



**BIENNIAL
REPORT** **BIENNIAL
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REPORT**

**LEARNING TOGETHER.
GROWING TOGETHER.**

APRIL 2018 – APRIL 2020

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Theme: Learning Together, Growing Together

The use of gradients represents the constant growth and change of the School of Applied Science, whereas the circles represents the holistic development of students and staff. By bringing these elements together, the Biennial Report will showcase the development of the School of Applied Science over the course of 20 years.

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SCHOOL OF APPLIED SCIENCE (ASC)



VISION

To be a leading centre for training, education and applied research in the chemical and life sciences



MISSION

To continuously seek innovative ways to train and educate school leavers and the workforce, and to carve niche applied research areas that will benefit students, industry and the community

MESSAGE FROM

MR PETER LAM,

PRINCIPAL & CHIEF EXECUTIVE OFFICER



Upskilling and reskilling are no longer options but necessities in today's context. How has TP imbued this to ensure quality education for her students?

The COVID-19 pandemic has demonstrated with even greater certainty that lifelong learning and the ability to upskill and reskill are extremely important for one to be employable. Learning to learn, unlearn and relearn is an important skill that has been well demonstrated by TP staff especially during the pandemic. It is also a skill that our students get to practise as they go through their 3 years of diploma training.

In 2018, TP introduced a set of modules for all students, known as TP fundamentals (TPFun). It focuses on future skills to better prepare students for work and life, nurturing them into the TP Student Profile (TSP) of a Lifelong Learner, Future-oriented Creator, and Values-centred Leader.

TP has also made learning more experiential with an extended internship programme, some as long as six months. This gives students the opportunity to practise the adjacent skills picked up through TPFun in a real work environment. Specialised skills have been reduced in the diploma core. Graduates can upskill or reskill in these specialisations through public programmes under our continuing education and training (CET) framework, where they can deepen their skills to be subject matter experts.

Moving forward, how do you see the relationship of the industry and ASC evolving?

At TP, the relationship between the industry and school has always been a synergistic one. In alignment with the Ministry of Education's (MOE) roadmap for the future of education in Singapore: Learn for Life – Ready for the Future, ASC has also ramped up the number of meaningful CET programmes for Singaporeans during their working years. Programmes in food safety and medical biotechnology have been launched, as well as Work-Study Programmes in aquaculture, chemical technology and veterinary technology. These support the local workforce (including our graduates) to upgrade their skills and enhance their employability.

TP turned 30 in 2020. What is top on your wish list for ASC?

TP would not have come so far without very close knitted industry support and collaborations, in areas ranging from practice-based pedagogy and CET partnerships, to joint research, development and commercialisation. ASC has forged many synergistic partnerships with MNCs as well as SMEs. The growing list of industry partners can be found in this issue of the ASC Biennial Report.

Top on my wish list for ASC would be to further widen our collaborations and engage more companies strategically to step forward. Many of ASC's RIE and CET initiatives support the national agenda. With equally passionate industry partners, it would help ASC meet our national targets in a shorter span of time. Students trained in conjunction with companies on projects of national importance, would also better appreciate the relevance of their education and training at ASC.

Some of the activities at ASC that support national imperatives include the following. During the COVID-19 pandemic, ASC provided free training in the form of mobile-based micro-learning courses (MLC) and webinars. Of notable mention is the MLC on "Pandemic – Business as Usual", which helped companies make sense of and comply with biosafety measures during the circuit breaker period,

offering practical tips on conducting their business safely under the new normal. By popular demand, it was translated into Chinese and Malay by ASC, and subsequently into Spanish, Korean, Arabic, French, Japanese and Indonesian. The school has also put together meaningful programmes under Singapore's SG United initiative, to help reskill/upskill participants for better employability. In addition, to lend immediate assistance to ease manpower constraint for COVID-19 testing, ASC has designed a 2-week course to train by the hundreds, laboratory technologists for the test labs. This was initiated and supported by Temasek Holdings, and ASC has invited Singapore Polytechnic and Republic Polytechnic to come on board in anticipation of overwhelming demand.

All these were on top of the support ASC has always given to the industry through student projects, consultancies and R&D. ASC is also supporting Singapore's '30 by 30' food supply goal and environmental sustainability efforts for a Zero Waste Nation.

Two of ASC's significant partners had so far been recognised through TP's Partner-in-Education Award. It is my wish that ASC would continue to discover more of such great partnerships.

MESSAGE FROM MR ANDREW TJIOE, CHAIRMAN, SCHOOL ADVISORY COMMITTEE



What have you observed that ASC has done to achieve the aim of shaping the graduates to increase their employability?

With MOE's announcement in 2018 to streamline polytechnic courses to ensure that students develop relevant skills for an evolving workforce, ASC seized that opportunity to consolidate and refresh a majority of their full-time diploma courses. They launched two new diplomas in April 2019: Food, Nutrition and Culinary Science (FNC) and Medical Biotechnology (MBT) that offers a broad-based curriculum that serves more industry sectors. These courses would provide the graduate a wide and well-grounded training with the added flexibility to handle a varied job scope.

ASC has also been very proactive seeking opportunities in Singapore and overseas for students to gain more experiential learning with their related industry. Such exposure and global experiences ensure that they receive up-to-date technical training and valuable life skills. In fact, the industry looks out for graduates with transferable skills as it constantly faces numerous unprecedented challenges to increase efficiency and be more resourceful.

Being a major employer yourself, what can ASC do better to support their related industries?

Since the government's release of the Job Support Scheme (JSS), many companies are hiring particularly Singapore citizens and PRs. This is a good opportunity for ASC's fresh and recent graduates, and the School should strongly encourage them to join the workforce and gain early work experience to kick-start their career path. The graduates may not find a 100% job fit in such times, but if they are willing and eager to pick up skills through on-the-job training (OJT), this is essentially the way to follow as any curriculum has their limitations. For instance, there is a large demand for polytechnic graduates for the restaurants as we move towards a manpower lean set up with automation and more digitalisation. Unfortunately, applications are lower than expected though the starting salaries have increased.

If young graduates do not feel ready to work, then they should continue to learn, to reskill or upskill if necessary, as time is the essence to build a career. A good strategy by ASC to initiate students into their related industries is with their Work-Study award for the students. For instance, the Mitsui Study Award is a sponsorship that is available to students from the Diploma in Chemical Engineering where the recipient is assigned to Mitsui Phenols Singapore Pte Ltd for their internship, and upon graduation, the recipient works with the company for three years. This has also been effective with other industry partners including those from healthcare sectors.

What key concerns should ASC focus on in moving forward to better prepare their graduates for the unexpected?

Though ASC has a robust character and leadership-building framework for the students, it is critical to emphasize their importance in such times. Graduates must be geared with their personal compass to steer them through decision-making, challenges and difficulties in this ever-changing and complex world. They need to be more resilient, creative and digitally savvy in any industry sector. Even the F&B industry is not spared to immediate changes, such as a new approach to fine dining with digitalisation, more takeaways and online delivery. With major economic and structural changes in retailing like having a cloud kitchen, graduates must be prepared for more learning, adapting, as well as taking on different job roles through multi-tasking. This is the new norm.

As companies cut back on foreign workers, polytechnic graduates are in high demand. They should seize any job opportunities especially in this difficult period and turn this into a greater opportunity to learning and trying different areas, or continue learning through the many part-time courses that are being offered currently.

MESSAGE FROM DR GOH LAY BENG, DIRECTOR, SCHOOL OF APPLIED SCIENCE



Being an innovation-driven economy, how will ASC's strategic focus prepare our graduates for a rapidly changing economy?

Singapore is one of the most innovative cities in the world, with one of the strongest innovation ecosystems in the region. All graduates can expect to face a multitude of opportunities that come with challenges, but TP has carefully laid the foundation for them to be adaptable, lifelong learners, ready to take on the world.

We have made a concerted effort to streamline diploma courses with our Centres of Excellence (COE) and Centres of Innovation (COI). This supports cross-diploma training via final year electives, and a multidisciplinary skills-based training to nurture highly adaptable graduates for a VUCA future. With diploma course teams collaborating and co-creating projects and activities with our technology centres, students get to work alongside teaching and research staff on industry and competitive grant projects. Our centres also conduct projects in collaboration with other institutes of higher learning (IHL), locally and overseas. As such, the exposure students can receive these days are wider ranging than before.

Cross-disciplinary and inter-organisational collaborations are key, to providing a curriculum that prepares graduates for multifaceted challenges in the industry. Our growing and constantly evolving micro-ecosystem within the school, seeds the stage for cross-pollination of ideas, grooming innovative graduates for a rapidly changing global economy.

How relevant is ASC's growth areas in addressing the need of the various applied science related industries? Could you highlight some plans or initiatives for staff/student capability building and skills training to support national imperatives?

Our technology growth areas are in Food and Preventive Healthcare, as well as Urban Sustainability. These align with the national agenda on food security and environment sustainability, and involve lots of ground sensing to support the related industry sectors. We leverage strong industry collaborations and partnerships to engage in research, consultancy and training programmes, developing technologies within the school. In this way, learning opportunities are created for staff to strengthen their technical capabilities. Under these growth areas are also emerging areas in regenerative science (in plants and animals), carbon capture, and sand replacement.

For our students, ASC has launched a framework called the Differential eXperiential Programme (DXP) to encourage the learning of a new skill or different discipline, through workshops, laboratory experimentations, research methodologies or analysis. Freshmen can opt to delve into new or related disciplines through exploratory work such as Guided Learning (GL) projects, and later expand the scope for deep learning in their final year Major Projects (MP). This framework allows students to explore beyond their diploma core, and acquire a multi-disciplinary perspective about projects, the way things work in the real world.

2020 is also ASC's 20th anniversary. Could you highlight some of ASC's major achievements and milestones in the past decade? What is your aspiration for ASC in the next 10 years?

ASC has grown from strength to strength building upon legacies, and is now known for services, research and training in the areas of complementary health science, aquaculture, printable sustainable materials, and carbohydrate science.

In the next 10 years, we shall continue to deepen in those areas as we embark on growing knowledge and skills in the area of regenerative science, for translation in plant and animal-related applications. Our focus is in developing platform technologies where the benefits can be readily demonstrated in plants and animals, and also further translated for human applications, in partnership with the industry. "High science low tech" suits the polytechnic setting. It gives context to the learning of science, while keeping technology translation simple enough for students to par take, and easy enough for the industry to adopt.

In terms of pedagogy, supported by technology development at the school, ASC is moving towards more hands-on, more experiential type of lesson delivery. Practice-based, project-based and skills-based pedagogies will all suit students' hunger for an exciting and relevant learning experience at ASC. Knowledge acquisition shall be scaffolded towards more self-directed e-learning over the three years, while cross-disciplinary skills acquisition would deepen through the DXP mentioned earlier. Students would also have the choice to graduate with more certified skills, picked up over the three years at their own pace.

In other words, in the next ten years to come, I envisage ASC to be more a technology school than a science school, producing graduates who are able to tackle technological challenges with a scientific approach.

SCHOOL ADVISORY COMMITTEE



(From left to right)

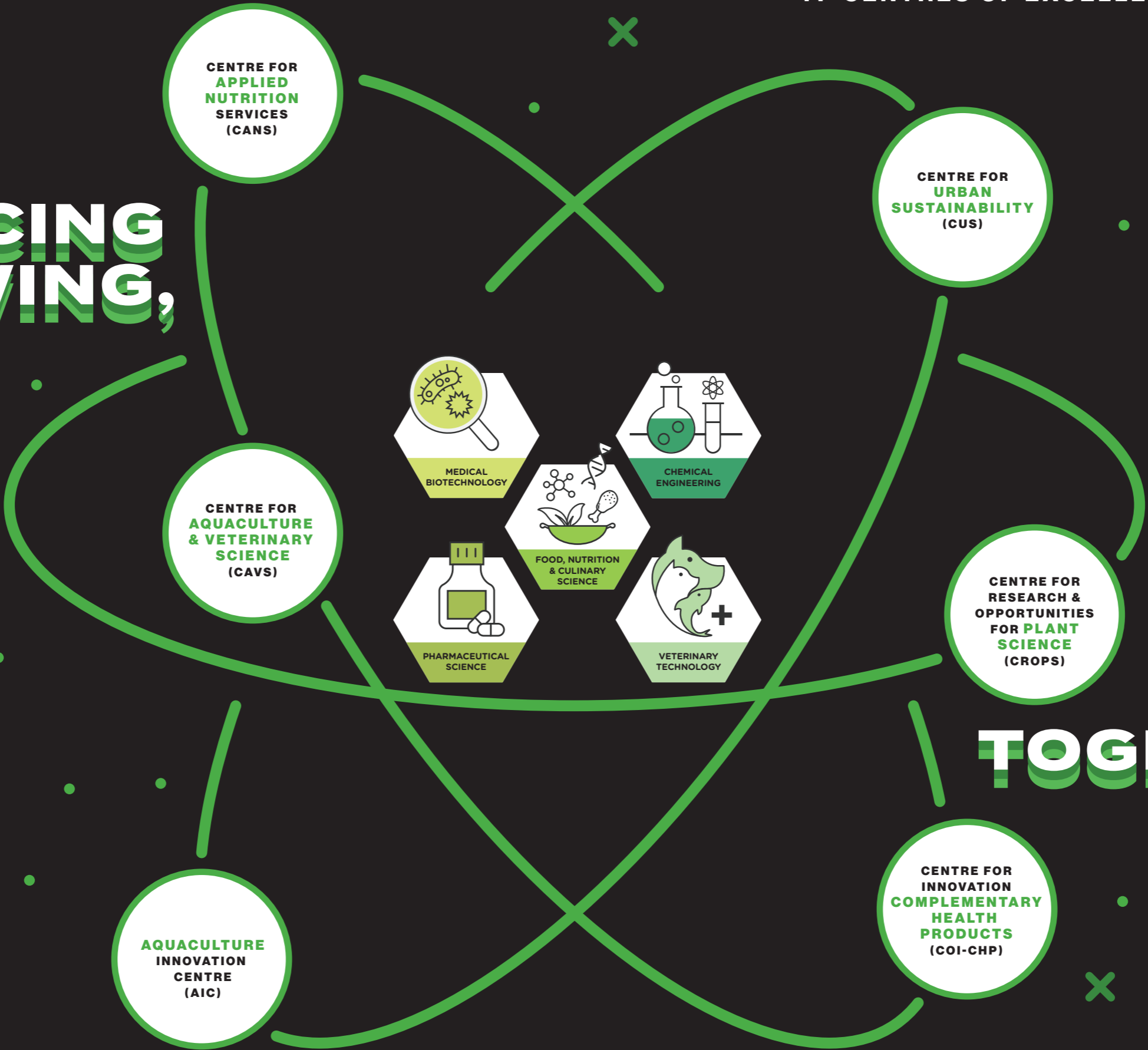
Top Row: Ms Chang Kwei Fern, Dr Ang Hui Gek, Ms Lee Choon-Siew, Mr Teng Chong Seng, Mr Lu Jin Ping, Dr Rufaihah, Dr Goh Lay Beng, A/Prof Lita Chew

Bottom Row: Mr Mock Siew Fai, Dr Manjeet Singh, Mr Andrew Tjioe, Dr Lucas Ng

Term of Office: 1 MAY 2017 to 30 APR 2020

NAME	ROLE	NAME	ROLE
Mr Andrew Tjioe Ka Men <i>President & CEO Tung Lok Restaurants (2000) Ltd</i>	Chairperson	Dr Allan Lim <i>Group Manager Nestle R&D Centre (Pte) Ltd</i>	Member
Dr Lee Chee Wee <i>Director School of Applied Science Dr Goh Lay Beng effective from 1 Jan 2019</i>	Deputy Chairperson	Ms Low Min Yong <i>Assistant Group Director, Applied Sciences Group Health Sciences Authority</i>	Member
Ms Hamida Zam Zam <i>Domain Lead, Business Development School of Applied Science</i>	Secretariat	Dr Annie Ling Mei Chuan <i>Group Director, Policy & Technology Policy Research & Surveillance Division Health Promotion Board</i>	Member
Dr Ang Hui Gek <i>Director, Allied Health Singapore General Hospital</i>	Member	Mr Lu Jin Ping <i>Managing Director Admaterials Technologies Pte Ltd</i>	Member
Ms Chang Kwei Fern <i>Director Accreditation Enterprise Singapore</i>	Member	Mr Eric Ng <i>Group Chief Executive Officer Apollo Aquaculture Group</i>	Member
Dr Cheng Wen Haur <i>Deputy Chief Executive Officer & Chief Life Sciences Officer Wildlife Reserves Singapore</i>	Member	Mr Lucas Ng Hong Kiang <i>General Manager (Plant) Petrochemical Corporation of Singapore (Pte) Ltd</i>	Member
Ms Cindy Koh Kai Lin <i>Director Consumer Division and Regional President Americas Consumer Division Singapore Economic Development Board</i>	Member	Dr Rufaihah Binte Abdul Jalil <i>Research Assistant Professor, Department of Surgery Yong Loo Lin School of Medicine National University of Singapore</i>	Member
Ms Goh Han Yan <i>Head, Consumer Businesses Singapore Economic Development Board Stepped down and replaced by Ms Cindy Koh</i>	Member	Dr Manjeet Singh <i>Director Procurement Office (A*PO) Agency for Science Technology and Research (A*STAR)</i>	Member
Mr Mock Siew Fai <i>General Manager, Plant Mitsui Phenols (S) Pte Ltd</i>	Member	Mr Teng Chong Seng <i>Director, EHS Pfizer Asia Pacific Pte Ltd</i>	Member
Ms Lee Choon-Siew <i>Audit Director, Supply Chain GlaxoSmithKline Pte Ltd</i>	Member	Dr Wong Hon Mun <i>Senior Specialist, Industry & Professional Development Animal & Veterinary Service National Parks Board</i>	Member
		Ms Goh Han Yan <i>Head of Department, Pharmacy National Cancer Centre Singapore</i>	Member

**ADVANCING
& GROWING,**



TOGETHER.

TEACHING AND LEARNING



FACELIFTS FOR DIPLOMA COURSES



DIPLOMA IN **Food, Nutrition & Culinary Science**

A rapidly ageing population with increasing incidence of chronic diseases contribute to high healthcare cost. Besides ramping up healthcare infrastructure and manpower, the government places strong emphasis on health education, disease prevention, healthy eating and active living.

Vigorous global competition drives food manufacturers to build R&D capabilities and innovate to face challenges and access rapidly growing emerging markets. With the manpower crunch in Singapore, the food service industry has to adopt manpower-lean practices through the setting up of central kitchens using automation to increase productivity. Integrating nutrition in their products while ensuring value-for-money and quality taste will blur the divide between food service and food manufacturing.

The merger of the Diplomas in Applied Food Science & Nutrition, and Baking & Culinary Science creates synergies that support the food manufacturing and food service sectors, with nutrition as the fundamental backbone. The new curriculum gives students good foundational knowledge in food science and nutrition as well as hones their culinary skills. From the junior year, they will select food science, nutrition or culinary electives, with an opportunity to deepen skills further in the respective areas during their senior year.

DIPLOMA IN

Medical Biotechnology

With reduced birth rate in Singapore and consequently the dwindling cohort size, consolidation of synergistic diplomas was done to optimise resources at TP. The original two courses, Diploma in Biomedical Science (BMS) and Diploma in Biotechnology (BIO) were designed such that BMS graduates would work mainly as medical laboratory technicians in hospital clinical laboratories, and BIO graduates as R&D assistants in research laboratories or QA/QC technicians in life science companies. However, in recent years, the boundary of career prospects and job scopes between BMS and BIO graduates have been less defined. According to the Ministry of Manpower's (MOM) recent data, employers are hiring both BMS and BIO graduates as technicians in clinical and research laboratories. This supported the basis for the merge of the two courses.

The development of biotechnology continues to revolutionise the world of medicine. Exciting and new developments in biotechnology have led the way to new



diagnostic methods or treatments to combat previously life-threatening diseases, and to improve the quality of life. According to MOM's data, both medical laboratory technologists and biomedical research technologists are in high demand. This further supports the need for the new course to focus on the area of medical biotechnology that trains students in both aspects. The new merged course offers two specialised diploma options in the second semester of Year 2: Medical Laboratory Technology and Personalized Medicine Research.

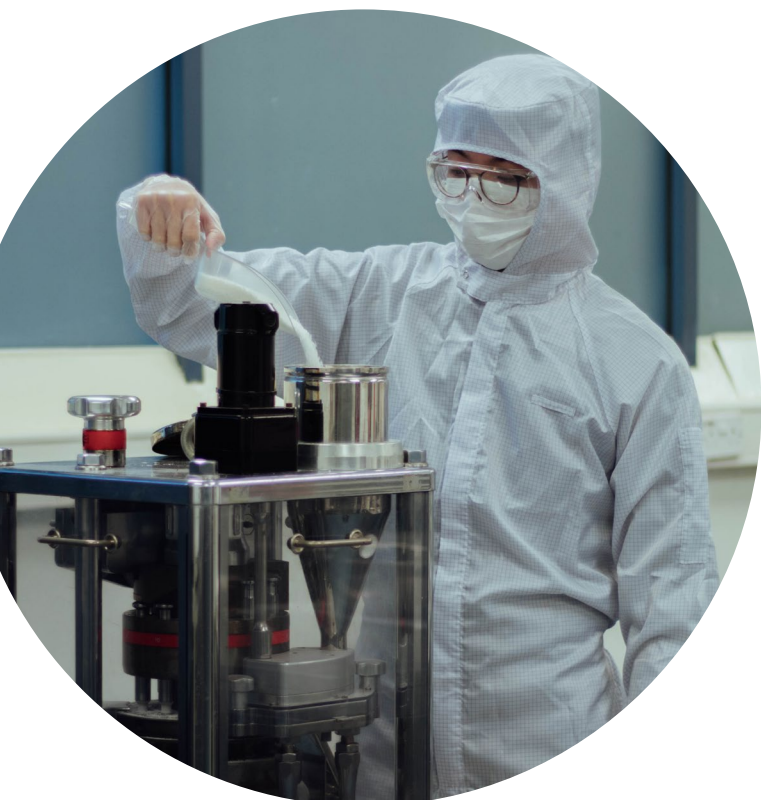
DIPLOMA IN

Pharmaceutical Science

The Diploma in Pharmaceutical Science (PHS) aims to provide skilled manpower to support the continued growth in the healthcare, and pharmaceutical and biopharmaceutical manufacturing industries.

In 2018, PHS underwent a major revamp of its course structure to align with the National Competency Standards for Pharmacy Technicians launched by the Ministry of Health (MOH) in 2015, and the biopharmaceutical manufacturing skills framework for the training of skilled manpower in these industries.

With the new course structure, PHS consolidated its elective clusters to offer two elective clusters: Pharmacy Practice and Pharmaceuticals and Biologics. The skill sets and knowledge previously taught in the Forensics and Bioanalytics elective cluster were subsequently reorganized and subsumed as diploma core subjects.



ROBUST STUDENT INTERNSHIP TRAINING

Ms Magdeline Hor

Manager, Continuing Education Training

In the past, the Student Internship Programme (SIP) was a non-graded subject that awarded just a Pass, Fail or Pass with Commendation. As such, it was not included in the computation towards the student's Grade Point Average (GPA). However, in 2015, SkillsFuture Singapore announced an initiative called the Enhanced Internship Programme. With this programme, it placed an emphasis on internships as an integral component of polytechnic education that helps strengthen the understanding of theories through workplace training.

With effect from 2018, in order to phase in this change, TP adjusted its SIP grading system to award letter grades that are eventually computed into the students' GPA. Its rationale was to emphasise and motivate students on the importance of SIP, and to recognise those who had performed well enough to help improve their overall GPA. This also motivated staff to actively engage companies to provide robust learning experiences for the students.

Hence, ASC's SIP was extended from a duration of 16 to 20 weeks to a period of 20 to 26 weeks. In addition, each student was issued a checklist of Learning Outcomes that lists transferable and industry-specific skills. The checklist indirectly became, for the student, company supervisor, and staff liaison officer, a structured learning programme to which all parties jointly committed to. Another enhancement was the introduction of a mentor for each student by the SIP organisation. The mentor would provide guidance, support and inspiration to the student through sharing of knowledge and experience relevant to work, career and/or professional development. Through this, it hoped that students would develop an awareness of the possible job and career opportunities in their related industry/sector. With these enhancements, ASC students were encouraged to reflect on what they had hoped to accomplish during SIP and beyond.

Testimonials by Industry Partners

“ This is our 15th consecutive year of partnership with Temasek Polytechnic School of Applied Science. These students spend 24 weeks in various laboratories to be trained at the bench as well as pick up soft and IT skills. Once they have demonstrated competency, they work alongside our team of Medical Laboratory Technologists. All of the students showed maturity and a deep willingness to learn, and have performed well at the tasks assigned to them. We are very pleased with both their attitude and quality of work and they have been a great help to us. They have also done well in their Major Projects, some of which have been published in peer reviewed journals. ”

*Dr Alvin Lim
Assistant Director
Department of Molecular Pathology,
Division of Pathology, SGH
Adjunct Associate Professor
Duke-NUS Medical School
Adjunct Associate Professor
Nanyang Technological University*

“ TP students are generally well-motivated. They have been proactive and made the effort to meet the various deadlines. Having a structured learning outcome allows the student, company supervisor and TP liaison officer to have a common understanding of the aims and the objectives of the whole training program and overall, we found this structure helpful. The structure allows us to better incorporate the various Key Tasks and competency standards as required by the MOH PT work group. ”

*Ms Esther Ang Pei Jing
Senior Pharmacist, Outpatient Pharmacy
KK Women's & Children's hospital*

“ The Student Internship Programme at Temasek Polytechnic provides a good opportunity for polytechnic students to be exposed to early, direct hands-on research experience, which is an entry point for future aspiring undergraduate research opportunities. With the extended SIP, students have more time to develop not only their laboratory technical skills, but also critical thinking, time management, and scientific writing skills. The focused and structured learning outcomes and grading system provides a clear guiding tool for both the mentors and the students. ”

*Dr TOH Tan Boon (Ph.D.)
Senior Research Fellow, Head
Translational Core Tx Laboratory
The N.I Institute for Health (N.I)
National University of Singapore
Center for Life Sciences*



Two students from Diploma in Chemical Engineering, Muhammad Afif B Kamaludin (A17D5) and Glenn Cheok Jun Wei (A17D3), were attached to the Osmoflo desalination plant in South Australia, Adelaide for their 6-month internship.

Testimonials by Students

“ The experience I gained from SIP was a fruitful one. Having the SIP performance to be included into our cGPA certainly had its benefits such as giving a chance to achieve a better score for those who do not perform well academically. The grading of SIP also helps to let me know about the quality of my work. The learning outcomes set by the school and organisation help to streamline our learning. It also helps the organisation plan our tasks effectively rather than letting students do tasks which may not be useful to our learning. Having a mentor assigned to me was beneficial as I learnt more about the industry, further studies and career paths. I could also confide in my mentor when I had difficulties at work and they would try to help me if they could. ”

————— Nicole Chan Jie Yu
Attached to KK Women's and Children's Hospital, Pharmacy Department
A17L1, Diploma in Pharmaceutical Science

“ The additional 6 weeks of SIP allowed me to acclimatise and adjust to the research environment. Additionally, this extension gave me time to plan my experiments, as well as the SIP and MP deliverables, at a comfortable pace, allowing for a pleasant and enriching internship. In my opinion, grading SIP is an effective measure to ensure that students treat the SIP seriously and not neglect it amidst completing the Major Project. ”

————— Justin Tang Jit Hin
Attached to The N.I Institute for Health (N.I),
National University of Singapore, Center for Life Sciences
A17L4, Diploma in Pharmaceutical Science

“ With SIP being graded, it made the semester more balanced as the focus is on both our work performance as well as our major project. It also provided an extra source of motivation to do more and perform better during my period of attachment. The grading also helped to raise my final GPA which benefitted my university applications. ”

————— Po Qian Hwee
Attached to St John's Island National Marine Laboratory
A17K1, Diploma in Veterinary Technology

“ Having my internship at a petrochemical industry was interesting mainly because it's a totally new working environment and it's not the usual office 9 to 5 type of work. Instead its shift work and I was always on standby. The workplace is big, noisy, and humid and at times I got to climb towers that are high. I appreciate how different stream processes are connected to each other and how each and every stream/pipes becomes useful. One would even say it's quite an odd job, but I guess that's what makes it unique as well memorable. The extended internship period allowed me to fully immerse in the learning experience for 6 months. I remained focus, did my best and obtained an A grade for the internship. It was a rewarding and enriching experience. ”

————— Yee Jia Jun
Attached to Singapore Refining Company Pte Ltd
A1ED3, Diploma in Chemical Engineering

POWERING EDUCATION THROUGH APPLIED LEARNING

VETERINARY WORK-BASED TRAINING

Dr Neo Peici

Veterinarian, Centre for Aquaculture and Veterinary Science



The TP Animal Clinic and Wellness (TPACW) offers the full spectrum of veterinary services, including animal rehabilitation, with a focus on the wellness of family pets by protecting, promoting, and supporting good health. It provides affordable services with best practices without compromising on patient care.

This facility is primarily set up for the purpose of supporting student training in a real-life clinic setting. The fully operational and licensed clinic helps to enhance students' competencies as they undergo training as part of their curriculum by providing veterinary assistance. Under the close supervision of professional veterinarians and veterinary technicians, students from the Diploma in Veterinary Technology are attached to the facility to observe and gain hands-on experience as a Veterinary Technician trainee. They assist in areas such as admission of patients, anaesthesia preparation, intra-operative monitoring, post-surgery care, as well as the discharge and treatment of patients.

Testimonials

“ I have learnt a lot from TPACW as everything that was taught in books were shown in real-life. The attachment has given me a better perspective on clinic work as well as the technical skills required for the job. ”

————— Ariel Peh Shi Qi
A18K1, Diploma in Veterinary Technology

“ My attachment at TPACW has been both enriching and enlightening. It was eye-opening to observe and learn how a clinic functions, and even more exciting to finally be able to put our practical skills to use. The vast insights that we gained from TPACW is definitely something that will come in handy when we embark on future internships and job opportunities. ”

————— Naomi Koh Shao Yun
A18K2, Diploma in Veterinary Technology

“ I had a great learning experience from clinical rotations held at TPACW. The teachers helped me pick up skills which I will definitely be able to utilise in the future. ”

————— Ee Xin Ru, Chirsty
A18K1, Diploma in Veterinary Technology



CULINARY SCIENCE IN ACTION

Chef Randy Chow

Manager, Bistro Lab and CU2+



Bistro Lab is a 2-storey, 100-seater cafeteria managed by the Centre for Applied Nutrition Services. A learning enterprise cum training facility for students from the Diploma in Food, Nutrition and Culinary Science, and the Diploma in Baking and Culinary Science, it facilitates work-based training to induct students entering the foodservice industry. Together with a core team of chef instructors, this training facility cooks and serves healthier Asian and Western food for dining in, takeaway and catering events.

Specifically, through operating both the dining areas and different types of kitchens, Bistro Lab offers students:

- hands-on, real-time learning experiences in running a food & beverage business;
- opportunities to discover and explore new food concepts, kitchen technology and ingredient applications; and
- industry projects on food & beverage innovations, particularly in the development of sustainable cooking methods and nutritious recipes.

Testimonials

“ Spending 4 months at Bistro Lab was an eye-opening experience that gave me a glimpse into the real-life industry, learning to understand consumer behaviour, analyse daily sales and interact with customers. The chefs at Bistro Lab were very knowledgeable and were ecstatic to share with us. Working at Bistro Lab has truly helped me grow in my craft and be a more responsible and resilient person. ”

————— Clarissa Lee Qi Shani
A17J2, Diploma in Baking and Culinary Science

“ A truly unique and distinctive platform to grow and hone my skills as a culinary student. It provided opportunities to learn and apply fascinating techniques and knowledge that I’ve acquired from the absolute best chef mentors there is to offer. From learning classic French dishes to experimenting with oriental dishes. I remembered waking up daily at the crack of dawn, thrilled and eager to dive straight into the Bistro Lab kitchen. ”

————— Julius Chen XunWei
A18J2, Diploma in Baking and Culinary Science



“ Bistro Lab is a facility where teamwork and cooperation are being fostered and learning is not determined by a syllabus, but a two-way street where everyone must play a part in order to thrive. Learning at Bistro Lab has been a creative platform for us to develop new and unique products/ meals and to see from a business perspective to better understand how an F&B business operates. ”

————— Tan Yong Liang Cadell
A17J2, Diploma in Baking and Culinary Science

MOVING AHEAD WITH CET

Ms Magdeline Hor

Manager, Continuing Education Training

In the last two years, ASC increased its momentum in the provision of CET programmes to the public. These CET programmes were created to serve the diverse needs of the industries. Some of the industry sectors include nutrition, healthcare, laboratory sciences, animal sciences, chemical technology and workplace safety. Presently, the CET programmes, are shown in the table below:

“ MOH is pleased to support the Specialist Diploma in One Health (SDOH), as endorsed by the One Health member agencies. I note that the course has been and will continue to be useful for public health officers. ”

— Dr Derrick Heng
Group Director, Public Health
Ministry of Health Singapore

	SPECIALIST DIPLOMA	PART-TIME DIPLOMA	INDUSTRY CERTIFICATIONS
BIOPHARMACEUTICALS MANUFACTURING	Specialist Diploma in Biopharmaceutical Technology	—	—
ENERGY AND CHEMICALS	Specialist Diploma in Laboratory Management & Instrumentation	Diploma in Applied Science (Aquaculture) Diploma in Applied Science (Chemical Technology)	Fundamentals of Chiller and Cooling Tower Systems for Facility Management
ENVIRONMENTAL SERVICES	Specialist Diploma in Environment & Water Technology	—	—
HEALTHCARE	—	Diploma in Applied Science (Medical Laboratory Science) jointly conducted by the 5 polytechnics	Certificate in Phlebotomy
PROFESSIONAL SERVICES	Specialist Diploma in One Health Specialist Diploma in Veterinary Wellness Care	Diploma in Applied Science (Veterinary Technology) NEW Diploma in Security, Workplace Safety and Health NEW	Skills Certificate in Pet Care & Management (Companion Animals) Skills Certificate in Pet Care & Management (Ornamental Fish) Skills Certificate in Small Animal Echocardiography (Basic) NEW

Notably, for the veterinary sector, ASC offers a suite of certification courses to support training. This included the foundation course to the achievement of Continuing Professional Education (CPE) for practising veterinarians.

“ The proposed diploma programme with WSP, which is also tied with 2 Modular Certificates in Aquaculture Sciences and Aquatic Systems & Mechanics, (and to be completed in 12 months along with on-the-job training), such a programme will benefit my company. It will equip new ITE graduates with the relevant knowledge and skills to perform their work. We are also happy that the proposed WSP allows participants to study at their own pace in 4 years. Besides, building their skills and knowledge, they also acquire a diploma in the process. ”

— Mr Phua Lucky
Deputy CEO
Apollo Aquaculture Group Pte Ltd

Upon reviewing industry requests, ASC developed and co-delivered customised full-qualification programmes. An example is the Specialist Diploma in One Health where the school coordinated and administered the programme with four government agencies. They were: National Environment Agency (NEA), Ministry of Health (MOH), Singapore Food Agency (SFA) and National Parks Board (NParks). The course enjoyed strong support with trainers coming from these institutions and they worked together with ASC lecturers. The course participants were staff members from these institutions. Through this programme, the agencies aimed to foster a holistic perspective of public health among their staff members to respond in an integrated and effective manner to public health emergencies.

“ The Work and Study Programme gives me an opportunity to gain more knowledge and acquire new skills sets which will be beneficial to me. I will also get to network and befriend more people in this industry. Perhaps I may become their colleague. ”

— Angiela Yeo
Vet Clinic Assistant
Acacia Veterinary Clinic

“ As a WSP student I benefitted more compared to studying as a full-time student. I can absorb and understand better the lectures as the course is related to my daily work. With the lessons and guidance from the lecturers and manager, I can apply the knowledge and skills well. ”

— Ong Jie Yi Diana
Air Liquide Singapore Pte Ltd

The **SkillsFuture Work-Study Programme (WSP)** is also being offered to recent graduates of ITE and polytechnics in these CET programmes:

- Diploma in Applied Science (Chemical Technology)
- Diploma in Applied Science (Veterinary Technology)
- Diploma in Applied Science (Aquaculture)
- Specialist Diploma in Veterinary Wellness Care

Besides the full-qualification programmes, ASC delivered numerous short courses for skills training and upgrading in different industry sectors and community groups (as shown in the table below).

INDUSTRY FOCUS/ COMMUNITY GROUPS	COURSES
GMP AND VALIDATION-RELATED	Computer Systems Validation (CSV) Good (Quality Control) Laboratory Practices Introduction to GMP & Pharmaceutical Quality System Process Validation (PV) & Cleaning Validation (CV) Role of QA & QC in a GMP Manufacturing Environment & GXP Auditing Supplier Qualification & Monitoring
MINISTRY OF EDUCATION (MOE) SCHOOL TEACHERS	Basic First Aid in Science Labs Fundamental Principles and Applications of Instrumental Analysis Introduction to Advanced Lab Equipment Learning Journey on Healthy Living Maintenance of Optical Microscopes Nutrition for Optimum Health Risk Management for Practitioners
PUBLIC	Nutrition for Optimum Health Nutrition Therapy for the Prevention and Management of Diabetes
WORKPLACE SAFETY AND SECURITY	Bedok Safety Group WSH May Seminar 2019 Risk-based Corrective & Preventive Action (CAPA) Mechanism SS ISO 45001 Occupational Health & Safety Management System Adoption Workshop

UPGRADED TEACHING FACILITIES

Dr Jiang Li

Senior Manager, Technical and Infrastructure Support

East Wing Teaching Laboratories

With the introduction of new technologies and changes in the curriculum and pedagogy, the school's older teaching laboratory facilities needed an upgrade. Cited at TP's latest block, the East Wing Block 1A, and termed the East Wing laboratory renovation project, it all started in December 2018. Renovation had since been completed and all the new laboratories were fitted out and started functioning in October 2019.

The new features were:

- arrangement by clusters such as Biology, Biologics, Chemistry, and Food;
- related clusters are located on the same floor to optimize laboratory utilisation rate and facilitate scheduling of practical sessions;
- better equipped laboratories to enhance interactive teaching in a laboratory setting;
- equipped with movable benches for easy re-configuration of the class layout;
- integrated laboratory set up for both teaching and research purposes; and
- fitted with latest industry-relevant equipment to meet current industry design standards and requirements.

Biology Cluster

Medical Technology Laboratory



This houses several analytical instrument to provide students the opportunity to master relevant skills before entering the industry. With instruments for histopathology, such as the automatic tissue processor, embedding centre and microtomes, students gain hands-on experience to process tissue samples and view them under the microscope.



Microbiology Laboratory



This laboratory allows students to explore fundamental microbiology techniques such as culturing, staining and identification of bacteria. With the new layout and design of the benches, students can easily view the demonstration by tutors, and tutors in turn can also assess the students' performance easily.

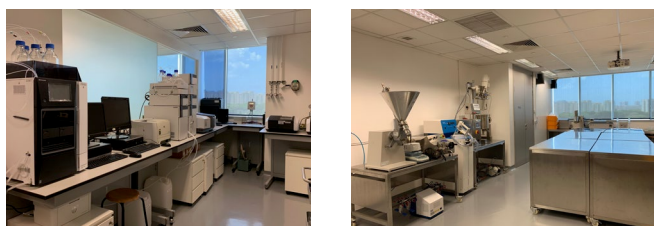
Biologics Cluster

Small Bio-processing Laboratory



This houses equipment for purification by Tangential Flow Filtration (TFF) and gel size exclusion chromatography (SEC). The laboratory set up allows students to view demonstrations by staff as machines are centrally located and placed on laboratory benches.

Pharmaceutical Formulation and Analysis Laboratory



This well-equipped laboratory provides students with ample hands-on opportunities to perform the manufacturing of different pharmaceutical dosage forms, as well as the analysis of pharmaceutical raw materials and finished products in accordance to the pharmacopoeia test methods. The laboratory is also used for industry projects related to product formulation development and characterisation.

Cleanrooms 10K and 100K



These newly established cleanrooms serve as a platform for research collaborations, development of cell-based therapy skills, and training facility for the emerging cell-based therapies industry.

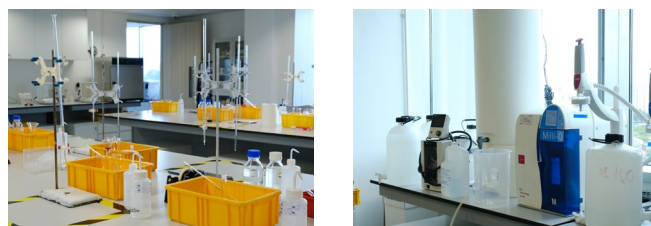
Chemistry Cluster

Instrument Laboratory



Equipped with industry-relevant equipment such as the High Performance Liquid Chromatography (HPLC) analyser, Inductively Coupled Plasma (ICP) spectrometer, and Infrared (IR) spectrometer, this laboratory is to impart hands-on skills required by industries such as forensics, petrochemical and pharmaceutical.

Chemistry Laboratory



This laboratory is primarily used for PET training to explore basic chemistry skills in chemical sample preparation that includes distillation, liquid-liquid extraction and titration.

Food Cluster

Beverage R&D Laboratory



This laboratory houses equipment such as mixer, homogeniser, as well as an Ultra High Temperature (UHT) machine to impart hands-on skills required by the beverage industry.

Bakery & Confectionery R&D Laboratory



A well-equipped laboratory with commercial grade baking and confectionery related equipment to provide students the opportunity to familiarise and master relevant skills before entering the industry. The laboratory set up is also capable of supporting training for baking workshops and competitions.

Culinary Theatre



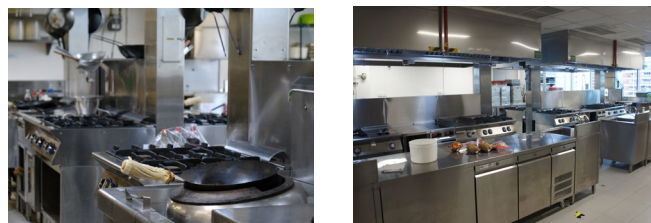
This 100-seater Culinary Theatre is equipped with state-of-the-art ovens, cooktops and audio-visual tools to enable a multi-sensory, interactive learning experience. Industry partners have taken centre stage to host food product launches, culinary demonstrations, and food and nutrition educational sharing sessions.

Dairy & Frozen Confections R&D Laboratory



The Dairy & Frozen Confections R&D Laboratory houses equipment such as ice cream maker, food processor and homogenizer for student training and benchwork trials to conduct product formulation as part of industry projects.

Kitchen Laboratories



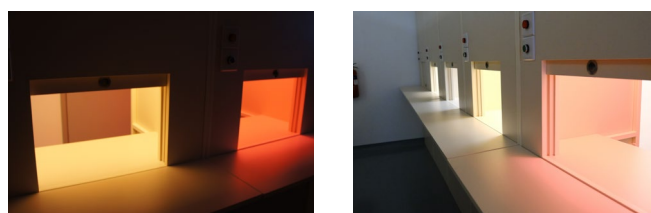
These Kitchen Laboratories are equipped with commercial scale cooking appliances and equipment. Built with audio-visual capability, they are suitable for hosting cooking demonstrations, competitions and cooking workshops. The set up allows any form of training to simulate closely with the industry standard for the learner to acquire industry-relevant skills in both Asian and Western cuisines.

Noodle & Snack R&D Laboratory



The Noodle & Snack R&D Laboratory is equipped with pilot scale equipment like semi-continuous noodle maker, combi oven, tunnel dryer, various-sized mixers to enable hands-on experience. The laboratory also provides opportunities for staff capability development to work on pre-commercial production.

Sensory Laboratory



The laboratory features 10 open sensory evaluation booths, each equipped with a lighting unit of different light sources. Adjacent to the testing booths is a well-equipped sample preparation room to ensure proper sample transfer during a study. Built to conduct a range of sensory evaluation techniques, the laboratory is used to carry out studies as part of new product development or product reformulation.

APPLIED RESEARCH AND INNOVATION

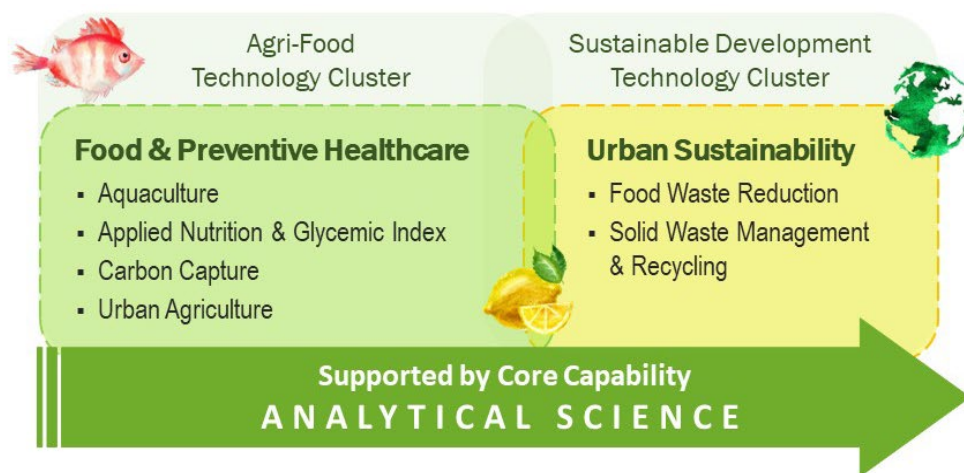


NOW IN ASC

Dr Wang Shy Chyi

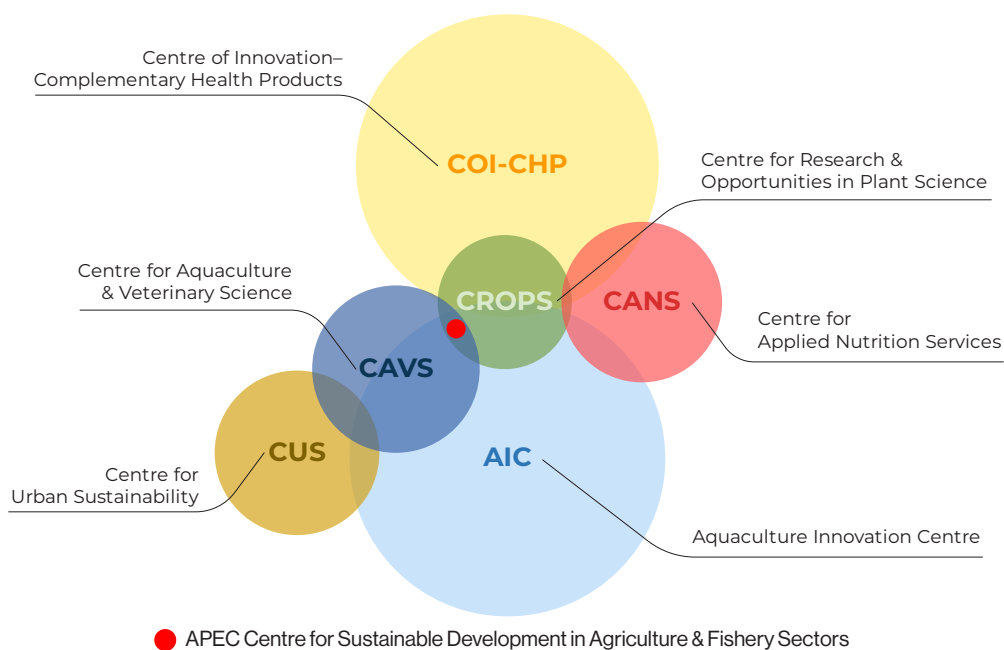
Assistant Director, Technology Development

Under a new leadership from 2019, the School's focus areas were streamlined to augment the Agri-Food and Sustainable Development technology clusters at Temasek Polytechnic.



Growth areas for the School of Applied Science

Currently, the Centres of Excellence (COE) within ASC work closely with the Centre of Innovation (COI) and the Aquaculture Innovation Centre (AIC) to form a strong agrotechnology microecosystem with multiple areas of synergy between them.



School of Applied Science agrotechnology microecosystem model

In addition, ASC has collaborated with APEC Policy Partnership on Food Security (PPFS) to set up Centre for Sustainable Development in Agriculture & Fishery Sector

Together, these Centres are the breeding grounds for innovation and industry engagement. Staff are empowered to put forward meaningful innovations for funding requests. Some recently approved projects include 'An Integrated System to Produce Recycled Mixed Plastic Ingredients and Composites for Infrastructural Applications' (NEA-Closing the Waste Loop), 'Herbal Product Development by 3D Skin Model and Liver-immune Co-culture System for Skin Allergy' (MOE-Translational R&D and Innovation Fund), 'A Pilot Study of Integrated Treatment of Hazardous Industrial Wastewater Mixture', 'Efficacy of Dietary Manipulation on Gut Microbiome and its Metabolites', 'Optimization of Rosemary Extract Used as Preservative in Fish Oil' and 'Integrated Intensive Urban Farming Solutions (I2UFS) for Indoor Farming and Nursery Management'.

The Centres also provided support to the industry, particularly the SMEs, in product development, process improvement and solutioning. Such work included the development of improved recipes as healthier choices, and an example was a project carried out by CANS that saw the development of 15 Asian modular recipes suitable for dysphagia patients that were very well-received by the Parkway Cancer Centre. Another project, led by COI-CHP, saw the formulation of a specific herbal product for the prevention of diabetes that had since been licensed for commercial application. For novel solutions, CUS saw the identification of a novel biocatalyst for the food composting process and in early 2020, staff from various Centres formulated an alcohol-based hand sanitizer against the COVID-19 virus.



Importantly, these Centres provided training opportunities for staff and at the same time for students as they complemented the Diplomas by facilitating and enhancing skills-based training. Such forms of training were conducted at the learning enterprises, namely Bistro Lab Cafeteria & Production Kitchens (managed by CANS), and TP Animal Clinic & Wellness (managed by CAVS). These learning enterprises are operated in tandem with emphasis on real-life training for the students.

Concerted efforts were also aimed at integrating research with academic and student development. With the overarching objective of creating the Learner, Creator and Leader, students were grounded in the holistic development of domain competency and skills proficiency. A unique Differential eXperiential Programme (DXP) was also launched to enhance ASC's flagship Differential Research Programme (DRP). Having had an initial experience in DRPs, students may then continue to pursue their areas of interest into the academic semester to fulfil academic requirements, undertaking the Guided Learning (GL) module, and a related Major Project (MP). This route would allow them to further hone their domain skills under the supervision of our scientists and researchers.

Moving forward, the Centres and Diplomas will continue to gear towards achieving skills mastery with relevance to the changing economy, and bring education to life and life to education.



COLLABORATIVE INDUSTRY PROJECTS

Asian Modular Dysphagia Meals Made Simple!

Singapore is greying at a faster pace compared with the last decade. The physiological process of aging, stroke, and certain cancers can affect one's ability to swallow food at old age. As such dysphagia affects more than 60% of elderly nursing home residents, patients after stroke, and around 30% of the seniors who are admitted to hospital. When chewing and swallowing are compromised, the recipes offered are even more important to prepare meals for such persons.

Sensing the increasing needs, CANS, working with students developed 15 modular therapeutic recipes to suit the different levels of texture and consistency based on the new International Dysphagia Diet Standardization Initiative (IDDSI). These recipes were carefully adjusted to retain their unique Asian flavours. This collection of recipes makes it easy for patients and caregivers to savour their favourite local dishes in the comfort of their homes. A part of this project was done in collaboration with Parkway Cancer Centre and with the funding received from Temasek Polytechnic Research Funding.



TEXTURE-MODIFIED VARIATIONS



POACHED PEAR

IDDSI LEVEL

5 MINCED & MOIST

Place 100 g of Poached Pear in a bowl and mash slightly with a fork.

Use fork or spoon pressure test to assess texture.

4 PUREED

In a small saucepan, mix 100 g of cooked and sliced Poached Pear with cornstarch slurry. Cook and slightly thicken.

Remove from heat and transfer to a food processor and blend to a fine puree.

Use fork drip test and spoon dip test to assess the texture and consistency.

3 LIQUIDISED

Place 100 g of cooked Poached Pear in a food processor.

Blend well to a fine and smooth texture. Add water (~30-50mL) while blending.

Use fork drip test to assess. Add additional liquid if required.

A Nutrition Resource Booklet on Healthy Eating Strategies for the Elderly



Developed by CANS in collaboration with the Agency for Integrated Care (AIC), this “Eating for Health: Resource Book 2” was designed to offer practical recommendations and healthy eating strategies for the elderly. Launched in May 2019, this resource book is now available in the Primary Care Network as a quick reference tool for healthcare professionals, patients and caregivers to select and prepare healthier meal options. The book consists of nutrient composition for 45 commonly eaten local and international dishes categorised for ease of reference, and tips for healthier alternatives.

Developing a More Efficient Biological Indicator with Fast Growing Mutants Of *G. stearothermophilus*

In modern healthcare and research institutions, sterilization by wet heat is a crucial process used to avoid bacterial contamination. However, validation is required to ensure the efficacy of this steam sterilization process to assure end-users that the sterilized equipment are safe for use. The bacterium, *Geobacillus stearothermophilus*, is commonly used as a biological indicator for sterility monitoring due to its thermophilic nature. Currently, the turnaround time for this biological indicator is between 4 to 6 hours due to the bacterium's prolonged spore germination process. With an increasing demand for a

faster turnaround biological indicator, ASC conducted a project for Steris Corporation, USA, that focused on the development of mutants of *G. stearothermophilus* with reduced spore germination time.

Students from the Diploma in Biotechnology had the opportunity to be introduced to the sterilization and validation concepts and be trained in basic laboratory skills, as well as understand more about microbiology and biological indicators.

Developing Ready-To-Eat Meals Suitable for People With Diabetes

Leveraging on ASC's expertise in food and culinary science, NTUC Foodfare partnered CANS to develop healthier food products and meal options that will benefit the masses through NTUC Social Enterprises' reach of dining, supermarket, eldercare and early childhood education chains.

At the end of 2018, under NTUC Foodfare's house-brand, Chef's Finest, a new line of low Glycemic Index (GI) ready-to-eat meals were launched and sold across all NTUC Fairprice supermarkets nationwide. Developed by staff and students, these frozen and microwavable meals come in both Asian and Western flavours, and are certified halal. Bearing the Healthier Choice label, all these items are endorsed by the Health Promotion Board (HPB) as being suitable for those with diabetes.



A Low Cost and Rapid Testing Method for Product Quality Assessment of Lac Activated Liver Protector™

Commissioned by GNC Singapore, ASC's Centre of Innovation for Complementary Health Products (COI-CHP) conducted this study for long-term QC monitoring of the herbal product. In this project, a high performance thin layer chromatography (HPTLC) fingerprinting assay was developed for qualitative identification of the herbal ingredients used in the GNC herbal product. Upon successfully developing this HPTLC assay, it was used as a low cost yet rapid analysis for product QC monitoring.



LAC Activated Liver Protector™

Modern Chemical Instrumentation for Fast Screening of Multi-Pesticide Residues in Organic and Non-Organic Vegetables

As consumers become increasingly wary about what they consume, fresh and processed food products have come under greater scrutiny to ensure product safety when they are introduced into the local market. Scientific approaches in this area increase consumer confidence and also allow enterprises to remain competitive.

Partnering with Agilent Technologies, COI-CHP developed an advanced liquid-chromatography coupled with triple quadrupole (LC-QqQ) instrument-based chemical analysis method for fast screening of multi-residue pesticides in complex product matrices. This method has been applied to test organic-labelled and conventional vegetables, as well as various fruits, wines and TCM herbs.

Recycling Urban Wastes Into TP Recycled Ecological Blocks (REB) and Green Park Benches



CUS has created a safe and viable technique (environmentally & economically) to process urban wastes such as wood & horticultural wastes and incineration fly ash into REB that can be used to construct outdoor and park facilities, as well as DIY (do-it-yourself) furniture. The use of REB building materials would not compromise the environment and eliminate the need for high heat, pressure and adhesive application during its production. With REB, CUS also prototyped green park benches that are six times cheaper than similar park benches in the market too. These benches require 2.67 times less manpower to build and offer increased productivity by up to 62.5% per year.

In collaboration with the National Parks Board, these benches were made from cementitious materials incorporating wood and horticultural wastes collected from Bedok Reservoir Park, and then installed in the park for public use.

An Urban Photobioreactor for Algae Farming

The Water Technology domain under CAVS, collaborated with Life3 Biotech to set up an urban algae system for public showcase. From algae cultivation, reactor assembly, configuration design to operation of the reactor, students from the Diploma in Chemical Engineering were involved in this collaborative project as part of their Student Internship Programme and Major Project.



Developing a diagnostic assay to detect a neurological condition in parrots

Captive parrots are highly susceptible to a chronic and often fatal neurological condition called proventricular dilatation disease (PDD). PDD targets the digestive and nervous systems, and positive diagnosis is difficult as no sign is definitive for PDD.

In order to screen the movement of birds from overseas zoos as part of biosecurity measure, and protect the psittacines in Jurong Bird Park, CAVS collaborated with the Wildlife Reserves Singapore (WRS) to develop an

Enzyme-linked Immunosorbant Assay (ELISA) for the detection of antibodies against Bornavirus in the infected birds. Carried out by a team of CAVS researchers in the Veterinary Diagnostic Facility, the objective of developing this serodiagnostic test is to complement WRS on their RT-PCR test outcomes, as it is not conclusive in cases where it fails to detect ABV infection. The development of the immunoassay was completed and has been used successfully to screen numerous blood samples collected from the birds from WRS.

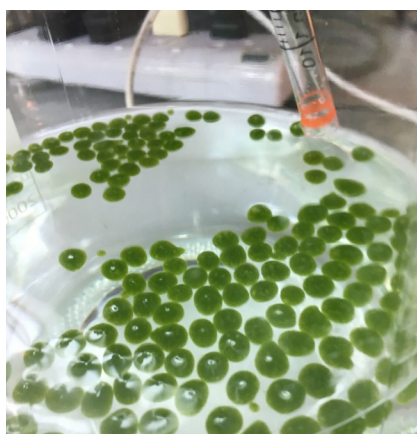


Blue and Gold Macaw



African Grey Parrot

Innovative Eco-friendly beads made for Water Treatment



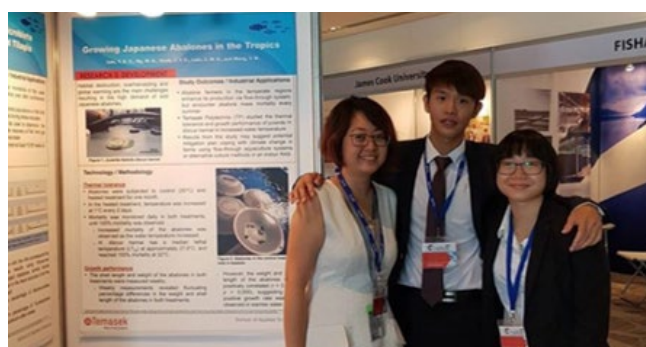
The Water Technology domain under CAVS has devised an environmentally-friendly method of having cleaner water. With our reservoirs functioning to maintain water continuity and sustainability, and our open ponds serving as aesthetic features in every park, the market outlook for this proposed technology is promising. This developed filter can also be deployed in domestic and commercial aquariums as a water-saving device.

They have created a prototype of an algae-based modular filter that would remove soluble nutrients from open waters like ponds and even reservoirs. This will lead to elimination of native algae and plankton. Also by manipulating the formulation of the algae beads to keep out unwanted growth of micro-organisms, the modular filter will be an attractive strategy to restore the quality of green waters. Moreover, as the filter's "by-products" are beads saturated with microalgae, these could also be conveniently harvested and used as animal feeds.

Helping farmers to enhance abalone culture

Over 100 abalone species can be found across the world's oceans but due to both restricted fishing and increasing demand for these very expensive molluscs, over 95% of abalone consumed are actually cultured on farms. One of the challenges faced by the farms is the abalone's slow rate of growth which will lead to significant financial investment and time required.

CAVS collaborated with Oceanus Group to conduct a number of projects aimed at testing different methods to accelerate growth, as well as to attempt producing larger specimens of abalone. These projects focused on feed, nutrition and environmental stressors. Examples of projects included the study on the effect of temperature tolerance limits on the survival and growth of Japanese abalone (*Haliotis discus hannai*) and genetic profiling of laggards and normal growing abalone juveniles. The studies were conducted in CAVS' Aquaculture Research Facility (ARF) involving students from the Diploma in Veterinary Technology.



INVENTIONS UP FOR GRABS

Organic Biofertilizer: Yertilizer

Principal Investigator:
Dr Chan Giek Far
Manager, Medical Biotechnology



Yertilizer is an organic biofertilizer that consists of a beneficial yeast type, *Pichia sp.* It is preserved in rice flour, and works by releasing phosphorus trapped in soil, hence increasing phosphorus availability for plant growth.

Low Cost Onsite Multiplex Device for Early Prediction of Kidney Damage

Principal Investigator:
Dr Amaladoss Anburaj
Lecturer, Plant Biotechnology

Used for detecting uric acid levels from finger-prick blood, this onsite, paper-based device functions on the activities of uricase and peroxidase enzymes that are immobilized on the paper device. It is cost-effective, user-friendly and does not require any skilled personnel or equipment to conduct the test. Results are obtained instantaneously and can be easily adopted for clinical or home testing, for detecting and monitoring the progression of gout and hyperuricemia.

Natural Multi-Pest Repellent: TPel Gel

Principal Investigator:
Dr Chan Giek Far
Manager, Medical Biotechnology



TPel gel is an all-natural multi-pest repellent made from lemongrass and cinnamon extracts. These extracts are mixed with gelling agents and preserved with food-grade stabilisers. The effusion from TPel gel effectively keeps cockroaches, ants, lizards and mosquitoes away for about 4 weeks when placed indoors.

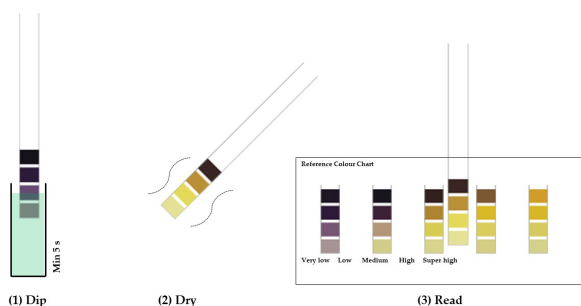
Biocatalyst and Additives for Food Waste Composting

Principal Investigator:
Dr Miao Huang
Manager, Chemical Engineering

This is a cost-effective process to efficiently transform food waste to compost thereby reducing the environmental impact of food waste. By using some novel strains and organic additives for in-vessel composting of post-consumption mixed Asian food waste, the end product achieved can be mixed with soil to support plant growth. energy at pH 8 and at reaction times of less than 2 hours to produce good calorific values of the biocrude fractions. With further processing, these are likely to reach that of diesel, which indicates that the short HTL process can convert food waste into liquid fuels.

Colour Strip for Rapid Determination of Antioxidant Capacity in Food

Principal Investigator:
Dr Xue Xuejia
Lecturer, COI-CHP



This colour strip is used to determine the antioxidant levels of food products. By dipping the colour strip into the liquid food sample for a few seconds, similar to the use of the pH paper, the colour bands are read against a designed reference colour chart to determine the antioxidant level. Being highly cost-effective, it serves as a starting point for testing laboratories or individuals who would like to estimate the antioxidant levels in food.

Natural Pest Attractant: TPest

Principal Investigator:
Dr Chan Giek Far
Manager, Medical Biotechnology

TPest is an all-natural pest attractant made from rice flour, molasses and yeast. It is an organic, biodegradable and non-toxic pest attractant, and when placed as a bait on a sticky trap, TPest can lure cockroaches, and sometimes ants and lizards too, onto the trap effectively. It can be discarded after pest has been trapped.

Hydrothermal Liquefaction of Food Wastes

Principal Investigator:
Dr Wuang Shy Chyi
Assistant Director, Technology Development

Using hydrothermal liquefaction (HTL) as a process flow to convert food waste to biofuel, this environmentally friendly process is simple and highly energy efficient. At a higher pH, the HTL process favours the conversion of mass to energy at pH 8 and at reaction times of less than 2 hours to produce good calorific values of the biocrude fractions. With further processing, these are likely to reach that of diesel, which indicates that the short HTL process can convert food waste into liquid fuels.

Innovative Green Filter

Principal Investigator:
Dr Wuang Shy Chyi
Assistant Director, Technology Development

A contained modular filter that uses microalgae to help assimilate soluble nutrients from open waters, this module can be sized for applications in domestic and commercial aquariums. When applied to greenwaters, this filter can prevent additional stress to the downstream water purification processes. This can therefore greatly reduce water consumption in small aquariums.

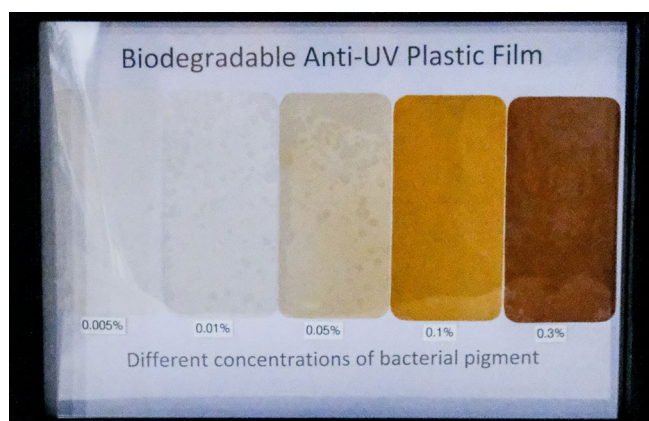
Herbal Shi Hu Preparation for Diabetes Prevention

Principal Investigator:
Dr Shi Lei
Scientist, Math & Chemistry

Prevention is one of the keys to stem the rise of diabetes that has increasingly affected the population at large. This *Shi Hu* (Dendrobium) herbal preparation has been efficacious in controlling diabetes and can be used as health supplement for diabetes prevention. Made into capsules, it is effective, easy-to-consume, and has no known side effect compared to synthetic agents for the prevention of diabetes.

Degradable Anti-UV Bioplastic Film

Principal Investigator:
Dr Jason Chang
Senior Manager, CAVS



Made from naturally occurring compounds, this biodegradable bioplastic is also non-toxic. Containing a bacterial pigment, the bioplastic has the capacity to absorb blue light and ultraviolet (UV) radiation. The film can potentially replace harmful plastic films, and can also be used to block damaging blue light from computer screens and phones.

INDUSTRY PARTNERSHIPS

Agilent Technologies

With a longstanding partnership, the Agilent Partner Lab @TP is part of Agilent Technologies' global network of Partner Laboratories that facilitates the exchange of scientific breakthroughs and trends in chemical analysis.

American Concrete Institute-Singapore Chapter (ACI-SC)



A partnership to provide training for adult learners along with ACI-USA, ACI-SC, Malaysia, India and Philippines Chapters to increase global opportunities in education, certification courses, R&D and consultancy services.

APEC Policy Partnership on Food Security (PPFS)

A collaborative partnership for the set up of the Centre for Sustainable Development in Agriculture and Fishery Sector in ASC.

Blue Aqua International Pte Ltd

A partnership to set up a joint research and training centre in TP and Blue Aqua's local farm with hands-on training opportunities for students at the shrimp breeding farm in shrimp breeding, broodstock development and hatchery, as well as farm operation and management.

Changi General Hospital (CGH)

A collaborative partnership to conduct nutrition clinical studies and human trial studies; to test the safety and efficacy of complementary health products; and to facilitate clinical education through student internships and staff industry attachments.

Defence Science & Technology Agency (DSTA)

A collaborative partnership to conduct R&D on a specific sublingual formulation.

Health Promotion Board (HPB)

An established partnership for ASC to develop a Glycemic Index (GI) database of local foods, create awareness among the public on the GI concept and nutrition, provide consultancy services to SMEs in the development of healthier food products, and nutrition research.

Institution of Aquaculture Singapore (IAS)



An MOU to enhance the scope of aquaculture research and training that includes joint research and publications, student and staff training, competency certification, as well as aquaculture training for the industry.

Lubritrade Ocean (Ubin) Pte Ltd

Aimed to enhance farm productivity and effective farm management, the partnership focused on collaborative studies in fish health management and growth performance, as well as to develop Standard Operating Procedures for farm practices.

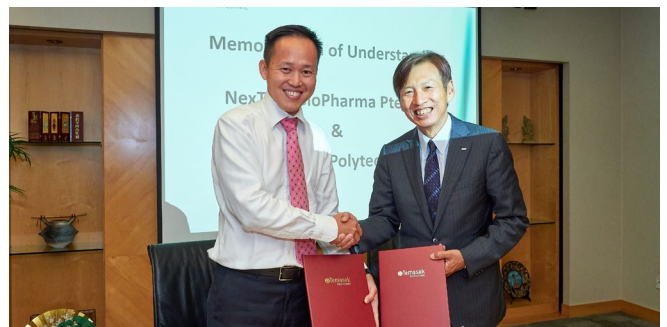
Mount Pleasant Veterinary Center (MPVC)

This partnership is to support the practical training of Veterinary Technology students through the hands-on guidance and teaching by MPVC in the different areas of veterinary assistance at their clinics and hospital.

Nestec Nestlé R&D (Pte) Ltd

Nestec has been working with TP on glycemic index research and testing since May 2013.

NexTech BioPharma



An MOU for joint R&D in cell processing, stem cell therapy, immunotherapy, and other related medical sciences; skills training for staff and students; and development of courses for the cell therapy industry.

NTUC Foodfare Co-operative Ltd



The collaborative partnership for the development of healthier or low Glycemic Index (GI) food products and recipes, as well as nutrition education programmes.

National Parks Board (NParks)



With a long history of cooperation, the partnership focuses on student training in areas of marine conservation, projects, staff exchanges and development opportunities.

Oceanus Group Ltd



A collaborative partnership on aquaculture technology with the set-up of Oceanus Innovation Centre @TP for joint projects and training, as well as R&D on aquaculture nutrition, disease and detection, treatment and prevention, and broodstock and seedstock growth.

Resorts World@Sentosa (RWS)

An MOU with the RWS' Marine Life Park focused on research, student internship, student enrichment workshops on marine conservation for students, as well as graduate job opportunities in areas of marine wildlife and coral conservation.

Salt Asia Pte Ltd

A partnership collaboration on research in mushroom cultivation and related capability building, student training and courses.

Shizuoka Prefecture Government, Singapore Office

An MOU to cooperate in agriculture R&D, student internships, exchange programmes and study trips for staff and students.

Singapore Quality Institute

An MOU for training programmes and projects in quality management system for the medical device industry.

The Medicine Manufacturing Association of Singapore (TMMAS)

A partnership to support SMEs and LLEs in the Traditional Medicines sector through collaborative industry projects, staff industry attachments and student internships.

Tung Lok Group

A partnership to provide student internships at various kitchens and sponsorship of course graduation awards. The Group has also been very supportive of many school events through its generous sponsorships.

Wildlife Reserves Singapore (WRS)

An MOU to collaborate in veterinary research, diagnostic testing and training. It also involves the development of low cost, user-friendly diagnostic tools or laboratory testing method for on-site diagnostic testing as part of WRS's exotic animal care and management programme.

Workforce Singapore (WSG)

A partnership with WSG (formerly WDA) to provide WSQ training in Attach and Train Programme (Biologics Manufacturing), as well as to incorporate WSQs into pre-employment training (PET) and continuing education training (CET) for the chemical industry.

MILESTONES

SCHOOL OF APPLIED SCIENCE

2000
-
2003

ACADEMIC DEVELOPMENTS & INITIATIVES

- Applied Science School established
- Mrs Soon-Ong Meng Wan appointed as School Director
- School Advisory Committee
- Diploma in Applied Food Science & Nutrition
- Diploma in Biotechnology
- Diploma in Chemical Engineering
- Diploma in Consumer Science & Technology
- Diploma in Biomedical Science

TECHNICAL FACILITIES & COMPETENCIES

- TP Hydroponics Greenhouse
- Aquaculture Workstation
- Food Preparation Laboratory
- Food Product Development Laboratory
- Glycemic Index (GI) Testing
- Traditional Chinese Medicine (TCM) Analysis
- Hydroponics Orchid Growth System

2014
-
2016

ACADEMIC DEVELOPMENTS & INITIATIVES

- BOOST (Biologics Overseas Skills Training) programme (in conjunction with WDA, EDB)
- Specialist Diploma in Biopharmaceutical Technology
- Specialist Diploma in Laboratory Management & Instrumentation
- Surge Research & Education (SuRE) Programme
- Specialist Diploma in One Health (in collaboration with AVA, MOH and NEA)
- Inaugural TP-AVE training workshop on farm crisis management planning

TECHNICAL FACILITIES & COMPETENCIES

- Institutional Review Board
- 1st low GI meals at Bistro Walk
- 1st commemorative cookbook, Singapore Hawker Classics Unveiled (supported by SG50 and NHB)
- Inaugural Institution of Aquaculture Singapore (IAS) Conference co-organized by ASC and IAS
- Centre of Innovation for Complementary Health Products (COI-CHP)
- Centre for Aquaculture & Veterinary Science (CAVS)
- 1st International Conference in Analytical Science @ TP powered by Agilent Technologies
- Village Café Learning Enterprise

2008
-
2009

ACADEMIC DEVELOPMENTS & INITIATIVES

- Diploma in Pharmaceutical Science

TECHNICAL FACILITIES & COMPETENCIES

- Culinary Laboratories
- Glycemic Index Research Unit (GIRU)
- Singapore Accreditation Scheme (SINGLAS) accreditation for functional food testing, and chemical and biological testing
- Bistro Walk Training Cafe

2017
-
2018

ACADEMIC DEVELOPMENTS & INITIATIVES

- Bistro Lab Training Cafeteria and Production Kitchens Facility
- President's Award for Teachers 2018 awarded to Ms Tan Lay Khee

TECHNICAL FACILITIES & COMPETENCIES

- Centre for Traditional Medicine (CTM)
- Centre for Molecular Diagnostic (CMD)
- MOU between TP and BioPharma (Stem Cell Therapy)
- Launch of Eco-Friendly Park Bench at Bedok Reservoir

2004
-
2007

ACADEMIC DEVELOPMENTS & INITIATIVES

- Diploma in Baking & Culinary Science
- Diploma in Veterinary Technology

TECHNICAL FACILITIES & COMPETENCIES

- Temasek Animal Facility
- Temasek Applied Science Research Centre
- KoolWerkz Ice Cream Training Factory
- Institutional Animal Care and Use Committee (IACUC)
- Tissue Culture Plantlets Production Training Unit
- Singapore's 1st low GI bread

2010
-
2013

ACADEMIC DEVELOPMENTS & INITIATIVES

- Dr Lee Chee Wee appointed as School Director
- Rebranded as School of Applied Science
- CET Diploma in Applied Science (Chemical Technology)
- CET Diploma in Applied Science (Forensics)
- CET Diploma in Applied Science (Aquaculture)
- Specialist Diploma in Environment & Water Technology

TECHNICAL FACILITIES & COMPETENCIES

- 1st Agilent Partner Laboratory in SEA & Korea region
- TP Animal Clinic
- Deli Delite Training Food Kiosk
- TP-InvitroCue Toxicology Laboratory
- 1st local Asian food GI database
- Centre for Applied Nutrition Services (CANS)

2019
-
2020
(MARCH)

ACADEMIC DEVELOPMENTS & INITIATIVES

- Dr Goh Lay Beng appointed as School Director
- Hosted the inaugural WorldSkills Singapore (WSS) for Chemical Laboratory Technology (CLT) trade
- Diploma in Medical Biotechnology
- Diploma in Food, Nutrition and Culinary Science
- Specialist Diploma in Veterinary Wellness Care

TECHNICAL FACILITIES & COMPETENCIES

- Sold off KoolWerkz Ice Cream Training Factory
- Centre for Urban Sustainability (CUS)
- Centre for Research and Opportunities in Plant Science (CROPS)
- Aquaculture Innovation Centre (AIC) (Centre of Innovation)

TEACHING PRACTICES: CHANGING WITH THE TIMES

Ms Tan Lay Khee

Assistant Director, Academic Development

Over the last 20 years, the teaching role of lecturers in ASC has gradually evolved from “Sage on the Stage” to “Guide by the Side”. The change in teaching practices is primarily driven by the increasing accessibility to information, as well as the shorter shelf-life of knowledge. If teaching remains as passive transmission of knowledge, there will undeniably be minimal value-add to student learning. As such, it is imperative to move from focusing on ‘what to learn’ to ‘how to learn’.

With a need to deepen students’ skills and enhance employability, ASC underwent a curricula redesign to place emphasis on authentic learning. In the past, lecturers would tell students what to do in many of the subjects’ practical sessions and students merely followed the given protocols. However, over time, there has been an increased use of projects to drive student learning. Such learning involves engaging students to apply their knowledge to real-world problems. The modes of authentic learning adopted by ASC include project-based learning, simulated practice and workplace learning.

In project-based learning, students actively explore a given context, then apply their knowledge to design their experiments, before they perform the analysis to collect data and draw conclusions, while lecturers support student learning through discussions and help bridge learning gaps. With this, ASC students are empowered in the active construction of their own knowledge through projects.

Projects undertaken could range from the purification and characterisation of a given biomolecule, development of healthier recipes, to even the evaluation of the quality of a given drug substance. For some subjects, Problem-based Learning (PBL) is also employed so that students can identify their own learning gaps, conduct research, and construct solutions to solve the problem. Lecturers facilitate student learning through artful questioning that stimulates reflection as well as elicits articulation of problem-solving process.

Simulated practice – another mode of authentic learning – enables learning to take place in a safe yet seemingly real-life experience, where students are immersed in a given role to mitigate tensions and practical challenges. For example, students training as pharmacy technicians learn through role-play where they need to elicit information from the patient, assess the condition, and perform patient counselling and drug dispensing. Alternatively, students could be immersed in the role of process technicians, where they are required to analyse the situation, then to trouble-shoot and uncover the cause of any system discrepancy.



Learning also takes place beyond the classrooms. Besides the Student Internship Programme, some diplomas also employ workplace learning training programmes in the related on-campus Learning Enterprises (such as Bistro Lab cafeteria and TP Animal Clinic & Wellness), as well as external organisations such as retail pharmacies. Such training programmes equip ASC students with the necessary skills, attitudes and knowledge to perform the job role and operate optimally in their workplaces.

ASC also leverages on technology to facilitate student learning. One such example is the edutech application that clinched the TP Education Innovation Award 2019. In this instance, ASC employed a 3D Virtual Reality (VR) system to create a VR video to engage students to view their laboratory demonstration in an immersive environment. The 3D spatial representation afforded by the VR system enabled students to observe the procedure in all directions. This in turn helped them to acquire the necessary skills to manipulate the physical apparatus more appropriately. This application is currently being used in a subject that helps students learn how to perform cell sub-culturing aseptically.

With the introduction of the Bring Your Own Device (BYOD) initiative, students now enjoy greater ease in accessing online materials while contributing to a greener environment. Lecturers too learnt to leverage on technology to support student learning. E-tools such as Kahoot and Mentimeter are now widely used in lessons to engage students in applying what they learnt through answering questions. This real time collation of students' responses provides prompt diagnostic feedback to lecturers and allows for adjustment of instructions so that students with learning gaps can level up.

Ultimately, to align with Singapore's Skills Framework, a component of the Industry Transformation Map developed by the Ministry of Trade and Industry, and to ensure skills recognition for employability, teaching goes beyond the didactic approach. It becomes critical to inculcate generic, as well as technical skills and competencies; lecturers should engage students in simulated practice, such as handling equipment in a given context, role-playing, and discussing case studies.

EXPANDING THE HORIZON IN APPLIED RESEARCH AND INNOVATION

Dr Padmanabhan Saravanan

Lead Scientist, Plant Biotechnology

Urban transformations that are also sustainable are vital for the future of humanity and our ecosystem. With climate change, a reduction in crop yield by up to 25% by 2050 has been forecasted. This could cause disruption to food supply chains globally. Singapore, which imports over 90% of its food, wants to be less vulnerable to the volatility of the global food market. Hence, our nation is currently driving its efforts in two key thrust areas viz. Agri-Food and Smart Sustainable Cities (Cities of Tomorrow – CoT), in order to fulfill the goal of supplying 30% of the country's needs through home grown food, and 80% 'greening' of buildings by 2030.

ASC has identified three major technology clusters, namely, Agri-Food Technology, Renewable Resources Technology, and Medical Technology. Supported by our Centres of Excellence (COE) and the Centre of Innovation for Complementary Health Products (COI-CHP), these clusters contribute towards R&D in aquaculture, plant biotechnology, applied

nutrition (particularly glycemic index testing and research), and point-of-care diagnostics. In line with our nation's recent strategic move to achieve the 2030 goals, Dr Goh Lay Beng, Director of ASC conceived a COE for Research and Opportunities in Plant Science (CROPS) in late 2018. This was to create an agrotech ecosystem for the school involving a multidisciplinary domain network to support its overall mission and vision. CROPS was established in the 1st quarter of 2019, focusing on translation projects with commercial value, developing technologies for sustainable farming of crops for food security, enhancing crop productivity for urban and indoor farming industry, promoting training and adoption by industries to help improve operational sustainability. Selective R&D areas include reprogramming plant systems for urban farming to achieve higher biomass, pest resistance, nutritional enhancement combining gene editing and metabolomics approaches, and seed development.

As an off-shoot of ASC to support growth and productivity increase in the aquaculture sector, another Centre for Innovation (COI) was established. Named Aquaculture Innovation Centre (AIC), it is supported by Enterprise Singapore and launched on 26 June 2019 by the Senior Minister of State, Mr Koh Poh Koon. AIC aims to create a strong innovation ecosystem, robust intellectual property and standards framework to place Singapore in the limelight as a leading player in the urban agriculture and aquaculture industry. AIC's thrust areas include the development of high density, urban, aquaculture ecosystem through selective breeding and quality seed production, multipronged management strategies to prevent and control diseases, and promote sustainable and green aquaculture through nutrition, with an emphasis on enriching, and supplementing alternative proteins, and implementing the 3R principle (reduce, reuse and recycle) through technology adoption.



On a similar note, ASC's renewable resource centre was transformed into the Centre for Urban Sustainability (CUS). Its key R&D thrusts include managing solid waste and implementing recycling for building materials and 3D printable composites; recycling food waste into value-added products; and repurposing renewable resources as functional materials, including self-cleaning /anti-fouling coatings, and hydrogels for environmental applications. These areas are aligned to Nation's CoT initiative.

To date, ASC has repurposed and repositioned its R&D capabilities to support two main growth areas, namely, Food and Preventive Healthcare and Urban Sustainability. These growth clusters are supported by the horizontal core analytical science capability. Over the past six years, ASC has secured about SGD13.45 million through external research grants from various agencies [MOE, NEA, BCA, SFA (APF), SMF, SIIRD, TOTE] to build its capabilities in the identified growth areas, and serving more than 350 industry partners.

DEVELOPING OUR PEOPLE: LAST 20 YEARS

Mr Loh Gin Hin

Deputy Director, Quality Development and Planning



The last two decades of staff development can be described as times of ramping up, repositioning, and rebalancing. The focus was different in each of these milestones.

Ramping Up

Under the leadership of the School's first Director, Mrs Soon-Ong Meng Wan, the School of Applied Science (ASC) ran its first full-time course, namely the Diploma in Applied Food Science and Nutrition. Within the next five years, three other full-time diploma courses were launched. They were the Diplomas in Biotechnology, Chemical Engineering, and Consumer Science and Technology. To meet the changes and demands of the industry, four other full-time courses were established. They were the Diplomas in Biomedical Science, Pharmaceutical Science, Baking and Culinary Science, and Veterinary Technology.

In ramping up for organisational growth, the focus of staff development was to equip staff for teaching and pastoral care responsibilities as Lecturers and Care Persons (CP). In ASC, a CP provides pastoral guidance to his/her Care Group. The students' interests were looked after by their CP from the time of admission to their graduation. It was crucial to re-orientate staff who had worked in the industry to acquire the necessary pastoral care knowledge and skills. Moreover, staff attended internal workshops on curriculum design, pedagogy and assessment. Some staff also attended conferences both locally and overseas, and participated in workshops on thinking tools, creative problem-solving, and problem-based learning, etc. There were fond memories of counselling and pastoral care-related training conducted by Dr Jessica Leong, then a former TP staff. There were also other pertinent workshops for CPs to help them understand the needs of their adolescent learners.

Repositioning

Subsequently, under the leadership of Dr Lee Chee Wee, ASC's second School Director, the School built upon the strong foundation laid by Mrs Soon. Staff development focused on improving skills in applied research and consultancy to meet the needs of the industry. The organisation structure was also revamped, after careful consideration of each staff's role in research, innovation and enterprise (RIE) development. This work scope was above and beyond a staff's teaching and pastoral care roles. Since then, applied research grants and consultancy dollars secured by ASC grew close to three times, averaging approximately 2.5 million SGD per year.

Regarding repositioning for skills mastery, the focus of staff development was to provide opportunities for staff to develop their competencies. On-the-job placements through personal involvement in applied research and consultancy projects enabled staff members to strengthen their skillsets and enhanced their expertise. Through the collective and dedicated efforts of all staff, ASC's Centres of Excellence and Innovation grew further to serve the needs of the industry. ASC continued to be known for its applied research and consultancy services in areas of glycaemic index, complementary health products, fish vaccine and feed development, recycling of wood and concrete, etc.



Rebalancing

Currently, under the directorship of Dr Goh Lay Beng, ASC embarked on the journey of rebalancing and consolidation. The School had benefitted much from the contributions of Mrs Soon and Dr Lee. Though ASC fine-tuned its organisation structure to recognize the roles of student development and course management teams, there is also a recognition that it should strengthen as an educational institution through its RIE efforts. The student development team will continue to contribute to school-level holistic development of students through service learning and other out-of-classroom learning activities during the polytechnic's FLEX weeks.

In the context of rebalancing and consolidating school efforts, ASC continued to emphasise consultancy and applied research efforts, with the aim of improving industry partnerships and enhancing staffs' industrial competencies. Staff were encouraged to familiarise themselves with industry practices through attachments and RIE involvement. The School also grew its CET offerings, in line with TP's objectives to provide learning and training opportunities for adult learners.

In conclusion, staff development in ASC will continue to evolve with time and leadership change. Currently, research-led teaching will allow stronger connection with teaching and research efforts in the School. Furthermore, there is a need to foster greater engagement of learners in online modules. While the School continues to meet the challenges of internal and external environments, ASC remains focused in its objective to nurture and train the workforce of Singapore in the Applied Sciences.



NURTURING OUR STUDENTS: LAST 20 YEARS

Mr Tan Keng Beng

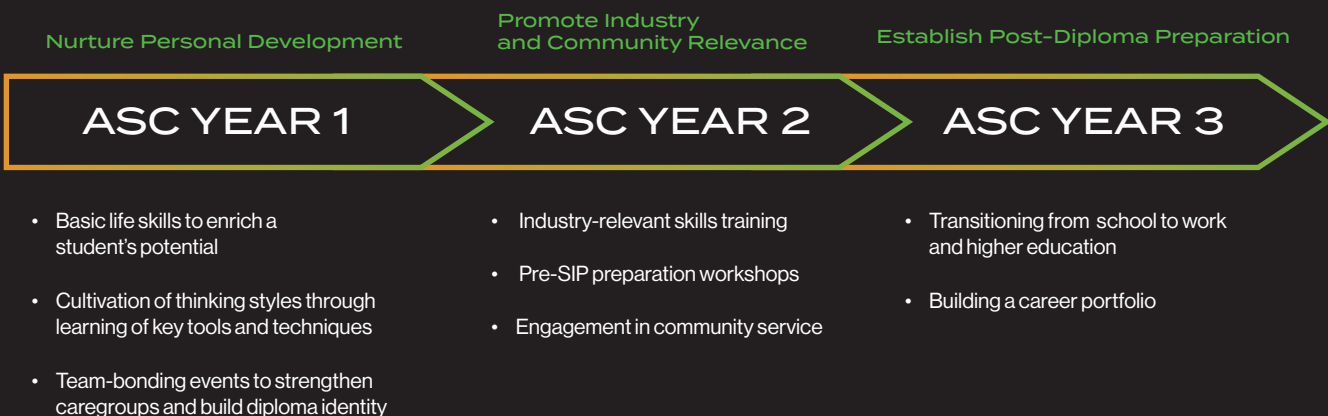
Assistant Director, Student Development

In 2006, the Student Development (SD) team was established, focusing on facilitating the achievement of the core attributes of 'character' and 'change readiness', as part of TP's Desired Graduate Profile (DGP). A staff team was set up to organise activities by integrating key learning outcomes of character-based modules with student activities in each level:

- Intrapersonal development (knowing oneself)
- Interpersonal development (knowing others)
- Extra-personal development (being aware of the environment around)

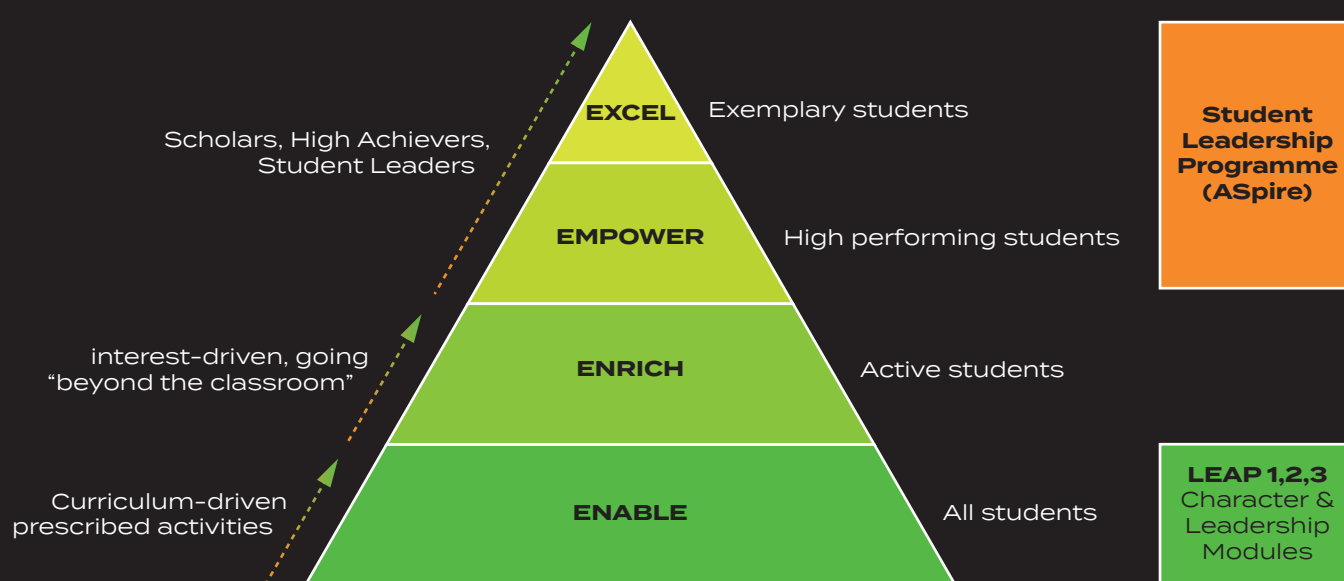
Leading the Applied Science Studies Club, the team organised a variety of school-wide events such as Freshmen Orientation and Sports Day for all ASC students.

As the School grew and matured, each diploma course established their own Diploma Interest Group where course-specific activities were carried out. Students of each diploma course were encouraged or nominated to participate in the activities based on their potential and aspirations. The SD team took the role of overseeing the activities, providing advisory and mentorship programmes to each diploma and year of study. The focus area for each year differed and the details are as follow:



In ASC, the SD philosophy evolved around enabling students to maximize their potential. This followed a four-level Student Engagement Framework targeted at uplifting all students.

At the Enable level, the School would reach out to all students through activities and programmes that are curriculum driven. This included TP Fundamental (TP Fun) subjects that students were required to take such as leadership profiling and skills-based service learning in the character and leadership modules called LEAP. Students would also learn about national and global issues through the Critical Issues & Critical Thinking (CICT) and Global Studies modules. Other signature events for the students were the Campus Care Network (CCN) day and industry visits organised by the diploma courses.



ASC Student Engagement Framework

For the Enrich level, students were encouraged to actively participate in CCAs to chart their own SD journey by pursuing their interests and passions via activities beyond the classroom. Besides joining CCA clubs as student leaders, there were also many overseas trips and community projects that students would also participate in.

With the Empower level, it invited both academic achievers and talents beyond scholastic and CCA accomplishments. Participants also included young innovators, entrepreneurs and those who had competed at the national or international level (e.g. World Skills competitions). Aspiring students would participate in ASC's Student Leadership Programme to help them discover their strengths and weaknesses, and the propensity to serve others.

At the Excel level, ASC adopted a TP wide approach to develop the high performing students by leveraging on both in-house expertise and external programmes. ASC would also offer specially curated programmes to develop these students into leaders with vision, character and heart.

A CHAT WITH OUR LONG SERVICE COLLEAGUES

Ms Malar Vizhi D/O Chinniah

Assistant Manager, Corporate Development



Having been with ASC for a while, how has ASC made a difference to you?

So how has this learning allowed you to make a meaningful difference to ASC? And what is your greatest career accomplishment so far?

Tell us about a mentor who made an impact on you or set you on your present path.

What was the biggest challenge you faced in ASC and how did you overcome it?

If you had to advise someone who is considering to join ASC, what would that be?

Working in ASC has helped me grow both personally and professionally. Learning on the job cannot be more apt than being in ASC.

I feel the most meaningful difference I have made in ASC would be the service I offer to my colleagues. I have sincerely treated everyone the same and given my best service. For my greatest accomplishment that would be to receive the National Day Award. I feel deeply honoured.

That has to be Dr Lee Chee Wee, our former Director. He was a mentor that certainly made an impact to my career in ASC. He was a wonderful and caring person who always made time for his staff and was able to make them feel at ease. There were no airs about him.

Interestingly, I feel that working in the School Director's office in ASC is the biggest challenge! This office is a happening place for me as I receive all sorts of queries and it feels like a "one stop centre". Working in this office has certainly kept me on my toes. To overcome this, I need and have to always be able to prioritize things and importantly to ensure the matter is swiftly moved along.

I would say that if you want to join TP, think of it as your second home – this is where we spend most of our time and we need to make it work in every way. My advice would be to work hard, respect all your colleagues, don't be shy about asking for help – it's the only way to learn. Don't forget to smile as it does make a person's day!

Mrs Tay-Chan Su Chin

Deputy Director, Academic and Student Development



Describe how ASC made a difference in your life/career.

How/why did you begin teaching? What is the greatest reward of being an instructor? Describe a particular moment or memory that stands out for you.

Tell us about a mentor who made an impact on you or set you on your present path.

What was the biggest challenge you faced in ASC and how did you overcome it?

If you had to advise someone who is considering to join ASC, what would that be?

For my time in ASC, I have realised that you never stop learning, and it is really part of everyday life. It keeps you on your toes too!

I did not consciously think about being a teacher earlier in my career, but when the opportunity came, I jumped on it. I guess my mother's time as a teacher did rub off on me although things were vastly different then. As a child, having seen many students who came around to visit or greet my mother casually in passing, these made many good memories for me the reward of being a teacher. She is also my role model as a teacher who "walk the talk". Personally, the greatest reward is when the students say that they feel motivated to stay in the diploma-related career and return to say hello years after. A memory that stands out for me would be this particular graduate that comes to visit me annually for more than 10 years since his graduation. He only stopped visiting when he had to migrate overseas.

There is no one special mentor, but many along my path. They are the various senior management and colleagues who made a big impact on me. Their nuggets of wisdom and words of support have been so important to me during my time in ASC.

My biggest challenge faced were the many changes that took place due to the change in leadership. To overcome this, one needs to be adaptable, hold on to your principles and do what is right.

Join ASC if teaching and mentoring are what you like! Also, you should preferably have traits such as adaptability, and the ability to accept challenges, and importantly to enjoy learning new things.

OUR FONDEST MEMORIES



Diploma in Applied Food Science and Nutrition

“ My fondest memory in ASC was helping during Open House, making friends from different clusters and promoting my course to potential juniors! ”

————— Bellarie Lim, A13A3

“ Grateful to have fun and amazing lecturers. ”

————— Leonard Yeo, A12A4

“ OLTC is my fondest memory in ASC! The team spirit of students from different courses coming together despite our differences and giving our best so that the Freshmen can have an enjoyable orientation is still etched in my mind. ”

————— Oh Cher In, A10A3

“ Planning and executing CCN Day! Participating in the DRPs and developing numerous recipe trials for diabetics, and the caring lecturers who taught with all their heart and placed students' welfare at first place. ”

————— Koh Yu Yuan, A8A3

Diploma in Baking and Culinary Science

“ My 3 years in BCS was fun yet enriching. I learnt many skills, from the most basic to the most tedious with the help of passionate chefs. I would like to take this opportunity to thank them! Their patient guidance brought me through this journey! I'm also thankful for the friends I've made during this course and thank you BCS for making my poly life an interesting one! ”

————— Raelene Hwan, A16J2

“ Unbreakable bonds, engaging lessons, phenomenal study trip experiences. ”

————— Cheng Keng Wen, A16J1

“ I guess my fondest memory would be all the time I spent in the kitchen. That's where we learnt, were scolded, and experienced joy and anger. That's the place where we spent most of our time. Coming to school before sunrise and going back after sunset. ”

————— Jeanice Toh, A16J1

Diploma in Biomedical Science

“ Thank you for all the wonderful memories and experiences. Really missed those fun laboratory sessions with my fellow classmates and the time spent in BMS interest group and Biomedical Outreach to Society (BOTS), planning events to give back to the community. TP ASC will always have a special place in my heart and here's to a greater 20 years ahead! ”

————— Ng Su Hui, A14G2

“ ASC opened my eyes to so many things over the 3 years that I was there. Above all, it taught me what it felt like to be part of such a huge family, and how so many different people can come together to take part in something and make it so memorable. To the place that gave me so many memories that I will always keep, allowed me to meet great friends who are like family, and taught me things that I will always be grateful for, thank you and Happy 20th Anniversary! ”

————— Sarmeni Ramakrishna, A16G1

Diploma in Biotechnology

“ Participating in a Sustainable Community Development project organised by ASC I travelled to Batam, Indonesia to teach children how to make their own organic fertilizers using everyday products. We also taught them how to conduct simple tests on the water that they used to rear their fishes in. ”

————— Ng Qi Yuan Joyce, A13F1

“ Getting accepted by NUS Medical School was mind-blowing to me. I knew that I was competing with JC students with perfect A-level grades. But I knew that I had to try even if I had a tiny chance or I would regret it forever. I would like to thank lecturers at TP who saw my potential and passion for helping others and encouraged me to try. ”

————— Lim Jia Ying, A12F1

Diploma in Chemical Engineering

“ The polytechnic education has provided me a strong foundation in the Chemical Engineering discipline. The internship opportunities have also allowed me to learn a lot outside the classroom. The skills and knowledge that I have acquired were practical and helpful for my job. ”

————— Ong Li Xuan, A11D6

“ Being in ASC gave me a new perspective of school. There were loads of opportunities for every student to learn and develop holistically. Despite the hardships I faced, I have never felt alone, and I can never express enough my gratitude to my helpful and friendly lecturers, and amazing friends that I have met during this 3-year journey. ”

————— Clara Chu Jia Ying, A17D5

“ I remembered the course was quite challenging, especially for someone without an Additional Math background but the lecturers were always there to guide me. The ChE training that I went through was versatile and I felt that I could find jobs in many different industries. ”

————— Tay JiaHao Alvin, A10D6

“ One of my fondest memories being in ASC was when I represented ChE for Worldskills Singapore (Water Technology). I learnt new skills and knowledge beyond my field of study and met many students from different institutions. It was a rewarding learning experience and one that I will never forget. ”

————— Koh Jing, A17D5



Diploma in Veterinary Technology

“ My fondest memory of TP has got to be the friendships made. From my classmates, to freshman orientation campmates, and my mentors during my FYP, these people have all played an important role in my life, and I'm glad we're still in touch after all these years! ”

————— Lo Zhiwei Joey, A9K1

“ TP has given me all sorts of fond memories both in and outside the classrooms. From cheering my heart out in camps for ASC and TPFO, participating in different leadership roles, and even exciting industrial attachments at the Singapore Zoo! Looking back, I don't regret my choice and am very grateful for all the opportunities given. ”

————— Stacia Loong Wei Yin, A15K1

“ My ASC days were definitely the best! I missed those times when we could bring our pets to school. I also missed being surrounded by all my friends who were animal lovers. We had great relationships with our lecturers and school was never boring! ”

————— Lee Rui Xue, A13K2

“ My fondest memory of TP is the bond I had with my lecturers. The students' eagerness to learn and the teachers' willingness to engage them through their learning progress have made my time in ASC a meaningful and memorable one. ”

————— Daniel Tung Yu Chen, A16K1

Diploma in Pharmaceutical Science

“ ASC gave me opportunities that I would never, otherwise, be exposed to. It was due to these opportunities and support from lecturers that I was able to push beyond my boundaries. For all of that and more, thank you ASC. ”

————— Sherissa Oh, A13L2

“ One fond memory that I had from PHS was during the simulations for the Pharmacy Practice modules. The lecturers took on roles of various types of patients that we may encounter in real life situations. These simulations were fun and interactive; thus, it is one of my fondest memory. ”

————— Goh Zhi Yin, A14L4

“ My fondest memory will be hanging out in the computer labs during breaks and having fun during the lab sessions. It was tough throughout the 3 years but the sense of accomplishment we felt when we graduated together was beyond words. Also, when lecturers become your friends after! ”

————— Jessilyn Tan, A10L1

“ The best things in life are the people you love, the places you go, and the memories you make. I am glad I chose to spend 3 years in ASC where I met my friends and found my interest. ”

————— Avril Ang Ee Lin, A14L3

REACHING OUT TO THE COMMUNITY



Blood Donation Drive



Since 2006, ASC Studies Club has been collaborating with the Red Cross Society of Singapore to organise blood donation drives in Temasek Polytechnic. This provided an opportunity for the TP staff and students to donate blood and increase awareness on the importance of blood donation. Annually, the main committee would assist the Red Cross Society to publicise this campaign to the TP family, and to co-ordinate the entire event. To commemorate the years of continuous support for the blood donation drives, the Red Cross Society of Singapore presented a Certificate of Commendation to the Studies Club at the Champion Blood Donors Recognition Ceremony 2019.

“ We are aware that some students may not be ready to donate blood, but they summoned the courage to be with their friends at the donation centre. They also became more aware of blood donation through the information on the posters. Regardless of whether the visitors to our donation centre eventually became blood donors, we are happy that all donors and their friends were educated on the importance of blood donation. ”

————— Tan Junheng, Malcolm
A18F3, Diploma in Biotechnology

‘Keep Clean Singapore’ Campaign

ASC has been organising the annual Keep Clean Singapore campaign by mobilising all freshmen to spend a Saturday morning in their first semester to clean up the neighbouring Tampines estates. Apart from raising awareness on cleaning our local community through litter picking, and advocating a cleaner Singapore, this activity also allowed students to foster a sense of belonging to the Tampines community. The organisers, comprising of committee members from all ASC Diploma Interest Groups, took the initiative to contact the National Environment Agency (NEA) and the Tampines Town Council, as well as worked with grassroots leaders to organise this community service project for their peers. The organisers had also suggested to the authorities to redeploy the cleaners for a few days before the event to

allow students to witness the amount of litter discarded by residents, so as to appreciate the effort by the cleaners in keeping our estates clean.

“ This event was very meaningful. When I was cleaning, I felt very annoyed at the fact that all these rubbish were actually thrown away by us. This made me want to stop everyone around us from littering. I have a greater appreciation and respect for the cleaners after experiencing how it is like cleaning and keeping Singapore clean. Keeping our environment clean should be everyone’s responsibility but people are destroying the environment and littering when there are rubbish bins within reach. ”

————— Tan Yang Ni, Gwenn
A17A1, Diploma in Applied Food Science & Nutrition

Willing Hearts Community Cooking Programme



Volunteering at the Willing Hearts Soup Kitchen is a great opportunity to give back to our community through the preparation of meals for low income households in Singapore. With the help of volunteers, the kitchen churns out around 5000 packets of lunch every single day. Hence, FIG arranged for FNC students to head down to the kitchen and do their part for our community. They arrived at the kitchen before dawn to help the selfless aunties and uncles wash, peel, chop, slice the ingredients and pack the lunches. The students were split into groups to help at different parts of the kitchen. The complaints of tiredness soon turned into words of affirmation and feeling of fulfilment, as they watched the packets of food being sent out. The students were glad that they took part in this meaningful activity.

Visit to St Andrew's Community Hospital

In 2018, Diploma in Chemical Engineering organised a visit to St Andrew's Community Hospital to spend a meaningful afternoon with the residents. The students engaged the residents through planned activities such as folding origami and sing-a-long sessions with the residents. The afternoon was filled with familiar songs such as "Chan Mali Chan", "Rasa Sayang" and "Can't take my eyes off you".

"It was a meaningful community project as we get to spend the afternoon with the aunties and uncles (residents) in the hospital. They participated spontaneously in the activities that we planned for them. I remember we prepared song lists with lyrics printed in big font size in several languages. We also tried our best to communicate with the residents in the dialects that we know. My friends and I thoroughly enjoyed the visit!"

————— Tan You Ying, Sylvia
A15D2, Diploma in Chemical Engineering

Food Interest Group (FIG)

By the Diploma In Food, Nutrition and Culinary science

"As someone who has food on my table every day, it didn't occur to me how fortunate I am to be able to eat to satiety daily. At Willing Hearts, I prepared vegetables for the lunch meals. After peeling potatoes for an hour, my shoulders started to ache and mosquitoes were biting incessantly. Speaking to a volunteer working alongside us however, revealed that she had been volunteering for 7 years every weekend, waking up early to begin food preparations at 5.30am. The dedication she has embodies the compassion of the volunteers for those in need. I realised that even though preparing vegetables could seem like a dull and repetitive task, the small efforts of many help to shape meals for the hungry individuals we would never have thought of otherwise."

————— Nadine Wong Yun Leng,
A19N1, Diploma in Food,
Nutrition & Culinary Science

Naturally Innovative Chemical Engineers (NICHE)

By the Diploma in Chemical Engineering



Volunteering at Life Edu Services

The Life Edu project was organised for the disadvantaged, needy families and individuals in the MacPherson community. Students volunteered at the Life Edu Centre to help in the National Library's kidsREAD programme. The kidsREAD programme helps to promote the love of reading and cultivate good reading habits amongst young Singaporeans, especially children from the low-income families. Before the programme, the student volunteers underwent some basic training on the general guidelines such as tone of reading to express the correct emotion.. The volunteers had to facilitate sessions that included self-reading amongst the children, a mass story-reading, and engagement activities related to the read story. Students also volunteered as chaperones for the children during the kidsREAD programme at the National Library. The MBIG members found this programme meaningful and gave positive feedback hoping for another similar opportunity again.

“ Through LES, I had the opportunity to interact with primary school kids. Due to the age gap, I was worried that communication would be a problem but they were very welcoming and eager to learn. I also found this experience meaningful as this programme allowed them to develop an interest in learning and reading. ”

————— Wang Haiqi, Yuki
A18G1, Diploma in Biomedical Science

Dia-Beat-It

Dia-Beat-It is a project held in partnership with the Housing Development Board held at Heartbeat@Bedok over a weekend in May 2019. Aimed to raise awareness for diabetes student volunteers from the Biotechnology and Biomedical Science diplomas set up and man the interactive booths. They shared with residents about the causes and effects of diabetes, and engaged them in simple exercises to incorporate in their daily lives to reduce the risk of diabetes.

This project benefited both the community and the students. The residents gained more knowledge of diabetes and ways they can better take charge of their own health. The students also learnt the significance of contributing back to the community through their course of study.



“ Since I was the photographer for the event, I managed to capture shots of the booth helpers interacting with the public and educating them about diabetes. Being able to capture smiles of both the helpers and the public was heart-warming. Even as a photographer, I still managed to learn about diabetes as I went around the booths. The booth together with its helpers was informative and interactive so this will definitely benefit the public. ”

————— Angel Amanda Tham Yun'er
A18F1, Diploma in Biotechnology

Totally Pharmaceutical Science (TOPS)

By the Diploma In
Pharmaceutical Science

Health Peers Programme



This is an initiative by PHS, in collaboration with the South East Community Development Council and residents from Garden Hill RC in Bedok. The programme was aimed to help residents manage diabetes and help reduce their risk in developing chronic conditions through inculcating a healthy lifestyle and diet. Prior to the programme, the students undergo specialised training in communication and counselling skills. They were also trained by healthcare professionals from Changi General Hospital through lectures and role play sessions on diabetes management, physical activities for diabetics, as well as diet and nutrition in diabetes. During the programme, students formed small teams to introduce the Health Peers Programme to the community. They engaged with residents and explained to those at risk or are suffering from diabetes mellitus, on the benefit of health counselling and emotional support.



“ Though we were taught about diabetes mellitus, this event gave me a better understanding about the disease. We were also given additional training which included communication and counselling skills when talking to the residents regarding the condition and other non-pharmacologic strategies to help curb the risk of the development of diabetes mellitus. We were also made aware of the incident rates and statistics regarding diabetes mellitus, which made me realise how serious diabetes mellitus is. I managed to apply the skills and knowledge learned during the event, where we had the opportunity to go door-to-door to engage and introduce the Health Peers Programme whilst raising awareness about the growing concern of diabetes that is affecting the community and Singapore as a whole.

”

————— Noory Mohd Zaini
A17L1, Diploma in Pharmaceutical Science

NUS Antibiotics Week

The NUS antibiotic resistance event aimed at educating the public on antibiotics, was a collaboration with the Regional Libraries at Woodlands and Jurong. The student volunteers helped educate the public through interactive activities with booths set up for both children and adults to take part in and learn about antibiotics treatment, appropriate use of antibiotics, general knowledge on antibiotic resistance, and ways to prevent bacterial infection.

“ One of the major takeaways from the NUS antibiotics week is that the misconception on the use of antibiotics is still very common amongst the general public. From what I have learned in PHS, I was able to educate parents and children about antibiotics. It was an enriching and fun experience getting to apply what I have learnt for the betterment of society.

”

————— Lim Xiang Nai Shani
A18L2, Diploma in Pharmaceutical Science

“ I learnt how to educate children about antibiotics and what they do. Guiding them was indeed very fulfilling! These skills that I have picked up from this event will be very useful for me to apply in the future as I will be working in a pharmacy where there will be lots of patient interaction and guidance. Overall, it was a beneficial exposure for me.

”

————— Hui Jun Jie Vincent
A18L1, Diploma in Pharmaceutical Science



Pet Grooming for CCN Day

A pet grooming session was organised on 22 November 2019 as a fundraising activity for TP's Campus Care Network (CCN) initiative that helps TP students in financial need. VWC, along with the help of fellow teachers and students were tasked to groom rabbits, cats and dogs. With the support of many pet owners, they raised a good amount through the pet grooming services to dogs, cats and rabbits too. Prior to the event, all student volunteers were trained on basic grooming skills and techniques to provide the best service to the clients. This event, not only helped our fellow students in need, it also provided the VET students to have hands-on practice with what they have learnt in their classes. Volunteers had a chance to apply their skills and knowledge such as early exposure to client management and proper handling of animals. An experience to better understand the value of teamwork and be compassionate to all.

“ As a student studying for the Diploma in Veterinary Technology, I was able to use my knowledge and skills in animal handling to raise funds for a good cause. CCN Day grooming was a very meaningful experience and I am glad to have taken part in it. ”

————— Tan Tse Kai Martin,
 A19K2, Diploma in Veterinary Technology

“ The grooming on CCN Day was a very memorable experience for me! This is because I got to apply what I learnt in school, do what I love for a good cause. Getting to see so many people step up to volunteer their time and energy to give back to the community was very heart-warming. ”

————— Chia Yih Harn Wynelle,
 A18K1, Diploma in Veterinary Technology



**BY STAFF,
FOR STAFF**



STAFF GATHERING AND SHARING



Sharing about wellness with the benefits of using essential oils by Ms Hamida Zam Zam



A much-needed knowledge and skill in ASC, Mr Loh Han Liat shared some quick tips and pointers to note when taking photographs.



A light-hearted sharing by Dr Jiang Li sharing some useful shopping hacks to revamp the living room with little effort



Lunch gathering to celebrate our Management Support Officer, Lillian Teo's retirement. Thank you for your contribution to ASC! (May 2018)

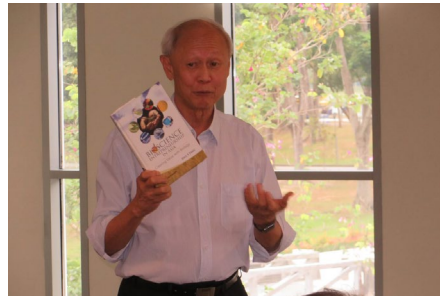
LEADERSHIP@LUNCH

Up close and personal with some distinguished industry professionals. These informal sessions allow staff an opportunity to learn how other leaders walk the talk, lead others, and lead themselves too.

With Professor Paul Teng (27 JAN 2019)

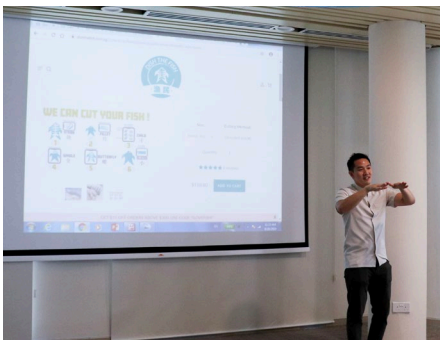


A rich sharing of experiences by guest speaker, Prof Paul Teng, Dean and Managing Director, National Institute of Education International (NIEI)



ASC Director, Dr Goh Lay Beng, presents a token of appreciation to Prof Teng for a captivating and enlightening sharing session

With Mr Jeffrey Tan (20 AUG 2019)



A fresh perspective, presented by new age fishmonger, Mr Jeffrey Tan



An engaged audience - all fishing for a new business approach as Jeffrey illustrates how he modernised an old trade with digitalisation. Attracting a new and younger market audience in the process.



A memento presented by ASC Director, Dr Goh Lay Beng, for a 'cool' sharing session.

ASC'S CHINESE NEW YEAR APPRECIATION LUNCH (15 FEB 2019)



The ASC family ushering in the new lunar new year with a "make a team pizza" session!



The final stage of baking is left to the expert Bistro Lab team.



A wonderful moment to wrap up and thank our dedicated staff for all their contributions to ASC as they retire and embark on new opportunities ahead. Dr Goh thanking Dr Lim Choon Kwang, Senior Scientist at the Centre for Aquaculture and Veterinary Science, and Ms Susila Krishnasamy, Domain Lead of Corporate Development.

ASC SAFETY AWARENESS DAY (9 APR 2019)



Learning from the professionals how to do CPR



A 'hot' session by SCDF on how to use the fire extinguishers correctly



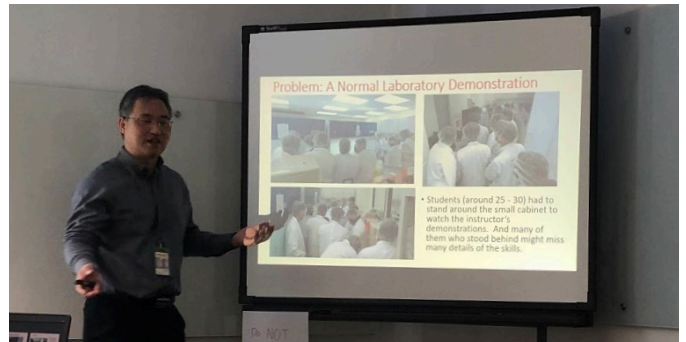
PROFESSIONAL LEARNING COMMUNITY SHARING (7 MAY 2019)



Fresh perspective by Dr Clara Teo and Ms Lau Poh Nguk on topic "More than just academic abilities"



Listening attentively to our speaker sharing ideas on how to engage with students during lesson.



Dr Zhang Pengchi sharing on the problems faced during practical session which led to the development of a virtual reality 3D laboratory demonstration system.

ANNUAL STAFF TEAM BUILDING (9 SEP 2019)



Harmless landmines to pull your mates to the finishing line.



Everybody say "ASC"!



All a game of trust and support for one another! A fun day out of the office and classrooms.



Finding the right balance and keeping that pose.

DIRECTOR'S COMMUNICATION SESSION (13 DEC 2019)



Interactive group activities to reinforce training by our consultant, Leong Kok Fann from Asian Pacific Methods on the importance of the 5 personality types, 3 key behaviours and 1 ASC (5-3-1).



Special farewell tribute by the staff to our Director, Dr Lee Chee Wee. Staging a surprise performance, singing a modified version of 'Count on Me' by Bruno Mars and the presentation of a specially compiled photobook of memories with ASC put together by staff.

STAFF APPRECIATION LUNCH & TEAM BUILDING SESSION (22 JAN 2020)



Team building session to discuss "what it means to be inclusive in ASC?"



A token of appreciation from Dr Goh to our retiring colleagues, Mr Teong Ping Nam, Senior Lecturer from the Math & Chemistry section, as well as to Dr Shabbir Moochhala, Head of the Centre for Research and Opportunities in Plant Science for their invaluable contributions to ASC.



LEARNING AGAIN: STAFF INDUSTRY ATTACHMENT

Ms Wu Manchao

Lecturer, Food, Nutrition and Culinary Science
Leong Guan Food Manufacturer Pte Ltd, Singapore (11 to 25 Sep 2018)



I was attached to Leong Guan Food Manufacturer Pte Ltd, a manufacturing company that supplies noodles, dumpling wrapper and bean curd products to hawker stalls, food courts and restaurants around Singapore. Despite being a Small Medium Enterprise (SME) company, Leong Guan has a very wide range of noodle products. The purpose of my Industry Attachment (IA) was to understand the processing of Asian noodles in a commercial set up. Being at the factory site, I had first-hand experience of the challenges faced of translating lab prototypes to a commercialization scale. This attachment also gave me the opportunity to work with the R&D team. This IA has certainly allowed me to deepen my understanding of noodle production that can be applied to my project work, as well as gain insights to the needs of an SME company to design more relevant and targeted CET courses to serve the food manufacturing industry.

Dr Amaladoss Anburaj

Lecturer, Medical Biotechnology
Keio University, Tokyo (24 Sep 2018 to 9 Oct 2018)

ASC's Point of Care Testing (POCT) laboratory has developed many diagnostic kits/assays using paper-based and PCR-based platforms. While Paper-based Analytical Devices (μ PAD) are rapid, cost effective and eco-friendly, these still require considerable amount of samples (such as blood) for diagnosis. Microfluidics Thread-Based Analytical Devices (μ TAD) help to overcome this limitation besides offering multiplexing capability. My Overseas Industrial Attachment (OIA) at Keio University, Tokyo provided me the opportunity to learn new capabilities with the potential to improve the sensitivity of the POCT devices developed by ASC. I learnt about the bioluminescence-based assays that could help improve our developed POCT devices in terms of their sensitivity, design, etc. I also learnt about the fabrication of low-cost microfluidics thread-based analytical devices (μ TAD). This OIA also provided ASC the possible collaboration for research between TP and Keio University, Japan, through joint grants (Gates Foundation, WHO, etc.).



Dr Matthew Kong

Manager, Digital Transformation
Tai Tong Ah Company Pte Ltd, Singapore (Feb to Jun 2019)

I was on an industry attachment with Tai Tong Ah Company Pte Ltd. Tai Tong Ah is a local GMP-certified manufacturer of Traditional Chinese Medicine (TCM) products, and places significant emphasis on product quality and efficacy. During the attachment, I was involved in the company's preparation for an upcoming GMP audit. This included document preparation, performing validation studies of the manufactured products, and preparing the site for an audit by the Health Sciences Authority. The culture of cohesiveness and collaboration in this small SME was a breath of fresh air and incredibly enriching. This attachment has also allowed me to understand the requirements and intricacies of GMP certification specific to the field of traditional Chinese medicines and has enabled the COI-CHP team to provide more relevant advice and consultancy to other local SMEs in the same field.



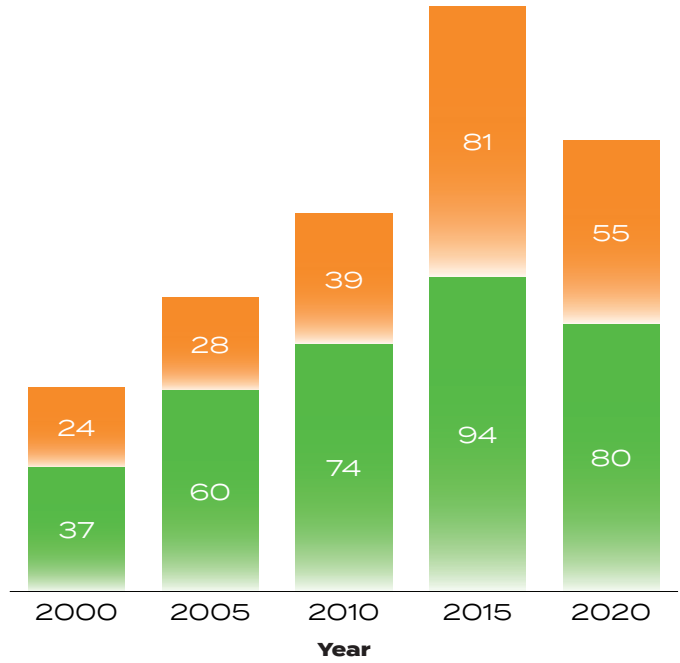
FACTS AND FIGURES



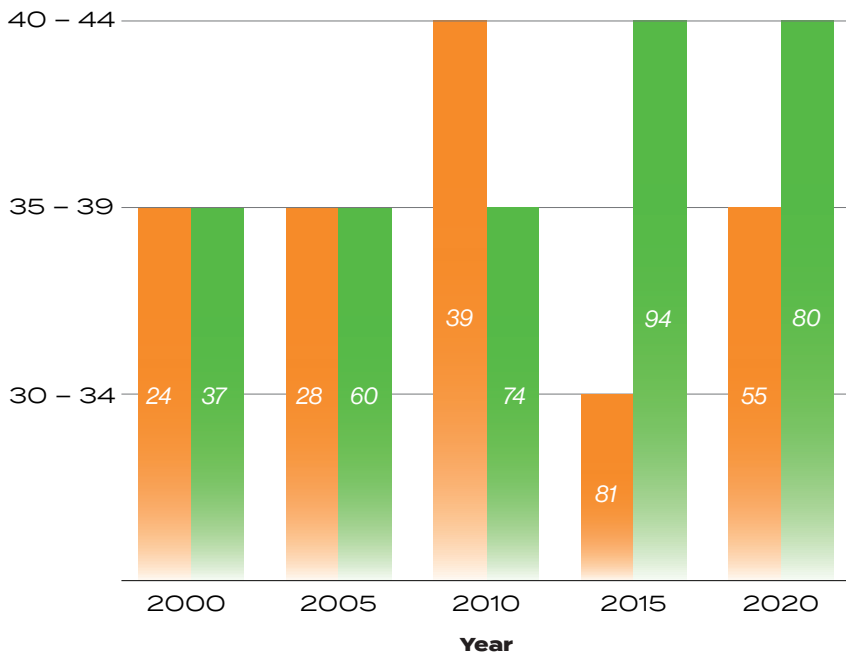
PROFILE OF STAFF

Staff Strength by Function between 2000 and 2020

- Administrative
- Scientific



Median Age



- Administrative
- Scientific

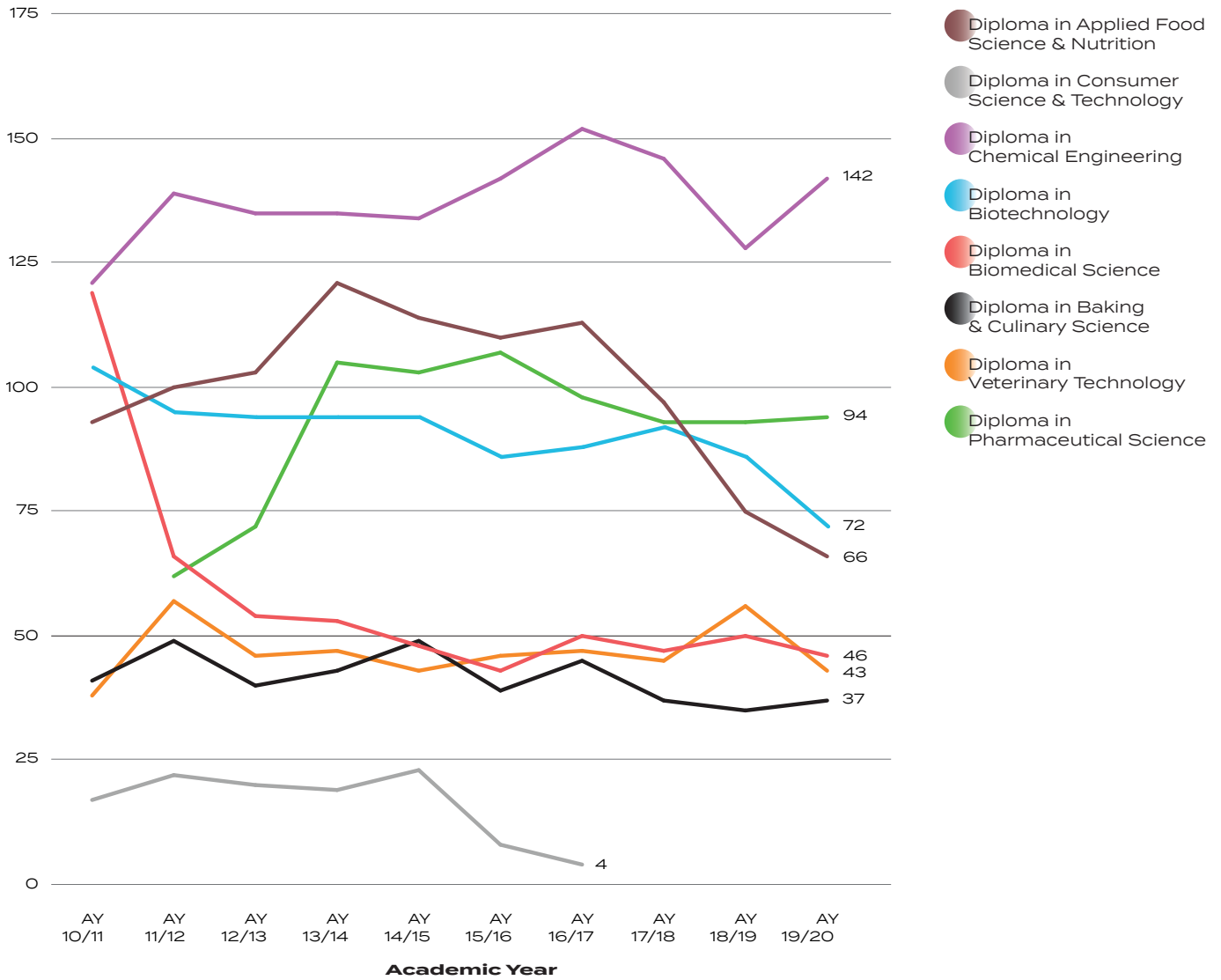
**Italicised numbers in the chart represent the staff strength by function*

Median Age Band of Staff between 2000 and 2020

The movement of median age band from 35-39 to 40-44 is a natural progression as school matures over the last 20 years. The rejuvenation of admin staff between 2010 to 2020 was due to school having more project staff to support school's RIE effort.

PROFILE OF GRADUATES

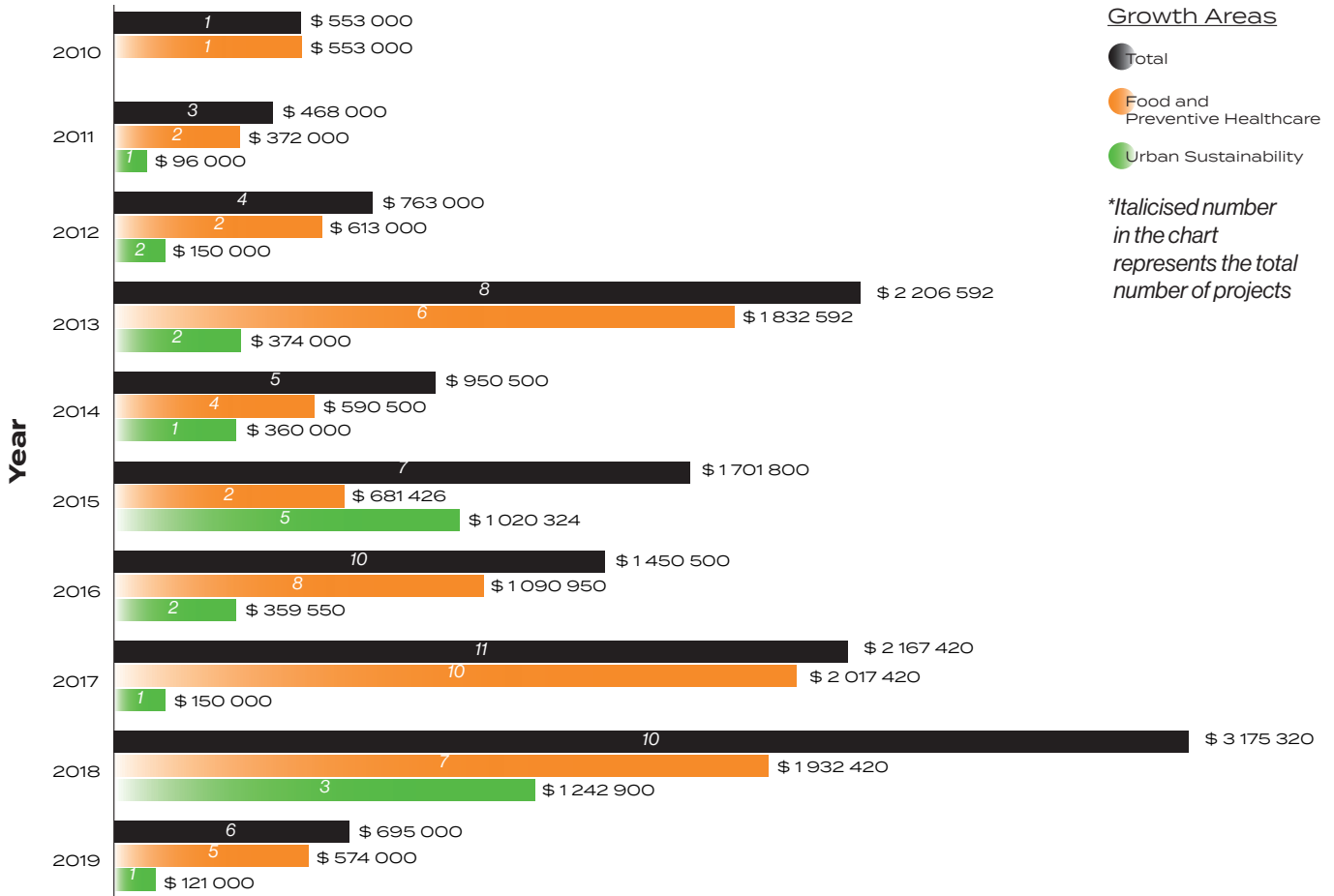
Number of Graduates



	AY 10/11	AY 11/12	AY 12/13	AY 13/14	AY 14/15	AY 15/16	AY 16/17	AY 17/18	AY 18/19	AY 19/20	AY 20/21
Total	533	590	564	617	608	581	597	557	523	500	489

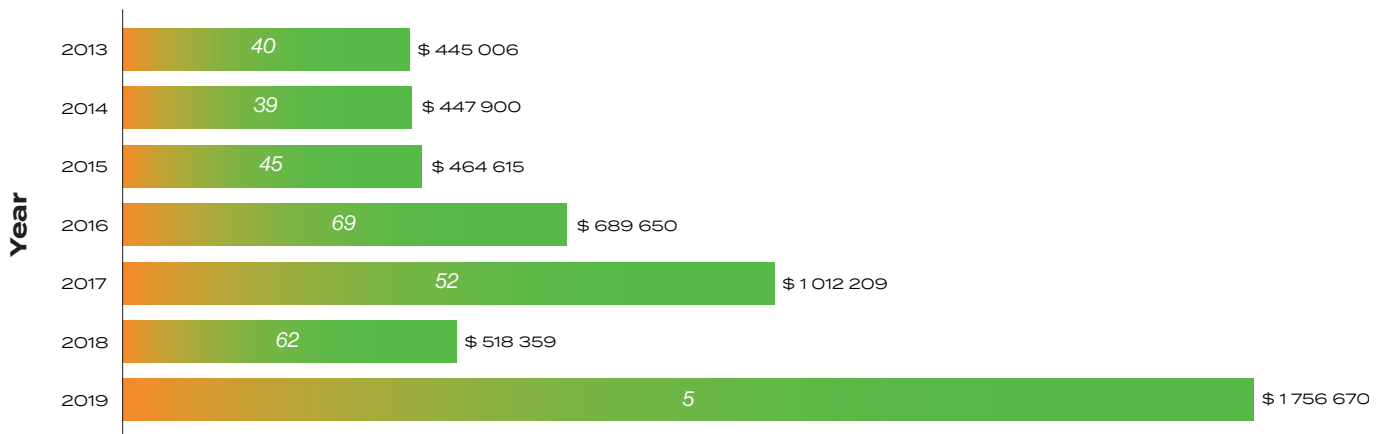
EXTERNAL RESEARCH GRANTS

Total Value, SGD



CONSULTANCY PROJECTS

Total Value, SGD



APPENDICES



OUR PARTNERS AND COLLABORATORS

1. 3D Matters Pte Ltd
2. 3M Technologies Pte Ltd
3. A G M Commercial Simbhaoli Sugars Limited
4. A*STAR Singapore
5. Aalst Chocolate Pte Ltd
6. Aastar Pte Ltd
7. AB Food & Beverages (Thailand) Ltd
8. AB Sciex (S) Pte Ltd
9. AbbVie Operations Singapore Pte Ltd
10. Abbott Manufacturing Singapore Pte Ltd
11. AbbVie Operations Singapore Pte Ltd
12. Academy of Chinese Medicine, Singapore
13. Access Medical Pte Ltd
14. Ace Biomed Pte Ltd
15. Ace Trading and Management Services Pte Ltd
16. ACM Biolabs Pte Ltd
17. Active Analytics Pte Ltd
18. Acumen Research Laboratories
19. ADM Cocoa Pte Ltd
20. Aegis Venture (M) Sdn Bhd
21. Age of Scientia Pte Ltd
22. Agency for Integrated Care Pte Ltd
23. Agilent Technologies Singapore (Sales) Pte Ltd
24. Agrimax Pte Ltd
25. AIT Ventures Pte Ltd
26. AITbiotech Pte Ltd
27. Akzo Nobel Paints (Singapore) Pte Ltd
28. Alchemy Foodtech Pte Ltd
29. Alcon Pte Ltd
30. Alcrea Pte Ltd
31. Alexandra Hospital
32. Alivia Foods Pte Ltd
33. Allswell Trading Pte Ltd
34. Amgen Singapore Manufacturing Pte Ltd
35. Amlab Services Pte Ltd
36. Analytical Laboratories (Singapore) Pte Ltd
37. Animal Veterinary Service (AVS)
38. Anta Tirta Kirana (Singapore) Pte Ltd
39. Anton Paar Singapore Pte Ltd
40. Anxon Engineering Pte Ltd
41. APD Pharmaceutical Manufacturing Pte Ltd
42. Apollo Aquaculture Group Pte Ltd
43. Applied Total Control Treatment Pte Ltd / ATC Coating Pte Ltd
44. Aqua FAME Pte Ltd
45. AquaRes Technology Pte Ltd
46. Aquaworld Tropical Fish Pte Ltd
47. Ascelon Pte Ltd
48. ASM Front-End Manufacturing Singapore Pte Ltd
49. Astra Zeneca Singapore Pte Ltd
50. Astuce Envirotec Pte Ltd
51. Auric Pacific Food Industries Pte Ltd
52. Auric Pacific Marketing Pte Ltd
53. Aventis Pharma Manufacturing Pte Ltd
54. Awe and Tang Aquarium LLLB
55. Bakals Malaysia Sdn Bhd
56. Bakels Singapore Pte Ltd
57. BD Biosciences (Becton, Dickinson and Company)
58. Beacons Pharmaceuticals Pte Ltd
59. Bespoke Ventures Pte Ltd
60. Betamore Limited
61. Biconi Pte Ltd
62. Big Tree Farms, Bali
63. Bioetc Pte Ltd
64. Bio3D Technologies Pte Ltd
65. BioGreen (Sanz Pte Ltd)
66. Bioinformatics Institutes, Singapore
67. Biological Resource Centre, A*STAR
68. Biome Singapore
69. Bioprocessing Technology Institute, Singapore
70. Blissfully Better LLC USA
71. BlueAqua International Pte Ltd
72. Botanic Culture International Pte Ltd
73. Bountifood Pte Ltd
74. Breadtalk Pte Ltd
75. BTFL Pte Ltd
76. Cancer Science Institute
77. Canine Wellness and Rehab Centre
78. Celblos Dermal Research Centre Pte Ltd
79. Central Narcotics Bureau of Singapore
80. Centre for Environment, Fisheries and Aquaculture Science, UK
81. Changi General Hospital
82. Charman Lai Setia Exports Ltd
83. Chek Hup Sdn Bhd
84. ChemoPower Technology Pte Ltd
85. Chew's Group Limited
86. China Tangshan Chinese Pharmaceutical Co.
87. Chip Seng Impex (S) Pte Ltd
88. Chr. Hansen Singapore Pte Ltd
89. Chye Choon Food Pte Ltd
90. CIBA Vision Asian Manufacturing and Logistics Pte Ltd
91. CLP EnvSystem Pte Ltd
92. Co May Pte Ltd
93. Coca-Cola Singapore Beverages Pte Ltd
94. Compass Business Consultancy Pte Ltd
95. Compass Foods Pte Ltd
96. CV. Quasindo
97. DFarmer Global Network Pte Ltd
98. Dana Products Inc
99. Danisco Singapore Pte Ltd
100. Danone Asia Pacific Holdings Pte Ltd
101. Danone Dumex (Malaysia) Sdn Bhd
102. Danone Nutricia Research (PTSH Holdings Singapore Pte Ltd)
103. Dashmesh Singapore Pte Ltd
104. Dav Electronics Pte Ltd
105. Dawyn Impex Pte Ltd
106. Delcie's Desserts and Cakes Pte Ltd
107. DHI Water & Environment (S) Pte Ltd
Diabetic Society of Singapore
108. Diabetic Specialties Pte Ltd
109. DKSH Singapore Pte Ltd
110. DSO National Laboratories
111. Duke – NUS Medical School
112. Dumex Singapore
113. Dynaglass Reinforced Plastic Pte Ltd
114. Dynalynk Pharma Pte Ltd
115. Eco-Wiz Group Pte Ltd
116. EcoGreen Recycle
117. Ecolab Pte Ltd
118. Ecolite Nutrition Domain (Singapore) Pte Ltd
119. Economic Development Board
120. Ecosoft Pte Ltd
121. Elo Water Pte Ltd
122. Eng Bee Paper Merchant Pte Ltd
123. Eng Seng Construction Pte Ltd
124. Enlive Pte Ltd
125. Enterprise Singapore
126. Epitome of Naturalness LLP
127. Eriskay Foods Pte Ltd
128. Esco Aster Pte Ltd
129. Eti Gida Sanayi ve Tic. A.Ş., Turkey
130. Eurofins Mechem Pte Ltd
131. Eu Yan Sang International Ltd
132. F&G Food Pte Ltd
133. F&N Interflavine Pte Ltd
134. Faesol Pte Ltd
135. Fairmont Hotels and Resort
136. Finagle Lanka Pte Ltd
137. Firmerich Asia Pte Ltd
138. Fishery Research Institutes of Shizuoka Prefecture
139. Fitness Health and International Pte Ltd
140. Fong Yit Kaya Pte Ltd
141. Food Innovation and Resource Centre
142. Foodia Inc., Taiwan
143. Foodie Warrior Pte Ltd
144. Forever Young Enterprise Singapore Pte Ltd
145. Fraser and Neave Pte Ltd
146. FrieslandCampina Amea Pte Ltd
147. Frost & Sullivan (Singapore) Pte Ltd
148. Fuchs Lubricants Pte Ltd
149. G.NRG Eco Pte Ltd
150. G5 International Holdings Pte Ltd
151. Gaia Science Pte Ltd
152. Gardenia Foods (S) Pte Ltd
153. Gardens By the Bay
154. Gardenia Bakeries (KL) Sdn Bhd
155. GeneSing Technologies Pte Ltd
156. Genome Institute of Singapore
157. GlaxoSmithKline Biologicals
158. Gills and Fins Pte Ltd
159. GlaxoSmithKline (GSK) plc
160. GlucoSTATS System Pte Ltd
161. Golden Sunland Singapore Pte Ltd
162. Gopher Pte Ltd

163. Grace Healthcare Products Pte Ltd
 164. GranFill Pte Ltd
 165. Green Faculty Pte Ltd
 166. Green Image Organic Enterprise Sdn Bhd
 167. Greenology Pte Ltd
 168. Griffith University
 169. Grover Capital Pte Ltd
 170. Guardian Health and Beauty
 171. Healing-Cell Pte Ltd
 172. H.W. Traditional Medicine Pte Ltd
 173. H&K Fishery
 174. Harbin Medical University
 175. Healing Movement Singapore
 176. Health Domain Pte Ltd
 177. Health Institute
 178. Health Promotion Board
 179. Health Science Authority
 180. Health Supplements Industry Association (Singapore)
 181. Healthway Medical Group Pte Ltd
 182. Hei Thai Pte Ltd
 183. Herb & Fashion Pte Ltd
 184. Herbal Life Asia Pacific Services Ltd
 185. Herbalife International India Pvt Ltd
 186. Herbalife International of Hong Kong Ltd
 187. Herbalife Korea Co Ltd
 188. Herbalife of Japan K.K.
 189. Herbalife Philippines
 190. Herbalink Pte Ltd
 191. Hexagon Nutrition Pvt Ltd
 192. Hock Hua Group
 193. Hock Seng Food Pte Ltd
 194. Hong Lian Gim Kee
 195. HSD Holding Smart Device S.R.L.
 196. Hua Bao Agency Pte Ltd
 197. Huay Feng Hang Pte Ltd
 198. Hyphens Pharma Pte Ltd
 199. Hysses Singapore Pte Ltd
 200. i2P Ventures Pte Ltd
 201. IDEC Corporation
 202. IE Singapore
 203. IM Gateway Pte Ltd
 204. iNano Industries Pte Ltd
 205. Incure Adhesives Manufacturing Pte Ltd
 206. Influid Asia Pte Ltd
 207. Ingrid Design Pte Ltd
 208. Innoheart Pte Ltd
 209. Innovative Diagnostic Pte Ltd
 210. Insectta Pte Ltd
 211. Inspiring Generations Pte Ltd
 212. Institute of Bioengineering and Nanotechnology
 213. Institute of Infocomm Research
 214. Institute of Mental Health
 215. Institute of Molecular and Cell Biology
 216. Institution of Aquaculture Singapore
 217. International Enterprise Singapore
 218. International Flavors & Fragrances (Greater Asia) Pte Ltd
 219. International Fragrance and Flavours, Inc.
 220. Intertek Testing Services (S) Pte Ltd
 221. INVE Asia Services Ltd
 222. InvitroCue Pte Ltd
 223. IPI Singapore
 224. Ippin Pte Ltd
 225. IQVIA Inc.
 226. Islamic Religious Council of Singapore
 227. James Cook University Pte Ltd
 228. Japan External Trade Organization
 229. Jay Gee Health Pte Ltd
 230. Jeen-Huat Foodstuffs Industries Sdn Bhd
 231. Jiangnan University
 232. Johnson & Johnson
 233. Jumbo Group Limited
 234. Jurong Health Services Pte Ltd
 235. Kampong Kekasih Pte Ltd
 236. Kang Zhen Pte Ltd
 237. Kei-Y Corporation Pte Ltd
 238. Kemin Industries (Asia Pacific) Pte Ltd
 239. Kentucky Fried Chicken Management Pte Ltd
 240. Keppel Infrastructure Holdings Pte Ltd (member of Keppel Group)
 241. Khoo Teck Phuat Hospital
 242. Kiat Lee Landscape and Building Pte Ltd
 243. Kim Sin Medicine Manufactory Pte Ltd
 244. Kino Biotech Pte Ltd
 245. KK Women's and Children's Hospital Pte Ltd
 246. Kovax Pte Ltd
 247. Kurita (Singapore) Pte Ltd
 248. Lam Soon Singapore Pte Ltd
 249. Le Choix Pte Ltd
 250. Leading Bioenergy (S) Pte Ltd
 251. Ledrink (Singapore) Pte Ltd
 252. Leong Guan Food Manufacturer Pte Ltd
 253. Life Technologies Holdings Pte Ltd (ThermoFisher)
 254. Life3 Pte Ltd
 255. Ligi Import Singapore Pte Ltd
 256. Lim Investment Management Pte Ltd
 257. LKF Medical Co Pte Ltd
 258. Lonza Biologics Singapore Pte Ltd
 259. Lubrigrate Ocean (Ubin) Pte Ltd
 260. Lynk Biotechnologies Pte Ltd
 261. Malaysian Dairy Industries Pte Ltd
 262. Malaysian Feedmills Pte Ltd
 263. Maliban Biscuit Manufactories (Pvt) Ltd
 264. Maliki International Pte Ltd
 265. Mandrake Medical Pte Ltd
 266. Marine Life Park
 267. McGraw-Hill Education (Asia)
 268. Mead Johnson (Manufacturing) Pte Ltd
 269. MeChem Consultancy Services Pte Ltd
 270. Meiji Seika (Singapore) Pte Ltd
 271. Merck, Sharp and Dohme Animal Health Innovation Pte Ltd
 272. MesoPhase Technologies Inc (Taiwan)
 273. Metropolitan Fishery Group Pte Ltd
 274. Mettler Toledo (S) Pte Ltd
 275. Micro Blood Science Inc
 276. Ministry of Economy, Trade & Industry (METI) (Japan)
 277. Minmed Pte Ltd
 278. Mitsui Chemicals Asia Pacific, Ltd
 279. Modular Farms Incorporated
 280. Montreux Patisserie Pte Ltd
 281. Mount Alvernia Hospital
 282. Mount Pleasant Animal Medical Centre Pte Ltd
 283. Movement for the Intellectually Disabled Singapore
 284. MP Biomedicals Asia Pacific Pte Ltd
 285. MSD Animal Health Innovation Pte Ltd
 286. Nalco-Pacific Pte Ltd
 287. Nanchang University
 288. Nanjing University of Chinese Medicine
 289. Nanyang Technological University
 290. National Cancer Centre Singapore
 291. National Dental Centre Singapore
 292. National Environmental Agency
 293. National Equestrian Centre
 294. National Healthcare Group Polyclinic
 295. National Heart Centre Singapore
 296. National Heritage Board
 297. National Kidney Foundation
 298. National Neuroscience Institute
 299. National Parks Board
 300. National Research Foundation
 301. National Skin Centre
 302. National University Health System
 303. National University of Singapore
 304. Nature Treasure Group LLP
 305. Nature Treasures Channel Pte Ltd
 306. Nestec Ltd
 307. Nestle Hong Kong Limited
 308. Nestle R&D Centre (Pte) Ltd
 309. Nestle Singapore Pte Ltd
 310. New Eastern (1971) Pte Ltd
 311. Ng Teng Fong General Hospital
 312. Ng Yong Hock Investments (S) Pte Ltd
 313. NHG Pharmacy
 314. North East Community Development Council
 315. Novartis Singapore Pte Ltd
 316. NSL Oilchem Waste Management Pte Ltd
 317. NTUC Foodfare Co-Operative Ltd
 318. NTUC Health Co-Operative Ltd
 319. NU International Singapore Pte Ltd
 320. Nutrition Innovation Singapore Pte Ltd
 321. Nutriwerks Pte Ltd
 322. Ocean Health Pte Ltd
 323. Oceanus Group Limited
 324. Oceanus Tech Pte Ltd
 325. Oh Chin Huat Hydroponics Farm Pte Ltd
 326. Olam Cocoa Pte Ltd
 327. Olam International Ltd
 328. OneNine57 Pte Ltd
 329. ONI Global Pte Ltd
 330. Optima Daribell Pte Ltd
 331. Orgabia Manufacturing Shd Bhd
 332. Oriental Aquarium (S) Pte Ltd
 333. Osmoflo Water Management Pte Ltd
 334. Our Friends and Partners
 335. Panasonic R&D Centre Singapore
 336. Par International Holdings Pte Ltd
 337. Paragon Traders Pte Ltd
 338. Parkway Hospitals Singapore Pte Ltd
 339. Parkway Laboratory Services Ltd
 340. Parkway Shenton Pte Ltd
 341. Peninsular Food Products Sdn Bhd
 342. Petrochemical Corporation Of Singapore (Private) Limited
 343. Philip Morris International Research Laboratories Pte Ltd
 344. Philips Electronics (S) Pte Ltd
 345. Phoon Huat Pte Ltd
 346. Photocatalysis Industry Association of Japan
 347. Pioneer Environmental Technology Pte Ltd
 348. Poli Medical Company Pte Ltd
 349. PolyBen Pte Ltd
 350. PomeFresh Organic Pte Ltd
 351. Prima Pte Ltd
 352. Procter & Gamble Company

353. Procter & Gamble International Operations SA SG Branch
354. PS Food & Beveragge (S) Pte Ltd
355. PT Sahabat Lingkungan Hidup (Indonesia)
356. PT. Amerta Indah Otsuka
357. PTSH Holding Banone Nutricia Research
358. Public Utilities Board (PUB)
359. Pure Rich Biogems (S) Pte Ltd
360. QuantumTx Pte Ltd
361. Quest Laboratories Pte Ltd
362. Quintech Life Science Pte Ltd
363. Quintiles East Asia Pte Ltd
364. Radiometer SEA Pte Ltd
365. Raffles Hospital Pte Ltd
366. Realstuff Aquaculture and Food Pte Ltd
367. Reborn Pte Ltd
368. Reckitt Benckiser (S) Pte Ltd
369. Reckitt Benckiser LLC (USA)
370. Resort World at Sentosa Pte Ltd
371. Revongen Corporation Sdn Bhd
372. RHK Venture Pte Ltd
373. Right Hands Corporation Pte Ltd
374. RIKEN Centre for Integrative Medical Sciences
375. Roche Diagnostics Asia Pacific Pte Ltd
376. Roche Singapore Pte Ltd
377. Rong Yao Pte Ltd
378. Ross University School of Veterinary Medicine
379. S M C Food 21 Pte Ltd
380. Sachi Inchi Pte Ltd
381. SAGA Laboratories Manufacturing Pte Ltd
382. Sai Hing Medical Hall Pte Ltd
383. Saint George's University Limited, Grenada, West Indies
384. Salus Nanotechnologies Pte Ltd
385. Sameza Pte Ltd
386. San Lay Marine Culture Co Pte Ltd
387. San Sesan Global Pte Ltd
388. Science Arts Co Pte Ltd
389. Scuta Farms
390. Sea Business Centre Pte Ltd
391. Seasons Aesthetics Pte Ltd
392. Seerpharma Singapore Pte Ltd
393. Select Group Limited
394. Sembcorp EOSM Pte Ltd
395. Sengkang General Hospital
396. SGS Testing & Control Services Singapore Pte Ltd
397. Shell Eastern Petroleum (Pte) Ltd
398. Shizenature Pte Ltd
399. Shizuoka Prefectural Government of Japan
400. Shokuken Prefectural Government of Japan
401. Siltronic Silicon Wafer Pte Ltd
402. Singapore Accreditation Council
403. Singapore AgriTech Pte Ltd
404. Singapore Centre for Environmental Life Science Engineering
405. Singapore Chinese Physicians' Association
406. Singapore Clinical Research Institute Pte Ltd
407. Singapore College of Traditional Chinese Medicine
408. Singapore District Cooling Pte Ltd
409. Singapore Food Agency
410. Singapore Food Delights Manufacturer Pte Ltd
411. Singapore General Hospital Pte Ltd
412. Singapore Health Services Pte Ltd
413. Singapore Heart Foundation
414. Singapore Institute of Engineering Technologists
415. Singapore Mabs Pte Ltd
416. Singapore Nutrition and Dietetics Association
417. Singapore Pastry Alliance
418. Singapore Peking Oxford Research Enterprise (SPORE), National University of Singapore
419. Singapore Police Force
420. Singapore Polytechnic
421. Singapore Refining Company Private Limited
422. Singapore Salad Pte Ltd
423. Singapore Sports Institute
424. Singapore Turf Club
425. Singapore University of Technology and Design
426. Singapore Veterinary Association
427. Singapore Workforce Development Agency
428. SingHealth Experimental Medicine Centre
429. Singka Industries Pte Ltd
430. Sino-Glory Medical Investment Pte Ltd
431. Skin Research Institute of Singapore
432. Smart Hatchery Pte Ltd
433. SMART-MIT Alliance
434. SmartAHC, Nanyang Technological University
435. Sobono Energy Pte Ltd
436. Somnetics Global Pte Ltd
437. South Island Aquarium Pte Ltd
438. Southern Taiwan University of Science and Technology
439. Soyato Foods International Pte Ltd
440. Soyjoy (Otsuka Pharmaceutical Co. Ltd)
441. Speedy Assay Sdn Bhd
442. Sri Nona Food Industries Sdn Bhd
443. ST Kinetics Integrated Engineering Pte Ltd
444. St. Andrew's Community Hospital
445. Starxyz Pte Ltd
446. Stellamarina Pte Ltd
447. STERIS Corporation
448. Steward Cross Pte Ltd
449. StratifiCare Pte Ltd
450. Strength Fish Farm and Trading Pte Ltd
451. Strides Pharma Global Pte Ltd
452. Sultan Qaboos University
453. Sunshine Bakeries
454. Sunward Pharmaceutical Pte Ltd
455. SW Foods International Pte Ltd
456. Swastea Pte Ltd
457. Sweet Home Candied Products Sdn Bhd
458. Syed Mohamed Traders (Singapore) Pte Ltd
459. Symrise Asia Pacific Pte Ltd
460. Syngenta Asia Pacific Pte Ltd
461. Systems On Silicon Manufacturing Company Pte Ltd
462. T&G Global Limited
463. Tai Tong Ah Company Pte Ltd
464. Taiho Pharmaceutical Co. Ltd
465. Takasago Singapore Pte Ltd
466. Tan Seng Kee Foods Pte Ltd
467. Tan Tock Seng Hospital
468. TAQ Pte Ltd
469. Tat Hui Foods Pte Ltd
470. Tatgu Pte Ltd
471. Techkon Properties Pte Ltd
472. Temasek Foundation
473. Temasek Life Sciences Laboratory
474. Tenplas Industries Sdn Bhd
475. Tessa Therapeutics Pte Ltd
476. Tetra Pak
477. TG Gateau Pte Ltd
478. Thai Airways Public Co. Ltd
479. Thanaka Cosmetics Pte Ltd
480. The Coffee Exchange Pte Ltd
481. The Fish Farmer Pte Ltd
482. The Goodwater Company Pte Ltd
483. The Kettle Gourmet Pte Ltd
484. The Leafy Loft Pte Ltd
485. The Mitolo Group
486. The National Centre for Genetic Engineering and Biotechnology, National Science and Technology Development Agency
487. The Product Makers, Australia Pte Ltd
488. The Sukha House Pte Ltd
489. Thermo Fisher Singapore Pte Ltd
490. Tien Yuen Chemical Pte Ltd
491. Timbre Enterprise Pte Ltd
492. Tong Jum Chew
493. Top Seller Pte Ltd
494. Toyo Rice Co. Ltd
495. Transalgae Israel Ltd, Israel
496. Trichokare Pte Ltd
497. Tropical Marine Science Institute
498. True Heritage Brew Singapore Pte Ltd
499. True Organix Asia Pte Ltd
500. Tung Luk Restaurant Pte Ltd
501. Turners and Growers New Zealand Limited
502. TÜV SÜD PSB Pte Ltd
503. Ugene Laboratory Services Pte Ltd
504. UglyGood Pte Ltd
505. Ultra Low Asia Hygiene Technology Pte Ltd
506. Unicurd Food Company Pte Ltd
507. Unified Summit Resources Pte Ltd
508. United BMEC Pte Ltd
509. Unitednature (FE) Pte Ltd
510. Unity By FairPrice
511. University of Applied Sciences, Utrecht
512. Uno Nutrition Sdn Bhd
513. Upgrown Farming Asia Pte Ltd
514. USA Poultry and Egg Export Council
515. Veolia ES Singapore Industrial Pte Ltd
516. VibraSys Pte Ltd
517. Vifor Pharma Asia Pacific Pte Ltd
518. Vistra Lemexiss Pte Ltd
519. Watsons Singapore Ltd
520. Welcia-BHG Pharmacy
521. WEMMS Enterprise
522. Wen Ken Marketing (S) Pte Ltd
523. Wenken Group Pte Ltd
524. West Pharmaceutical Services Pte Ltd
525. WhiteRock Medical Company Pte Ltd
526. Wildlife Reserves Singapore
527. Willowvale Asia Pte Ltd
528. Woon Leng Nursery Pte Ltd
529. Workforce Singapore
530. Wyeth Nutrition Singapore Pte Ltd
531. Xeon Trading Co. Pte Ltd
532. Yaizu Suisankagaku Industry Co Ltd
533. Yalkuit (Singapore) Pte Ltd
534. YHS (Singapore) Pte Ltd
535. Yi Shi Yuan Pte Ltd
536. Yikowei Pte Ltd
537. Yong Loo Lin School of Medicine
538. YTL PowerSeraya Pte Ltd
539. Yu Guo Chinese Physician Pte Ltd
540. Yun Onn Company Pte Ltd

INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE

2018

NAME	ROLE
Dr Padmanabhan Saravanan	Chair
Dr Ng Cher Cheen	Attending Veterinarian
Dr Koh Jun Jia	Alternate Veterinarian
Ms Viji Vijaykumarr	Secretary & Non-scientist
Dr Diana Chan Pek Sian	Scientist
Dr Jomer Bo Lucanas	Scientist
Mr Goh Miah Kiat	Scientist
Ms Elisabeth Tan Li Sa	Non-affiliate

2019

NAME	ROLE
Dr Shabbir Moochhala	Chair
Dr Clair Zhang Wei	Attending Veterinarian
Dr Ng Cher Cheen	Alternate Veterinarian
Dr Jason Chang	Secretary
Dr Padmanabhan Saravanan	Scientist
Dr Diana Chan Pek Sian	Scientist
Dr Jiang Fengli	Scientist
Mr Ramachandra Segaran	Non-scientist
Dr Christian Bluechel	Non-affiliate
Ms Elisabeth Tan Li Sa	Non-affiliate

INSTITUTIONAL REVIEW BOARD

JUNE 2017 – JUNE 2019

MEMBER	ROLE	INTERNAL/ EXTERNAL MEMBER
Dr Patrick Goh <i>Specialist Sports Physician Sports Medicine International</i>	Chairman	External
Dr Nicholas Ngui <i>Physician Owner of Neu Age Clinic</i>	Scientific person	External
Professor Christina Chai <i>Department of Pharmacy National University of Singapore</i>	Scientific person	External
Professor Eric Yap <i>Lee Kong Chian School of Medicine Nanyang Technological University</i>	Scientific person	External
Dr Jonathan Cheah Weng Kwong <i>Executive Director Faesol Pte Ltd</i>	Layperson	External
Mr Ong Yew Khoon Frank <i>Chief Human Resource Officer Institute of Mental Health</i>	Layperson	External
Dr Clara Teo Ru Lin	Scientific person	Internal (ASC)
Dr Goh Lay Beng	Scientific person	Internal (ASC)
Dr Kalpana Bhaskaran	Scientific person	Internal (ASC)
Dr Meliana Riwanto	Scientific person	Internal (ASC)
Dr Shabbir M Moochala	Scientific person	Internal (ASC)
Dr Sun Ling Ling	Scientific person	Internal (ENG)
Dr Tan Wah Pheow	Scientific person	Internal (HSS)
Mr Looi Kwok Peng	Layperson (Legal)	Internal (BUS)
Mr Chan Weng Kit	Layperson	Internal (RTD)
Mr Tan Chee Hong, Daryl	Layperson	Internal (RTD)

JUNE 2019 – PRESENT

MEMBER	ROLE	INTERNAL/ EXTERNAL MEMBER
Dr Nicholas Ngui <i>Physician Owner of Neu Age Clinic</i>	Chairman	External
Dr Lim Wei Wen <i>Research Fellow National Heart Centre</i>	Scientific person	External
Dr Ng Yi Kai <i>Scientific Officer National Public Health Laboratory National Centre for Infectious Disease</i>	Scientific person	External
Dr Jonathan Cheah Weng Kwong <i>Executive Director Faesol Pte Ltd</i>	Layperson	External
Mr Lim Kwang Kok <i>Assistant Director Intergrated Care Knowledge Agency for Integrate Care (AIC)</i>	Layperson	External
Dr Clara Teo Ru Lin	Scientific person	Internal (ASC)
Dr Foo Chun Shin Maisha	Scientific person	Internal (ASC)
Dr Kalpana Bhaskaran	Scientific person	Internal (ASC)
Mr Justin Ignatius De Silva	Scientific person	Internal (ASC)
Dr Leong Meng Fatt	Scientific person	Internal (ASC)
Dr Meliana Riwanto	Scientific person	Internal (ASC)
Dr Shabbir M Moochhala	Scientific person	Internal (ASC)
Dr Fu Yi	Scientific person	Internal (ENG)
Ms Gabrielle Lai	Scientific person	Internal (HSS)
Dr Tan Wah Pheow	Scientific person	Internal (HSS)
Mr Looi Kwok Peng	Layperson (Legal)	Internal (BUS)
Mr Chan Weng Kit	Layperson	Internal (RTD)
Mr Tan Chee Hong, Daryl	Layperson	Internal (RTD)

MANAGEMENT STAFF

As of April 2020

DIRECTOR

Dr Goh Lay Beng

DEPUTY DIRECTORS

Mrs Tay-Chan Su Chin
Academic and Student Development

Mr Wallace Lim Tse Loong
Administration and SkillsFuture

Mr Loh Gin Hin
Quality Development and Planning

ASSISTANT DIRECTORS

Mr Tan Keng Beng
Student Development

Ms Tay Lay Khee
Academic Development

Dr Wuang Shy Chyi
Technology Development

HEADS

Dr Kalpana Bhaskaran
*Centre for Applied Nutrition Services
Glycemic Index Research Unit*

Ms Petrina Lim
Translational Projects

Dr Tian Feng, Edmund
*Centre of Innovation for Complementary
Health Products*

Dr Wong Sook Fun
Centre for Urban Sustainability

Dr Wuang Shy Chyi
*Covering, Centre for Aquaculture and
Veterinary Science
Covering, Centre for Research and
Opportunities for Plant Science*

DOMAIN CHAIRS

Dr Patel Kadamb Haribhai
Plant Biotechnology

Mr Loh Gin Hin
Covering, Corporate Development

Mr Loh Gin Hin
Education R&D

Dr Wuang Shy Chyi
Covering, Water Technology

COURSE CHAIRS

Dr Maisha Foo Chun Shin
Pharmaceutical Science

Ms Koh Seow Wei, Valerie
Veterinary Technology

Mdm Ong Eng Gim
*Applied Food Science and Nutrition
Food, Nutrition and Culinary Science*

Mr Paul Sin
Baking and Culinary Science

Mr Zhang Pengchi
*Biomedical Science
Biotechnology
Medical Biotechnology*

Dr Leong Meng Fatt
Chemical Engineering

SENIOR MANAGERS

Dr Jason Chang
*Centre for Aquaculture and Veterinary
Science*

Dr Jiang Li
Technical and Infrastructure Support

MANAGERS (COURSES)

Dr Chan Giek Far
*Biotechnology
Medical Biotechnology*

Dr Miao Huang
Chemical Engineering

Ms Shahedah Bte Md Ali
Pharmaceutical Science

Ms Johanna Tan
*Applied Food Science and Nutrition
Baking and Culinary Science
Food, Nutrition and Culinary Science*

Dr Clara Teo Ru Lin
*Biomedical Science
Veterinary Technology*

Mr Wong Yoon Chron
Chemical Engineering

MANAGERS (DOMAINS)

Ms Victoria Cheng Kher Jia
Nutraceutical

Mr Randy Chow
Bistro Lab and CU2+

Ms Hor Mooi Sian, Magdeline
Continuing Education Training

Dr Matthew Kong
Digitalisation

Ms Lau Poh Nguk
Math and Chemistry

Ms Lin Meilin Phoebe
Technical and Infrastructure Support

We would like to thank these former ASC management colleagues for their contribution:

Dr Lee Chee Wee (*former Director*)

Dr Christopher Marlowe Caipang

Dr Diana Chan Pek Sian

Ms Chew Swee Cheng

Ms Krishnasamy Susila

Dr Jomer Bo Lucanas

Dr Shabbir Moochhala

Dr Ong Seng Poon

Dr Meliana Riwanto

Dr Padmanabhan Saravanan

Dr Mabel Wang Rong

Dr Andy Yeo Yee

Ms Hamida Zam Zam

STAFF AND STUDENT ACHIEVEMENTS

STAFF

AWARD	STAFF
President's Award for Teachers 2018	Ms Tan Lay Khee
MOE Innergy (Statutory Board) Awards 2019 <i>Project title: "Recycling Urban Wastes for a Better Tomorrow: TP Recycled Ecological Blocks (REB) and Green Park Benches"</i>	Dr Wong Sook Fun (Team Leader) Ferne Leong Wen Suey (Team Member) Kevin Lee Jia Le (Team Member)

STUDENT

AY18/19 ACADEMIC AWARDS

ACADEMIC AWARDS	DIPLOMA	STUDENT
A*STAR Science Award (Polytechnic) 2018	Chemical Engineering Applied Food Science & Nutrition Biomedical Science	Koh Jing Ho Jia Ying Melia Mindy Ho Jin Sim
CapitaLand Award for All-Round Excellence	Biotechnology	Cassandra Yip Ai Lin
GIC Sparks Study Grant Award	Applied Food Science & Nutrition Pharmaceutical Science	Lam Zhi Sheng Wu Ze Zheng
Jumbo Scholarship	Baking & Culinary Science	Tan Xiang Long
Lubritrade Ocean (Ubin) Scholarship	Veterinary Technology Veterinary Technology Veterinary Technology	Chean Mei Yun, Beryl Ng Yu Fei Tricia Jane Tay Shufen
Mitsui Chemicals Singapore Process Technology (MCPT) Study Award	Chemical Engineering Chemical Engineering Chemical Engineering	Anthony Goh Zheng Long Tan Jun Wei Tan Jun Han
NTUC Foodfare Scholarship	Applied Food Science & Nutrition Baking & Culinary Science	Siti Humairah Muhammad Azahar Wayne Ngiam Hian Jun
Roche Singapore Technical Operations Scholarship	Pharmaceutical Science	Nadiyah Shahira Bte Samani
Select Group Scholarship	Baking & Culinary Science Baking & Culinary Science	Tan Guan Quan Jonathan Kelly Lee Yuan Ying
Singapore Olympic Foundation – Peter Lim Scholarship	Chemical Engineering	Li Yue Long
The Daisy Phay TP Foundation Scholarship	Biomedical Science Pharmaceutical Science	Teo Mark Cassandra Tan Li Na
The Lee Kuan Yew Award	Pharmaceutical Science	Charlotte Gayondato Yap
The Ngee Ann Kongsi Scholarship 2018	Veterinary Technology	Myra Tan Xiao Hui
The Tan Agnes Jiannee Scholarship	Biomedical Science Biotechnology Pharmaceutical Science	Chua Jia En Crystalbelle Deric Lau Zhan Yuan Glenda Lee Peijun

AY18/19 COMPETITIONS

COMPETITIONS	AWARD	DIPLOMA	STUDENT
Food Hotel Asia Culinary Challenge 2018	Gold – Two-to-Tango	Baking & Culinary Science Baking & Culinary Science	Lim Tao Wen Wee Rui Ke, Dillon
	Silver – Two-to-Tango	Baking & Culinary Science Baking & Culinary Science	Nigel Peh Chang Yu Xuan Jerald
	Silver – Sweet High Tea Challenge	Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science	Elinor Leo Ming Xuan Lim Jia Hui Shanice Angelyn Chew En Qi Agnes Goh Si Hui
Inter-poly/University Food Innovation Product Award 2018	Most Innovative Award	Applied Food Science & Nutrition Applied Food Science & Nutrition Applied Food Science & Nutrition	Ng Yun Ru Carrienne Chin Kaiyan Tan Si Yu
NUS Crystal Growing Challenge 2018	2nd Runner-up	Chemical Engineering Chemical Engineering	Chireni Thirumaran Lee Pin Shyan
	Best Display Award	Pharmaceutical Science Pharmaceutical Science	Wilson Chan Weisheng Lim Ke Xuan Jelanel
Polytechnic Student Research Programme Award	Best Award Recipient	Biotechnology	Koh Xin Yi
Science Buskers Festival 2018	Champion	Biomedical Science Biomedical Science Biomedical Science	Shaun Ong Jing Long Jullian Chng Jun En Woo Keng Shawn
	2nd Runner-up	Pharmaceutical Science Pharmaceutical Science Pharmaceutical Science	Tang Xiang Fei Wong Kee Eng Nishath Kumar
Singapore Association for Laboratory Animal Science Poster Competition	2nd Prize Consolation Prize	Veterinary Technology Veterinary Technology	Sheryl Goh Athena Lim Leshyn
WorldSkills Singapore (WSS) for Chemical Laboratory Technology (CLT)	Medallion for Excellence	Pharmaceutical Science	Charlotte Gayondato Yap
Young Scientist Symposium 2018	Oral Presentation Merit Award	Veterinary Technology	Foo Rachel Wandaga
	Poster Presentation Merit Award	Veterinary Technology Veterinary Technology	Lim Yu Heng Frederick Vivi Ding Xin Hui
	Audience Participation Award	Biomedical Science Biomedical Science Biomedical Science Biomedical Science Pharmaceutical Science	Phu Pwint Thin Muhammad Faizal Peh Jin Wei Phu Pwint Thin Giovinna Arfan

AY18/19 NON-ACADEMIC AWARDS

AWARDS	PRIZE	DIPLOMA	STUDENT
Harvard Prize Book	Community Service Award	Biotechnology	Selva Raju S/O Arumugam
National Youth Achievement Awards	Gold Award	Biotechnology	Yip Ai Lin Cassandra
Temasek Student Excellence Awards	Sportsperson of the Year	Veterinary Technology	Chua Yi Shou Darren

AY19/20 ACADEMIC AWARDS

ACADEMIC AWARDS	DIPLOMA	STUDENT
ACI (Singapore) Chapter Scholarship	Chemical Engineering	Goh Pei Ting Gen
Anugerah MENDAKI Award	Applied Food Science & Nutrition Chemical Engineering Chemical Engineering Chemical Engineering Chemical Engineering	Nur Hani Syafiqah Binte Mohd Said Ali Sufiyan Khan Muhamad Dzakirin Azfar B M H Muhammad Fadzli B Sa'ad
A*STAR Science Award (Polytechnic) 2019	Biotechnology Biomedical Science Pharmaceutical Science	Charmaine Ho Jia Yi Tan Yeow Boon Xavier Ang Sheng
Blue Aqua International Sponsorship	Veterinary Technology	Nathaniel Lim Hong Ann
Enterprise Singapore Global Executive Scholarship	Biotechnology	Chang Danu Ega
GIC Sparks Study Grant Award	Veterinary Technology Veterinary Technology	Louicia Lee Xin Yi Phyllis Lim Jiawen
Mitsui Chemicals Singapore Process Technology (MCPT) Study Award	Chemical Engineering	Lek Hui En
MOH Healthcare Merit Award	Applied Food Science & Nutrition Applied Food Science & Nutrition Pharmaceutical Science	Ng Si En, Peggy Tan Hui Ting Stephanie Noory Mohd Zaini
NTUC Foodfare Scholarship	Applied Food Science & Nutrition Baking & Culinary Science	Leo Hui Yuan Riz Patricia Legaspi
Select Group Scholarship	Baking & Culinary Science Baking & Culinary Science	Rebecca Gay Ji Chin Tse Ning, Theodora
Singapore Buddhist Lodge Education Bursary	Chemical Engineering	Tey Fang Peng
Singapore-Industry (SgIS) Scholarship	Applied Food Science & Nutrition	Ho Jia Ying Melia
Singapore Olympic Foundation-Peter Lim Scholarship	Biomedical Science Chemical Engineering Chemical Engineering Chemical Engineering Chemical Engineering Pharmaceutical Science	Mindy Ho Jin Sim Muhammad Ihsan B Noor Isham Akram B Azman Akmal B Azman Erasmus Ang Zhong Qing Sheraine Ooi Shi Rui
The Daisy Phay TP Foundation Scholarship	Biotechnology Biomedical Science	Deric Lau Zhan Yuan Ong Choon Chen
The Lee Kuan Yew Award	Chemical Engineering	Koh Jing
The Mapletree-TENG Academy Scholarship	Molecular Biotechnology	Ryan Lim Ing Zheng
The Ngee Ann Kongsi Scholarship 2019	Pharmaceutical Science	Amanda Chew Le Xuan
The SINDA Excellence Award	Pharmaceutical Science Pharmaceutical Science Chemical Engineering	Nadiah Shahira Bte Samani Siti Farhana Bte Hamidi Ali Sufiyan Khan
TP Skills Mastery Award (Team)	Applied Food Science & Nutrition Applied Food Science & Nutrition Applied Food Science & Nutrition	Ho Jia Ying Melialow Ze Ying, Rachaelleo Hui Yuan

AY19/20 COMPETITIONS

COMPETITIONS	AWARDS	DIPLOMA	STUDENT
13th SALAS Regional Annual Scientific Conference 2019-Poster Competition	1st Runner-Up	Veterinary Technology	Melvin Ong Jin Xiang
ACI-Singapore Chapter Poster Competition 2019	Gold Award	Chemical Engineering Chemical Engineering Chemical Engineering	Aloysius Chua Jun Hao Goh Jun De Elton Ng Zi Yuan
	Silver Award	Chemical Engineering	Ashlyn Chan Wan Wei
	Merit Award	Chemical Engineering	Bryan Foong Zhi Chuan
	Commendation Award	Pharmaceutical Science Chemical Engineering Chemical Engineering	Izzah Hazirah Bte Junin Masayu Syafiqah Lua Wei Chong
Brand's Open Innovation Contest 2019	Champion	Applied Food Science & Nutrition Applied Food Science & Nutrition Applied Food Science & Nutrition	Ho Jia Ying Melia Low Ze Ying Leo Hui Yuan
	1st Runner-Up	Pharmaceutical Science Pharmaceutical Science Pharmaceutical Science	Foo Chuan Zheng Lim Xiang Nai Shani Ang Sheng
INNOVA.8 Business Idea Competition 2019	1st Runner-Up	Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science Baking & Culinary Science	Caedmon Boh Lui Min Zhuang Cheong Shi Ying Tesia Harriel Low Xin Yi Phoebe Lim Si Ying Lin Chen
International Science Enterprise Challenge (iSEC) 2019	Champion	Pharmaceutical Science	Poh Jess Yee
	2nd Runner-Up	Pharmaceutical Science	Foo Zi Jun Farrel
	Most Innovative Title	Pharmaceutical Science	Nam Yi Ting
Science Buskers Festival 2019	1st Runner-Up	Biomedical Science Pharmaceutical Science Pharmaceutical Science	Tan Peng Hong Jess Lee En Tong Nataline Britney Ong Jia Qi
	2nd Runner-Up	Pharmaceutical Science Chemical Engineering	Tang Xiang Fei Lew Yi Cheng
	Judges' Award	Veterinary Technology Veterinary Technology Veterinary Technology Veterinary Technology	Naomi Koh Shao Yun Achelle Kathleen Roman Siti Zaharah Binte Mohd Daud
Singapore Institute of Food Science and Technology Essay Writing Competition 2019	Champion	Applied Food Science & Nutrition	Low Ze Ying
Young Scientist Symposium 2019	Poster Presentation Merit Award	Biomedical Science Biotechnology Biotechnology Veterinary Technology	Cheryl Chua Wan Xuan Muhammad Haziq Bin Razeli Yap Ping Gwee Lee En Selecia

AY19/20 NON-ACADEMIC AWARDS

AWARDS	PRIZE	DIPLOMA	STUDENT
National Environment Agency Ecofriend Awards 2019		Chemical Engineering	Tan Shi Zhou
National Youth Achievement Awards	Gold Award	Biomedical Science Biomedical Science Chemical Engineering Chemical Engineering	Chua Jia En Crystalbelle Ou Li Min, Jamie Joel Foo Yong Jun Tan Shi Zhou
North East District Environment Award - Individuals (Youth)		Chemical Engineering	Tan Shi Zhou
Harvard Prize Book	Community Service Award	Applied Food Science & Nutrition	Adelyine Tay Gui Fen
Temasek Student Excellence Awards	Outstanding Sports Achievement Award Sportsperson of the Year Sports Team Excellence Award Student Leader of the Year	Veterinary Technology	Darren Chua Yi Shou
	Artist Excellence Award Arts Group Excellence Award Artist of the Year	Biomedical Science	Masaoy Rialyn Fae Lagui
	Sportsperson Excellence Award	Baking & Culinary Science	Muhd Fawwaz B Mohamed
	Community Service Excellence Award	Chemical Engineering Pharmaceutical Science Biotechnology	Erasmus Ang Zhong Qing Charlotte Gayondato Yap Selva Raju S/O Arumuga

PUBLICATIONS & PAPERS PRESENTED AT CONFERENCES

JOURNAL PUBLICATIONS

- Adel M, Caipang CMA, Dawood MAO (2017). Immunological responses and disease resistance of rainbow trout (*Oncorhynchus mykiss*) juveniles following dietary administration of stinging nettle (*Urtica dioica*). *Fish & Shellfish Immunology*, 71, 230-238.
- Beaumont C, Sackville A & Chew SC (2004). Identifying Good Practices in the Use of PBL to Teach Computing. *ITALICS 3* (1), LTSN-ICS.
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- Caipang CMA, Choo HX, Bai Z, Huang H, Lay-Yag CM (2015). Viability of Sweet Potato Flour as Carbon Source for the Production of Biofloc in Freshwater Culture of Tilapia. *Oreochromis sp. International Aquatic Research*, 7(4), 329-336.
- Caipang CMA, Fagutao FF, Fatira E, Lazado CC, Pavlidis M (2015). Cortisol Levels and Expression of Selected Stress- and Apoptosis-related Genes in the Embryos of Atlantic Cod, *Gadus Morhua* Following Short-term Exposure to Air. *International Aquatic Research*, 7 (1), 75-84.
- Chan GF (2014). Teaching and Learning Strategies Used in Metabolic Biochemistry to Stimulate Learning among Polytechnic Students. *Scottish Journal of Arts, Social Sciences and Scientific Studies*, 20(1), 55- 69.
- Cheng JL, Mi JY, Miao H, Sharifah Fatanah BSA, Wong SF, & Tay BK. (2017). Synthesis of ammonium and sulfate ion-functionalized titanium dioxide for photocatalytic applications. *Applied Nanoscience*, 7 (3), pp117-124.
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*“ Education is the most powerful weapon
which you can use to change the world. ”*

————— *Nelson Mandela*



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