn to integrate and apply the knowledge of food and nutrition sciences in the management of these diet-related disorders.

ANT3002 APPLIED NUTRITION

This subject focuses on the theory and skills required for counselling and effective communication in the healthcare industry. It also covers basic concepts and principles of research methodology and survey techniques. Knowledge associated with statistical analysis is included to inculcate a critical disposition towards reading health statistics.

APH2002 PHARMACEUTICAL CHEMISTRY

This subject examines the important functional group chemistry of pharmaceutical compounds and their structure-activity relationships. Concepts relevant to drug action and biological systems, and theories of drug-receptor interaction and receptor characterisation will be examined. An introduction to drug discovery and development will also be covered.

APH2004 PHARMACEUTICAL LEGISLATION & MARKETING

This subject provides an overview of legislations affecting the pharmaceutical industry. Topics covered include Poisons Act, Misuse of Drugs Act, Medicine Act, Sale of Drugs Act, SAPI code of marketing practice and legal status of Traditional Chinese Medicine. It also provides an understanding of basic marketing concepts, tools and techniques pertaining to the commercialisation of pharmaceutical products.

The focus is on market analysis, marketing strategies and planning, product development programme, pricing strategies and product life cycle management. You will also gain an understanding of the pharmaceutical industry and healthcare services.

APH2005 INTRODUCTION TO PHARMACOTHERAPEUTICS

This subject covers the pharmacotherapeutic approaches in the management of ailments, with emphasis on basic pathophysiology and the role of medications and/or retail products and their use. It also covers basic over-the-counter dispensing and counselling practices and an appreciation of complementary medicine.

APH2006 BASIC PHARMACOLOGY

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

APH3002 CURRENT GOOD MANUFACTURING PRACTICES

This subject provides the fundamental knowledge and applications of cGMP in the pharmaceutical 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.

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.

APH3005 BIOPROCESS TECHNOLOGY

This subject provides the fundamental principles of bioprocess technology and its relevance to the biotechnology industry. Topics include an overview of industrial bioprocesses, with an emphasis on fermentation and enzymes application, operations involved at various bioprocess stages, beginning from raw materials to finished products, basic concepts of bioprocess engineering, process control and instrumentation, bioreactor designs for culturing microorganisms, animal cells and plant cells.

APH3006 GOOD DISPENSING PRACTICE & PHARMACOTHERAPY

This subject covers the fundamentals of good dispensing practice to enable you to read and interpret prescriptions, to prepare and pack medicine in accordance with prescriptions within the legal requirements of pharmacy law. It also covers the theory of common diseases and the use of drugs to treat these diseases. Patient counselling and OTC product counselling will also be taught.

APH3007 PHARMACEUTICAL ANALYSIS

This subject introduces the principles and applications of pharmacopeial analytical methods. It emphasises analytical instruments such as high performance liquid chromatography (HPLC), ultraviolet-visible spectrophotometry and infrared (IR) spectroscopy as well as their applications in the analysis of pharmaceuticals. Physical analytical methods such as particle size analysis, dissolution, disintegration and friability tests will also be included. Method development will be elaborated in relevance to the optimisation of chromatographic performance. Method validation will be covered based on International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) guidelines.

APH3008 BIOPHARMACEUTICAL UNIT OPERATIONS

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. Consideration is also given to both analytical and process validation issues that are critical to successful manufacturing.

ASI2001 STUDENT INTERNSHIP PROGRAMME (CONSUMER SCIENCE & TECHNOLOGY)

This programme will help orient and integrate you into the working world. It also provides you with the opportunity to put theory into practice and enhances your ability to develop and organise the different aspects of a Home Economics teacher's role in a secondary school.

ASI3002 STUDENT INTERNSHIP PROGRAMME (CHEMICAL ENGINEERING)

This programme involves a compulsory 16-week 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 consciousness and written and oral presentation skills. Prior to the programme, students are required to undergo a six-week training programme at the Chemical Process Technology Centre.

ASI3003 STUDENT INTERNSHIP PROGRAMME (BIOMEDICAL SCIENCE/ BIOTECHNOLOGY/ PHARMACEUTICAL SCIENCE/VETERINARY TECHNOLOGY)

This programme involves attachment to industries related to the course of study for a period of 20 weeks. 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.

ASI3004 STUDENT INTERNSHIP PROGRAMME (BAKING & CULINARY SCIENCE)

For a period of 16 weeks, you are 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 communications – both oral and written, team-work, problem-solving and self-management.

ASI3005 STUDENT INTERNSHIP PROGRAMME (APPLIED FOOD SCIENCE & NUTRITION)

You will be attached to industries related to your course of study – food, healthcare or catering industries for a period of 16 weeks. 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 communications – both oral and written, team-work, problem-solving and self-management.

AVT2001 CLINICAL DIAGNOSTICS 1

This subject covers microbiology, radiology, histology and cytology in relation to veterinary applications.

AVT2002 CLINICAL DIAGNOSTICS 2

This subject covers clinical chemistry and haematology in relation to veterinary applications. Topics include the processes and principles used to evaluate pancreatic and liver functions, kidney function and electrolytes, haematology and making of blood smears.

AVT2003 LABORATORY SAFETY & MANAGEMENT

This subject covers basic principles and techniques of laboratory safety, and management as well as quality assurance, risk assessment and management.

AVT2004 VETERINARY PRACTICE MANAGEMENT

This subject covers the fundamentals on good dispensing practice, simple patient counselling skills, record keeping and veterinary reception.

AVT2005 ANIMAL CARE & MANAGEMENT

This subject covers an introduction to the care and management of animals (young and ageing) in general, and of specific animals, in the areas of housing, environmental factors, nutrition, reproduction, breed identification, first aid and wound management and animal behaviour. Animals covered would include birds, fish, rodents, dogs, cats, equine and some exotic animals. Dental prophylaxis will also be covered.

AVT3001 ANIMAL HEALTH & DISEASES

This subject covers an introduction to animal diseases of significance to veterinary technicians. The subject introduces you to pathogenic agents, their modes of action, and the observed symptoms as well as basic epidemiology and veterinary microbiology.

AVT3002 SURGICAL & ANAESTHETIC PRINCIPLES

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.

AVT3003 LABORATORY ANIMAL SCIENCE & TECHNOLOGY

This subject covers the care and use of common laboratory animals for research as well as operations and maintenance of animal facilities, animal biosafety levels, animal research models, disease prevention and occupational health and safety.

BMK3007 PRINCIPLES OF ENTREPRENEURSHIP

This subject covers the key principles of entrepreneurship. The early part of the course examines the traits of successful entrepreneurs. You will learn how to identify business opportunities and be given the opportunity to conduct field research in order to identify, evaluate and select viable businesses. You will then prepare basic business plans.

BMK3012 SALES MANAGEMENT

Selling forms an integral part of the promotion component of the marketing mix. This subject provides a comprehensive coverage of consultative selling, partnering, value-added selling, sales force automation, contextualised selling in both consumer and non-consumer industries, and time-proven fundamentals of sales management.

BRM1002 PRINCIPLES OF RETAIL MANAGEMENT

This subject introduces the basic principles and concepts in the field of retailing with particular emphasis on topics ranging from an introduction to basic retailing principles and practices, building and sustaining relationships in retailing to the key elements in the retail marketing mix.

BRM2006 STORE MANAGEMENT

This subject introduces the basic principles of store management with particular emphasis on topics ranging from introduction to store management, human resource management to operational management.

DAD1134 LIFESTYLE SEWING 1

This subject introduces the basics of operating the sewing machine. Basic sewing techniques are taught to make lifestyle items such as bags, hair accessories, cushion covers and tablecloths, etc. Lessons are specially designed for you to have fun while discovering the functions of the sewing machine.

DAD2135 LIFESTYLE SEWING 2

This subject introduces you to the technique in basic sketching, study of measurements, flat pattern drafting techniques, pattern layout, while applying sewing techniques in making basic apparel and lifestyle products.

DAD3137 DECORATIVE CONSTRUCTION

This subject introduces the basic skills involved in the surface decoration of textiles for clothing, furnishing, wall hanging and accessories. Various fabric manipulation techniques will be taught through hands-on demonstrations. You will be encouraged to carry out your ideas through intermediate design work and find personal ways of designing on fabrics so that a rich and stimulating base will be established in an integrated approach during the design development process.

DAS1106 TEXTILE FUNDAMENTALS

This subject gives a basic understanding of fibres and yarn in the context of textiles formation. You will be taught the fundamentals of knits and weaves, and to identify fabrics by names through visual identification and their intrinsic characteristics. Your understanding of textiles will encompass production processes, practices and new developments in the industry.

DAS1107 APPAREL DESIGN FUNDAMENTALS

The subject explores the three basic elements of design: line, colour and texture, and the design principles specific to apparel and accessory items. It examines their effects on personal appearances as well as their influences on changes in fashion trends in the apparel industry.

GCD1001/1002/1003 APPLIED PRINCIPLES FOR EFFECTIVE LIVING (APEL)

Applied Principles for Effective Living is TP's Core Programme consisting of three subjects, namely APEL 1 (Personal Effectiveness), APEL 2 (Interpersonal Effectiveness) and APEL 3 (Extropersonal Effectiveness). APEL was specially developed for TP students with the aim to help nurture in them the dispositions (ie, attitudes, skills, knowledge) towards the Principles for Effective Living, hence laying the vital foundation for their life-long success. The principles introduced in this programme are largely derived from applied psychological studies.