



# School of Engineering

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# School of Engineering

**This School is the place Where the Future Happens — where opportunities are provided for you to realise your ambitions. Always at the forefront of technology, we emphasise innovation, creativity, a practical approach to solving problems, and hands-on training.**

We offer 11 exciting diploma courses and a special programme — all of which provide you with a broad-based curriculum that opens the doors to flexible career opportunities in Singapore's new knowledge-based economy. In addition, the electives/options/specialisations offered in our courses have been carefully selected based on the latest industry trends, and they have been blended into the respective core diploma curriculum. This ensures that you are well prepared to start working in the industry, while giving you a strong foundation for university studies.

## Centres of Excellence

With the most up-to-date facilities and equipment, coupled with highly effective teaching methods, the School of Engineering is in the position to ensure that you get a wholesome education that prepares you to meet future economic challenges.

Our strength lies in our ability to be forward-looking to ensure that we remain at the cutting edge of technology. We have seven Centres of Excellence which undertake R&D work in collaboration with the industry, so as to further our expertise in specialised technological areas. These Centres help to enhance the professional and academic capability of our staff and students.

### Biomedical Engineering Research Centre

This interdisciplinary research centre provides a platform for clinicians, chemists, biochemists, electrical and electronic engineers, mechanical and mechatronics engineers, software engineers and industrial designers to interact and invent cost-effective medical devices and solutions. It currently focuses on the development of portable and wearable peritoneal dialysis devices and home haemodialysis devices for treating end-stage renal disease (ESRD) patients. The Centre also aims to provide the Medical Technology (MedTech) industry with the technological knowhow for commercialisation as well as the expertise in biomedical regulatory compliance.

### Clean Energy Research Centre

This Centre aims to provide research & development capability and technological know-how for Singapore's clean energy industry, as well as to offer the industry-relevant infrastructure to support the School's diploma programmes, particularly the Diplomas in Clean Energy, Electronics, Green Building & Sustainability, and Mechatronics. This Centre works on energy generation & storage technologies, power and energy management system & analytics. The objective is to proliferate and develop these technologies for applied research & development, training, industry collaborations and commercialisation. Backed by a team of scientists and engineers with vast experience in chemical, electrical, electronic and mechanical engineering, the Centre offers various facilities including chemistry labs, fuel cell test-stations, various gas supply (including hydrogen), power electronics and mechanical prototyping labs & workshops to conduct applied and industry-relevant research & development.

### Digital Fabrication & Additive Manufacturing Centre

This Centre focuses on advancing the relevant technologies by collaborating with institutes of higher learning and accelerating technology adoption by working closely with the industry. In addition, elements of Industry 4.0 such as remote monitoring and robotic automation are developed and demonstrated within the set-up.

### Interactive Digital Centre Asia (IDC Asia)

This Centre aims to conduct applied research and development in cross-disciplinary areas related to Interactive Digital Media (IDM) that will contribute to Singapore's Smart Nation initiative by harnessing technology to improve the lives of citizens, create more opportunities, and support stronger communities. The technologies include mobile apps, computer applications using Augmented Reality (AR) and Virtual Reality (VR), engineering analytics, Internet of Things (IoT) as well as innovative gadgets and interactive media. Relevant IDM projects undertaken by the Centre include 3D Simulation and Interactive Learning (3DSaIL), ICT & e-Learning, IoT@Home (a Smart Enabled Home), Real-Time Interactive AR/VR for Collaborative Learning, as well as pilots and trials for the Smart Connected Jurong Lake District.

### Microelectronics Centre

Microelectronics is at the core of the modern industry and has penetrated into almost every aspect of modern living. This Centre continuously grows its R&D capabilities on innovative micro-devices while focusing on the main areas such as biosensors, microfluidic chips, surface acoustic wave devices, flexible tactile sensors for robotic applications and other state-of-the-art microsensors and systems. It brings together scientists and engineers to pursue translational research and develop practical applications for commercialisation. It also supports staff capability development as well as teaching & learning activities by providing the necessary platforms and expertise. The Centre has secured various competitive R&D grants and established strategic partnerships with companies and research institutes, and has strong capabilities in developing microtechnology-based devices from concept to field-deployable prototype.

### Robotics & Automation Centre

This Centre strives to foster, develop and promote the latest technologies through innovation, applied research, capability development and application in robotics and automation that are relevant to the industry’s needs. The core technological areas include wireless sensor network, embedded intelligent system, robotic navigation, path planning, obstacle navigation, motion control for research robots, motion control for automation, machine vision, process control and simulation.

### Temasek Aviation Academy

This academy is one of the largest aviation/aerospace facilities in Singapore. It has specialised training labs for Airport & Airline Operations, Air Traffic Control, Pilot and Licensed Aircraft Engineer Training, and boasts of the latest state-of-the-art aerospace and aviation training equipment including full-flight simulators for training pilots and an aircraft hangar with a ground operational Hawker 700A business jet.

The **Aviation Research Centre** under the Academy conducts applied research in unmanned aerial systems, aerospace MRO and airport systems. It is well-equipped with quality facilities such as developmental labs, indoor and outdoor UAV flying enclosures, wind tunnels, computational fluid dynamics lab, virtual/augmented reality, flight simulators and composite materials labs. Working with strategic partners, the Centre adopts a future-oriented approach in developing new capabilities for the industry.

The **TP-Lufthansa Technical Training Centre** under the Academy provides specialised practical training for all full and part time aerospace students in Temasek Polytechnic, which is the only local institution of higher learning certified by the Civil Aviation Authority of Singapore as a SAR-147 Approved Maintenance Training Organisation (AMTO). This well-equipped Centre, renowned for its high standards and strict practical requirements, ensures that all students who successfully go through its doors will have a bright future in the aerospace sector.

# Minimum Entry Requirements

DIPLOMAS	MINIMUM ENTRY REQUIREMENTS	
<p>To be eligible for:</p> <ul style="list-style-type: none"> <li>• [T50] Aerospace Electronics</li> <li>• [T51] Aerospace Engineering</li> <li>• [T04] Aviation Management</li> <li>• [T38] Biomedical Engineering</li> <li>• [T43] Business Process &amp; Systems Engineering</li> <li>• [T52] Clean Energy</li> <li>• [T13] Computer Engineering</li> <li>• [T65] Electronics</li> <li>• [T29] Green Building &amp; Sustainability</li> <li>• [T28] Integrated Facility Management</li> <li>• [T66] Mechatronics</li> <li>• [T56] Common Engineering Programme</li> </ul>	<p>You must have 5 GCE O Level subjects comprising:</p> <p>English Language (EL1)*</p> <p>Mathematics (E or A)</p> <p>Any one of the following subjects Biology, Biotechnology, Chemistry, Combined Science, Computing/Computer Studies, Design &amp; Technology, Electronics/Fundamentals of Electronics, Physics/Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)/Physical Science</p> <p>Any two other subjects, excluding CCA</p> <p><i>* SPM / UEC holders must have a minimum of grade 6 for the Bahasa Inggeris (English Language) subject.</i></p>	<p>Grades 1 - 7</p> <p>Grades 1 - 6</p> <p>Grades 1 - 6</p> <p>–</p>

For details on ELR2B2 computation, visit: [www.tp.edu.sg/elr2b2](http://www.tp.edu.sg/elr2b2)

# Aerospace Electronics



**"Singapore's aerospace industry has been growing rapidly and customers' demands have become more sophisticated. We at ST Aerospace believe that these new challenges can only be met by a team of highly skilled and innovative aerospace professionals, and we believe that graduates from this course will be ready to fulfil the industry's needs."**

Koh Chin Seng  
Vice President, Human Resource,  
ST Aerospace  
Singapore-ASEAN

Step into an aircraft cockpit and you will see colourful lights, state-of-the-art instruments, bright LCD displays and dual steering systems for flight control navigation. Want to know how these systems work together to control the aircraft thousands of metres above sea level? This course will provide you with the answers, and set you on the path towards an exciting career in the aviation industry!

In this course, you will learn about avionic systems, including aircraft navigation and flight control systems, and you will also be equipped with knowledge and skills of the SAR-66 Aircraft Maintenance Licence (AML) Category B2 syllabus.

You will get to use our fully-equipped TP-Lufthansa Technical Training (LTT) aerospace training centre conveniently located on campus, and be trained by expert instructors certified by LTT, Germany. In addition, our Temasek Aviation Academy houses flight simulators and a full-sized aircraft hangar complete with a private jet, will add an authentic dimension to your learning.

TP is the first polytechnic to be certified by the Civil Aviation Authority of Singapore (CAAS) as a SAR-147 Approved Maintenance Training Organisation (AMTO). This means your diploma will be more widely recognised

by employers, and your AML apprenticeship duration after graduating from TP will also be significantly shortened, allowing you to become a Licensed Aircraft Engineer (LAE) up to 10 months sooner.

If you aspire to be a pilot, you can also fulfil your dream by taking flying lessons as part of your Student Internship Programme in your final semester of study, to get that coveted Private Pilot Licence (PPL).

## Career Opportunities

Singapore is today the most comprehensive aerospace maintenance, repair and overhaul (MRO) hub in Asia, accounting for a quarter of the region's MRO output. Our Aerospace industry is currently worth about S\$9 billion annually, and employs about 20,000 workers spread across more than 100 local and international companies carrying out MRO in Singapore.

It is projected that approximately one million additional personnel – including 460,000 new commercial airline pilots and 601,000 highly skilled maintenance personnel – will be needed worldwide over the next few decades, thereby giving you outstanding career prospects.

You will be highly sought-after as an aircraft maintenance engineer, aircraft electrical system specialist, avionics design and development engineer, avionics system specialist or avionics test engineer, in the fields of avionics testing and measurement, the design, development, manufacturing and technical sales of aircraft systems and components, as well as aerospace engineering support and services.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 94 credit units

Total Credit Units Completed : 130 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from mild or severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss, severe vision impairment or any physical impairment, or be physically dependent on mobility equipment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

*\* Students must choose one of these three subjects or TGL1001 Guided Learning.*

### DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EAE1002	Aircraft Electrical Fundamentals	1	4
EAE1004	Fundamentals of Aeronautical Science	1	5
EAE1006	Avionic Systems	1	4
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EAE2002	Aviation Legislation & Human Factors	2	4
EAE2003	Aircraft Electronics & Servomechanisms	2	4
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EAE3009	Basic Aerodynamics	3	3
EAE3018	Aircraft Digital Systems	3	5
EAE3021	Aerospace Maintenance Practices	3	16

### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Aerospace Engineering



**“This course has shown leadership by hiring staff fresh from the industry, and partnering recognised world-class training institutions such as Lufthansa Technical Training (LTT) to inject the latest, the best, and the most realistic practices from the aviation industry into its curriculum. The knowledge that you receive as students will definitely be both current and relevant to your future work environment.”**

Roberto Kobeh Gonzalez  
President  
Council of the International Civil Aviation Organisation (ICAO)

Every time we hear an aircraft roaring above us, we look up to the sky and marvel at how these huge machines overcome gravity to stay airborne, how they are made, and how some of them can even fly faster than the speed of sound! In this course, we unravel these mysteries for you.

In this course, you will learn about aircraft flight, aircraft design, airframe structure, engine systems, and manufacturing of aircraft systems, and you will also be equipped with knowledge and skills of the SAR-66 Aircraft Maintenance Licence (AML) Category B1 syllabus.

You will get to use our fully-equipped TP-Lufthansa Technical Training (LTT) aerospace training centre conveniently located on campus, and be trained by expert instructors certified by LTT, Germany. Our new West Wing building housing flight simulators and a full-sized aircraft hangar complete with a private jet, will add an authentic dimension to your learning.

TP is the first polytechnic to be certified by the Civil Aviation Authority of Singapore (CAAS) as a SAR-147 Approved Maintenance Training Organisation (AMTO). This means your diploma will be more widely recognised by employers, and your AML apprenticeship duration after graduating from TP will also be significantly shortened, allowing you to

become a Licensed Aircraft Engineer (LAE) up to 10 months sooner.

If you aspire to be a pilot, you can also fulfil your dream by taking flying lessons as part of your Student Internship Programme in your final semester of study, to get that coveted Private Pilot Licence (PPL).



## Career Opportunities

The aerospace industry in Singapore has been growing at an average rate of about 12% annually, and today our country is the regional leader in aerospace maintenance, repair and overhaul (MRO), manufacturing and research & development (R&D).

Our Aerospace industry is currently worth about S\$9 billion annually, and employs about 20,000 workers spread across more than 100 local and international companies carrying out MRO in Singapore. This rapid growth of the aerospace industry will create a strong demand for skilled aerospace professionals in the next few decades, so you will be highly sought-after as an aircraft maintenance engineer, structural or composites specialist, engine or power plant technologist, aerospace component design engineer, or an aeromechanical systems specialist. Your fundamental engineering training will also equip you to further your aspirations in future local and overseas degree programmes.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 97 credit units

Total Credit Units Completed : min 133 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from mild or severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss, severe vision impairment or any physical impairment, or be physically dependent on mobility equipment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

### DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EAE1002	Aircraft Electrical Fundamentals	1	4
EAE1008	Aircraft Electronics & Digital Systems	1	4
EDR1003	Engineering Drawing	1	4
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
EME1002	Statics & Strength of Materials	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EAE2002	Aviation Legislation & Human Factors	2	4
EED2010	Aerospace Design Project	2	4
EMA2003	Engineering Mathematics 3	2	4
EME2008	Principles of Dynamics	2	5
EME2009	Thermodynamics	2	3
EME2010	Fluid Mechanics	2	3
EAE3008	Gas Turbine Engine	3	4
EAE3009	Basic Aerodynamics	3	3
EAE3020	Aerospace Maintenance Practices	3	16

### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Aviation Management



**"I remain very impressed with your aviation training programmes, the passion of your students and staff, and your innovative efforts to meet the increasing demands of the aviation industry, for a challenging present and a bright future."**

Roberto Kobeh Gonzalez  
Fourth President  
Council of the International Civil Aviation Organisation (ICAO)

Over one billion people and 40 percent of the world's manufactured exports are transported by air each year, making the aviation business one of the key drivers of world trade. According to the International Air Transport Association (IATA), the aviation industry's contribution to Singapore's gross domestic product (GDP) would double to about US\$65 billion (S\$88 billion) by the year 2035, spurred by increased air travel.

The exponential growth of the aviation industry has created a high demand for specialised and highly-skilled aviation professionals to operate and manage the existing and new aviation services, facilities and infrastructures, such as Changi Airport's fourth and fifth passenger terminals, the Seletar Aerospace Park, and new state of the art aircraft such as the Airbus A350XWB and Boeing 787 Dreamliner.

This course is the first Aviation Management programme in Asia. You will learn a broad range of specialised aviation management skills and business knowledge. From understanding how to manage a world class airport to running the best airline in the world, we will prepare you for a career in the exciting aviation industry. You will also get a head start in the industry through a 6-month industrial attachment in various departments of the Civil Aviation Authority

of Singapore (CAAS), renowned airlines or airport ground handling agents, or by doing ground breaking research with institutions of higher education. There are also overseas internship opportunities with regional airports and aviation companies.

No aviation programme is complete without experiencing flight! You could gain in-flight experience as a cabin crew with a Singapore-based airline as part of your diploma internship, or choose to take the first step towards being a pilot by taking our Aeronautical Science Option, in which you will go through flying and theoretical lessons required to obtain a Private Pilot's Licence (PPL). Selected foundational subjects in this Option will also give you an advantage when you pursue the Commercial Pilot Licence (CPL) or Air Transport Pilot Licence (ATPL) in future.

## Career Opportunities

According to IATA, the number of aviation-related jobs in Singapore is expected to double over the next 20 years, spurred by increased air travel. Hence, you can look forward to exciting and rewarding careers with airport operators, airlines, aerospace companies, aviation consulting and investment companies, civil aviation authorities, as well as ground handling and logistics companies. Your job scope would include operations and management, sales and marketing, customer service, flight operations, air traffic control, and aviation commercial development. You will also have the option to further your studies in universities in Singapore and abroad, with as much as two years' credit exemption or advanced standing. Our diploma is well-recognised by many top universities in Australia, New Zealand, UK and USA and has built strong collaborative relationships with them.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0  
TP Fundamentals Subjects : 36 credit units  
Diploma Core Subjects : 75 credit units  
Diploma Option Subjects : 12 credit units  
Total Credit Units Completed : min 123 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

## DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EAD1001	Introduction to Civil Aviation	1	4
EAL1003	Airline Operations	1	4
EAL1004	Principles of Aeronautical Science	1	4
EAM1001	Airport Operations & Management	1	4
EBZ1004	Business Fundamentals	1	4
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
ESZ1002	Quantitative Methods	1	4
EAL2005	Airline Management	2	4
EAM2007	Aviation Safety & Security	2	4
EAT2006	Airport Systems	2	4
EAT2007	Airfield Systems	2	4
EBM2004	Project Management	2	4
EBZ2006	Service Quality & Management	2	4
EBM3004	Business Continuity Management	3	4
EMP3002	Major Project	3	8

## DIPLOMA SUBJECTS – DIPLOMA OPTIONS

You will take one of the following options in your final year, and will be streamed based on your interests, a selection process and a test.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Aeronautical Science Option</u>			
EAL3005	Air Navigation	3	4
EAL3006	Flight Planning	3	4
EAM3003	Meteorological Studies	3	4
<u>Airport &amp; Airline Option</u>			
EAL3004	Management of Air Cargo	3	4
EAM3002	Airport Administration	3	4
EAT3001	Air Traffic Management	3	4

# Biomedical Engineering



**"As the medical and healthcare solutions industry continues to globalise and advance at a rapid pace, biomedical professionals today face increasing demands and challenges. Students of this course are armed with sound fundamental knowledge, giving them a mastery of engineering skills so as to empower them to excel in their future careers while meeting the rigorous demands of this industry."**

Hema Venkataraman  
Director  
Infinity Biomed Solutions Pte Ltd,  
Singapore

The development of medical devices, from a tiny hearing aid to an X-ray machine; the search for a cure for human diseases; or even the very pills that you pop into your mouth – these are all part of the biomedical life sciences, which are now seeing a boom in related industries worldwide.

This course involves the application of engineering skills to the biomedical sciences and healthcare industry. You will learn the necessary biological techniques and apply them in the field of biomedical engineering. Under the Economic Development Board's plan, the field of life sciences is slated to be one of the four key pillars of Singapore's economy, besides chemicals, electronics and engineering.

Singapore is on its way to becoming a global centre for medical research and advanced patient care in specialised fields such as oncology, cardiology, ophthalmology, neurology and rehabilitation. It also aims to be a regional hub for a wide spectrum of healthcare services such as integrated healthcare services, hospital management, laboratory services, healthcare consulting, pharmaceutical research and clinical trials.

Companies dealing in medical devices and drugs will find it attractive to undertake the development and manufacturing of new drugs and medical products in

Singapore. In fact, numerous prominent overseas biomedical companies have set up base in Singapore, providing excellent job opportunities and career advancement prospects for holders of this diploma.



## Career Opportunities

You will be able to find employment in companies (MNCs, SMEs or public companies) dealing in the life sciences and electronics, as well as government agencies, health care institutions and hospitals. There are excellent career prospects in life science research centres, providing support in medical research activities, the maintenance of equipment, and specialist procedures. You can also be employed in pharmaceutical manufacturing firms, dealing with process control and quality control, or in hospitals, handling the operations and maintenance of specialised medical equipment. Some of our graduates are in wholesale and retail firms, doing the marketing and sales of medical devices and equipment, or providing after sales services such as commissioning, maintenance and training.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0  
TP Fundamentals Subjects : 36 credit units  
Diploma Core Subjects : 83 credit units  
Diploma Elective Subjects : min 7 credit units  
Total Credit Units Completed : min 126 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from mild or severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EBS1004	Human Anatomy & Physiology	1	4
EED1001	Electronic Prototyping	1	3
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1003	Chemistry	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem-solving	1	4
ESE1007	Engineering Analytics	1	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EMD2001	Medical Electronics	2	4
EMD2002	Medical Devices	2	4
EMF2003	Medical Device Manufacturing Practices	2	3
EBI3008	Medical Imaging & Informatics	3	4
EMP3002	Major Project	3	8

DIPLOMA SUBJECTS – ELECTIVES

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EBS2004	Medical Biochemistry	2	4
EBS2005	Clinical Laboratory Equipment	2	3
EBI3004	Audiometry & Hearing Devices	3	4
EED3014	Advanced Skills Practices	3	8

#### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma electives, will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Business Process & Systems Engineering



**"The subject areas covered in this course, including process optimisation, marketing strategies and business enhancement, are very relevant to the industry and will optimally equip students to meet the challenges of today's new business environment."**

Sim Sin Sin  
CEO  
Secret Recipe Café Pte Ltd

In today's business environment, companies' operations have become more challenging and complex. In addition to performing the traditional role of managing an enterprise, business leaders now require the skills to continuously refine business processes in order to overcome vital challenges. This course combines engineering disciplines with business management principles, producing graduates who are highly sought after by multinational corporations as well as small and medium enterprises.

As technology advances and Singapore strives to be a world-class service centre and logistics hub, the 21st century will see an increasing demand for tech-savvy professionals with multi-disciplinary knowledge and skills who are able to offer solutions to business issues and problems, so as to add value to their employers.

The introduction of business concepts and principles into a core of engineering fundamentals in this course will enable holders of this diploma to easily find their niche in an extremely wide variety of industries, including the manufacturing, logistics and service sectors in Singapore.

There are two main areas in this course: (i) Business Analytics, which concerns the systematic investigation, prediction and prescription of business performance in order to provide insights for future planning, known as forward business management; and (ii) Systems Engineering, which deals with the management, improvement and optimisation of business processes using a systems thinking approach so as to enhance business productivity and profits.

## Career Opportunities

Armed with the knowledge of fundamental business principles, business analytics, business process improvement and systems engineering skills, you will have the multi-disciplinary advantage to seek lucrative career opportunities in a variety of industries such as manufacturing, logistics and services which include healthcare operations, finance, retail, customer service, as well as sales and marketing. You can look forward to jobs as a business analyst, customer relationship executive, market researcher, logistics and supply chain executive, product marketing executive, quality assurance and control specialist, operations executive, and productivity and management systems executive.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 86 credit units

Total Credit Units Completed : min 122 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge

### GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EBZ1001	Business Fundamentals	1	4
EBZ1002	Principles of Economics	1	4
EEE1001	Circuit Analysis	1	6
EEE1003	Digital Fundamentals 1	1	5
EMA1003	Engineering Mathematics 1	1	4
EPZ1001	Introduction to Processes & Systems	1	4
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
ESZ1001	Systems Concepts & Tools	1	4
ESZ1002	Quantitative Methods	1	4
EBM2004	Project Management	2	4
EBZ2003	Engineering Economy	2	4
EBZ2006	Service Quality & Management	2	4
EQM2001	Process Management & Innovation	2	4
ESZ2001	Decision Analysis	2	4
ESZ2002	Process Optimisation & Improvement	2	4
EMF3002	Manufacturing Logistics & Simulation	3	4
EMP3002	Major Project	3	8
EPZ3001	Customer Relationship Management	3	4
ESZ3001	Supply Chain Management	3	4
ESZ3002	Systems Modelling & Simulation	3	4



# Clean Energy

**“From a small base today, the clean energy sector here is growing rapidly, thanks to several government initiatives and the declining cost of technology. We anticipate significant demand for qualified personnel in the clean energy industry over the next few decades.”**

Christophe Inglin  
Managing Director  
Energetix Pte Ltd  
Deputy Chairman  
Sustainable Energy Association of Singapore (SEAS)



Urban solutions and sustainability have increasingly become important economic pillars of Singapore. Clean Energy is an important part of these global megatrends, which are expected to create 20,000 new jobs by 2020. Therefore, the career opportunities in engineering consultation and sustainable urban solutions will continue to grow rapidly, giving you excellent future prospects.

This course will equip you with the knowledge and skills in four key technology areas, namely, electricity & power systems, renewable energy, energy efficiency and green transportation.

You will also be able to sharpen your skills with a wide range of exciting state-of-the-art learning facilities in our campus, such as our Smart Energy Training Systems, our Clean Energy Research Centre, and a solar photovoltaic “LIVE” Laboratory. These will not only enhance your learning experiences, but also ensure that you are competent and ready to work in the industry upon graduation.

With your diploma, you will also be eligible to apply for the Associate Singapore Certified Energy Manager (ASCEM) accreditation programme, an industry-recognised certification that will give you a career advantage.

In this course, you will get to take part in a wide range of vibrant and enriching activities such as leadership camps, the Youth Energy Showcase, Energy Connect seminars, sports activities, and social or community events. You will also have opportunities to gain global exposure through internship programmes at overseas institutions such as the University of New South Wales in Australia and Southwest Jiaotong University in China.

If you are passionate about the environment, you can participate in meaningful Overseas Community Projects in countries such as Thailand, Laos and Cambodia where you get to apply what you have learnt about solar technology, to design and install solar-powered LED lighting to light up the lives of locals there.

## Career Opportunities

As part of Singapore's Smart Nation initiative, the government has implemented a sustainable development plan to transform our country into a global Urban Solution Living Laboratory. Some of the measures include the 'SolarNova Programme' to install solar panels on the roofs of 5,500 HDB blocks by 2020, the 'Green Mark Programme' to 'green' 80 percent of Singapore's buildings by 2030, the enactment of the Energy Conservation Act to regulate sustainable energy management, a carbon tax to reduce greenhouse gas emission and the liberalisation of the retail electricity market in 2018 to increase competition.

All these mean that you will have bright prospects as there will be a great demand for engineering consultants. There will be exciting and fulfilling career opportunities in the electricity and energy services, decarbonisation as well as energy efficient air-conditioning and green manufacturing sectors. You can be a project engineer, design engineer, facility engineer, system engineer, R&D engineer, industrial engineer, equipment engineer, public service officer (energy planning, green transportation, environmental management), energy auditor, energy consultant, associate energy manager or even a green entrepreneur.

If you would like to ride on global urbanisation megatrend, manage future smart and green cities and have a passion for saving Gaia, you are the right person to join this course!

## Graduation Requirements

Cumulative Grade Point Average : min 1.0  
TP Fundamentals Subjects : 36 credit units  
Diploma Core Subjects : 93 credit units  
Total Credit Units Completed: min 129 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

#### DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED1001	Electronic Prototyping	1	3
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EER1001	Electrical Services for Facilities	1	4
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
ECE2007	Fuel Cell & Energy Storage Systems	2	4
ECE2008	Solar Cell & System	2	4
EER2001	Electrical Systems & Power Distribution	2	4
EGB2002	Air Conditioning & Mechanical Ventilation	2	4
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EBM3005	Energy Management & Audit	3	4
ECE3005	Industrial Sustainability & Energy Efficiency	3	3
ECT3004	Efficient Drive & Control Systems	3	3
EER3002	Electrical Diagnostics & System Integration	3	3
EMP3002	Major Project	3	8

#### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Computer Engineering



**"We are deeply impressed by your student interns, who converted an error-prone manual process into an automatically guided fool-proof one, leveraging on their hardware, software and system integration knowledge and skills. Their simple, low-cost innovative solution has solved a 30-year old problem and enhanced productivity for us. This is a testimony to the success of your course in equipping students with the critical competencies to meet the industry needs as we move towards Industry 4.0."**

Mr. Henry Tan,  
Director,  
Mitsuboshi Overseas Headquarters Pte Ltd

As Singapore forges ahead as a Smart Nation, there is an urgent need for strong computer engineering talent across almost every sector, such as high-tech manufacturing, aerospace, aviation, transportation, telecommunication, healthcare, finance, business and the civil service.

The Internet of Things (IoT), data analytics, artificial intelligence, cyber security and smart manufacturing are the enablers of a Smart Nation that are set to impact Singapore both socially and economically. This course will train you to become a part of the strong talent pool in these enabling technologies. It will equip you with IoT and system integration knowledge and skills – encompassing embedded systems to make things smart, computer networking for wired and wireless connectivity, as well as internet technology – all of which will empower you to create web and mobile applications, integrate systems and put together solutions using the latest technologies.

Such a multi-disciplinary, winning combination of electronics and computer science prepares you to be amongst the few who are fully proficient in hardware, software and integration of hardware and software systems. You will become total solution providers who are much sought after across various industry sectors.

The course prepares you for internationally recognised industry certification examinations from National Instruments, CompTIA, Oracle, Microsoft and Cisco. You will also be equipped with skills to learn "how to learn", which would ensure that you stay relevant and are able to quickly adapt to change in the face of "disruptive technologies".

## Career Opportunities

As Singapore progresses towards becoming a Smart Nation, IoT is poised to bring tremendous value and demand for computer engineers in a wide range of industries such as transportation, aerospace, aviation, manufacturing, telecommunication, healthcare, retail, logistics & supply chain, smart grid and even the government sector. You can therefore look forward to excellent career prospects as this course equips you with the various skill-sets that IoT requires. You can establish a career as a hardware engineer, system engineer, network engineer, software engineer, or embedded/firmware engineer.

If you are interested to further your studies, many local and foreign universities offer our diploma holders advanced standing for their degree courses. In particular, NTU grants our graduates direct entry into the second year of degree programmes in Computer Engineering, Computer Science and Electrical & Electronic Engineering, while NUS grants exemptions for selected modules amounting to almost a year.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0  
TP Fundamentals Subjects : 36 credit units  
Diploma Core Subjects : 81 credit units  
Diploma Cluster Elective Subjects : min 8 credit units  
Total Credit Units Completed : min 125 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

*\* Students must choose one of these three subjects or TGL1001 Guided Learning.*

## DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED1001	Electronic Prototyping	1	3
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EMC2006	Internet of Things Project	2	4
ESE2004	Object-oriented Programming	2	5
EMC3002	Embedded Control & Applications	3	4
EMC3005	System & Network Integration	3	4
EMP3002	Major Project	3	8
ESE3010	Database Management System & Design	3	4

## DIPLOMA SUBJECTS – CLUSTER ELECTIVES

You can opt to take Cluster Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Advanced Engineering Skills</u>			
EED3014	Advanced Skills Practices	3	8
<u>Computer Applications</u>			
ECC2013	Mobile Device Applications Development	2	4
ESE3006	ASP.NET Web Programming	3	4
<u>Virtual Reality</u>			
EDM2010	3D Modelling for Virtual Reality	2	4
EDM3004	Interactive Programming for Virtual Reality	3	4



#### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma cluster electives, will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Electronics



**“This course has proven itself successful in equipping its students with not only technical knowledge but also innovative ability and problem-solving skills. We strongly believe that the graduates from this course will bring the engineering field to a whole new level.”**

Liow Seow Poh  
Senior Manager  
Electronic Service Centre  
SDDA Pte Ltd (A company of ST Kinetics)

Electronics is an important part of human advancement and is used everywhere – in homes, offices, schools, factories, hospitals, transportation and even for leisure. Applications such as smart systems, satellite communication, sophisticated defence systems, medical equipment and personal mobile devices are all made possible through electronics. This course will give you tremendous flexibility and width – a springboard to a wide range of career options.

This course is positioned to be in line with industry goals and trends. As Singapore progresses towards becoming a Smart Nation, this course prepares you for the current and emerging needs encompassing the Internet of Things (IoT), automation, digital transformation, advanced manufacturing, assistive technology and a green environment. It provides you with a solid foundation in the principles and applications of smart electronic devices, circuits, programming, and systems, so as to equip you to meet the changing needs of the industry. Special emphasis is placed on embedded systems, hardware, software, data analytics, power electronics and system control. You will also develop effective communication, problem-solving, collaborative and transcultural skills, as well as skills in project planning and management, to prepare you for the workplace.

To be better prepared for the advancements in technology, final year students can choose to take one of the following Cluster Electives: Avionics, Networking, Robotics & Automation, or Semiconductor Technology.

## Career Opportunities

Many of the world's leading electronics and semiconductor manufacturers are based in Singapore, providing technological solutions to industries globally, and generating new products, applications and markets.

You will have excellent and flexible career prospects in the smart electronics systems, semiconductor, telecommunication, instrumentation & control, computing, consumer and industrial electronics industries. Your job areas may include product design, development & testing, process improvement, maintenance, marketing and sales. You can also look forward to career opportunities in the various industries that make use of applied electronics, such as the aerospace, robotics & automation, and land transportation, as well as the biomedical and pharmaceutical industries.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 82 credit units

Diploma Cluster Elective Subjects : min 8 credit units

Total Credit Units Completed : min 126 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

### DIPLOMA SUBJECTS - CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED1001	Electronic Prototyping	1	3
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
EED3014	Advanced Skills Practices	3	8
EMP3002	Major Project	3	8

### DIPLOMA SUBJECTS – CLUSTER ELECTIVES

You can opt to take Cluster Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Advanced Engineering Skills</u>			
EED3014	Advanced Skills Practices	3	8
<u>Avionics</u>			
EAE1006	Avionic Systems	1	4
EED1002	Printed Circuit Board Design	1	3
ESE1007	Engineering Analytics	1	3
ECT2005	Circuits & Control Systems	2	4
EEE2005	Integrated Circuit Applications	2	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EAE3018	Aircraft Digital Systems	3	5
EEE3004	Power Electronics & Drives	3	4
EEE3005	Advanced Electronics & Communication	3	4
EMC3002	Embedded Control & Applications	3	4

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Networking</u>			
ECC1002	Networking Fundamentals	1	4
EED1002	Printed Circuit Board Design	1	3
ESE1007	Engineering Analytics	1	3
ECT2005	Circuits & Control Systems	2	4
EEE2005	Integrated Circuit Applications	2	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EEE3004	Power Electronics & Drives	3	4
EEE3005	Advanced Electronics & Communication	3	4
EMC3002	Embedded Control & Applications	3	4
EMC3005	System & Network Integration	3	4
<u>Robotics &amp; Automation</u>			
EED1002	Printed Circuit Board Design	1	3
ESE1007	Engineering Analytics	1	3
ECT2005	Circuits & Control Systems	2	4
EEE2005	Integrated Circuit Applications	2	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
ECT3002	Analytical Robotics	3	4
EEE3004	Power Electronics & Drives	3	4
EEE3005	Advanced Electronics & Communication	3	4
EMC3002	Embedded Control & Applications	3	4
EMF3004	Automation & Machine Vision	3	4
<u>Semiconductor Technology</u>			
EED1002	Printed Circuit Board Design	1	3
ESE1007	Engineering Analytics	1	3
ECT2005	Circuits & Control Systems	2	4
EEE2005	Integrated Circuit Applications	2	3
EMA2003	Engineering Mathematics 3	2	4
EMC2001	Microcontroller Technology	2	5
EMI2008	IC Process Integration	2	4
EEE3004	Power Electronics & Drives	3	4
EEE3005	Advanced Electronics & Communication	3	4
EMC3002	Embedded Control & Applications	3	4
EMI3005	Cleanroom Equipment & Technology	3	4

#### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma cluster electives, will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Green Building & Sustainability



**"The re-launching of this course to emphasise today's green initiatives and the worldwide push to make buildings more environment-friendly is definitely a step in the right direction. We are confident that this course will produce the necessary skilled manpower for this emerging industry with great potential."**

Tan Tian Chong  
Director, Technology Development  
Building & Construction Authority

**"Going Green" is today's catch phrase, reflecting the growing worldwide concern for the environment. A green building is one that is designed to reduce its impact on mankind and the environment. Despite rapid urbanisation, we must ensure that our future is safe and healthy for everyone – in other words, there must be sustainability.**

New buildings – both commercial as well as residential – now come with not just automated high-tech gadgets, but also energy-saving features. This focus on environment-friendly buildings is not just a local industry trend; it is part of a global push by governments worldwide to create an environmentally sustainable infrastructure that will support the emerging lifestyles of a new generation of people with higher expectations of how they live, work, and play.

This course will equip you with the knowledge of green building architecture, technologies and practices, including passive and sustainable design, energy auditing and building management. Subjects such as Total Building Performance and Energy Audit and Measurements will give you the fundamental knowledge of good green building practices and designs. You will also be trained in the use of industry software for architectural drawings and building performance simulations.

In addition to the diploma, graduates from this course will be awarded the Associate Singapore Certified Energy Manager (ASCEM) certificate which is jointly administered by the National Environment Agency (NEA) and the Institution of Engineers, Singapore (IES). The demand for ASCEM professionals has increased greatly with the need for energy conservation in every building and it is the most sought after certification for people who wish to pursue a career in the energy conservation industry.



## Career Opportunities

With the launch of the Building & Construction Authority's "Green Mark" rating system to evaluate a building's environmental friendliness, building and property owners are now striving to adopt green building technologies and the best practices in environmental design and construction.

Green buildings currently make up more than 35 percent of buildings in Singapore, but come 2030, that figure is targeted to reach 80 percent of all buildings, driven by government funding to "green" all existing buildings. This alone gives an indication of the amount of retrofitting that will need to be done to buildings in our country, creating abundant job opportunities and demand for green building professionals. At the same time, new buildings coming on-stream need to incorporate green features and technology as well, adding to the demand.

You can look forward to careers in the energy market, sustainable design or building design industries, and find exciting job opportunities as an energy or green building consultant, an eco-city planner or designer, a green marketing executive or an environmentally sustainable design (ESD) engineer.

You can also further your qualifications in the fields of sustainable design and architectural-related programmes.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 92 credit units

Total Credit Units Completed : min 128 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

*\* Students must choose one of these three subjects or TGL1001 Guided Learning.*

### DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EBD1004	Virtual Design & Facility Planning	1	3
EEE1001	Circuit Analysis	1	6
EER1001	Electrical Services for Facilities	1	4
EGB1001	Introduction to Green Development	1	4
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EBD2009	Building Information Modelling Collaboration	2	3
EBM2004	Project Management	2	4
EBM2005	Fire & Life Safety Management	2	4
EBM2006	Building Management Systems	2	5
EGB2002	Air Conditioning & Mechanical Ventilation	2	4
EGB2003	Hydraulics & Drives	2	4
EGB2004	Tropical Architecture for Sustainability	2	4
EGB2005	Green Building Modelling & Simulation	2	5
EBM3005	Energy Management & Audit	3	4
EFM3001	Sustainable Facility Management	3	4
EGB3003	Total Building Performance	3	4
EGB3004	Sustainable Design	3	4
EMP3002	Major Project	3	8

### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2

# Integrated Facility Management

**This course has a long standing excellent reputation within the Facility Management (FM) industry for producing competent FM professionals. This can be proven by the high internship take-up rates during the course, the good job placement of its graduates, as well as its strong network of support from admission to graduation.**

Steve Lockwood, CFM, IFMA Fellow  
Director Accreditation and Academic Affairs (2017)  
International Facility Management Association (IFMA) Foundation



Integrated Resorts, airports, business towers, factories, shopping complexes, hospitals, schools – these facilities house an overwhelming amount of human activity. Who are the people who manage these facilities to ensure that businesses benefit? Who provides residents with the greatest human comfort at the least cost to the environment? Welcome to the world of Facility Management.

This course will train you as a professional who will manage the various physical facilities in today's modern landscape – in terms of not only a building's features and structure, but also its amenities, aesthetics and functionality, as well as how users interact with them. These facilities include Integrated Resorts, airports, events & convention centres, business & financial facilities, leisure and entertainment hubs, hospitality and tourism attractions, as well as residential heartlands. You can also take additional Cluster Electives in two very promising industries: Aviation Facilities and Hospitality Facilities.

As the first diploma course to be conferred the Best FM Training Institution (Innovation Excellence) Award by the International Facility Management Association (IFMA), and also the first diploma course in the world to be accredited by IFMA Foundation

as an Accredited Degree Programme, this course will give you a worldwide competitive edge.

## Career Opportunities

Armed with multi-disciplinary skills, you will find employment in the facilities management or development teams in the airport, hospitality and tourism, events and conventions, leisure and entertainment, integrated resorts, business and financial sectors.

On top of your diploma, the attained competencies will enable you to pursue numerous certifications recognised by the industry. These include the Facility Management Professional (FMP) certification by the International Facility Management Association (IFMA), the Fire Safety Manager (FSM) certification by the Singapore Civil Defence Force (SCDF), the Certified Associate in Project Management (CAPM) certification by the Project Management Institute (PMI), as well as the Associate Certified Project Engineer (Assoc. CPE) certification from the Institution of Engineers Singapore (IES).

## Graduation Requirements

Cumulative Grade Point Average : min 1.0

TP Fundamentals Subjects : 36 credit units

Diploma Core Subjects : 77 credit units

Diploma Cluster Elective Subjects : 12 credit units

Total Credit Units Completed : min 125 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

\* Students must choose one of these three subjects or TGL1001 Guided Learning.

## DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EBD1004	Virtual Design & Facility Planning	1	3
EBT1003	Facilities Operations & Maintenance	1	4
EER1001	Electrical Services for Facilities	1	4
EFM1002	Workplace Safety & Health for Facility Management	1	4
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EBD2005	Security & Surveillance	2	4
EBD2009	Building Information Modelling Collaboration	2	3
EBM2004	Project Management	2	4
EBM2005	Fire & Life Safety Management	2	4
EBZ2006	Service Quality & Management	2	4
EFM2004	Contract Management	2	4
EGB2002	Air Conditioning & Mechanical Ventilation	2	4
EBM3005	Energy Management & Audit	3	4
EFM3001	Sustainable Facility Management	3	4
EGB3003	Total Building Performance	3	4
EMP3002	Major Project	3	8

## DIPLOMA SUBJECTS – CLUSTER ELECTIVES

You can opt to take Cluster Electives when offered. These optional subjects will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Aviation Facilities Elective Cluster</u>			
EAM1001	Airport Operations & Management	1	4
EAT2006	Airport Systems	2	4
EAM3002	Airport Administration	3	4
<u>Hospitality Facilities Elective Cluster</u>			
BHT1010	Introduction to Hospitality & Tourism	1	4
BHT2003	Club & Resort Business	2	4
BHT2005	Event Management	2	4

#### DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma cluster electives, will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2



# Mechatronics

**"This course equips you with the fundamental knowledge and skill in integrating mechanical and electronics using computer control, so that you will definitely be well prepared to establish a career in today's modern industry. I can confidently say that, by graduating from this course, huge opportunities for success are open to you."**

Robson Tan  
Managing Director  
NICAE Trading & Industrial Supplies

In an era that increasingly values productivity, engineering employers favour graduates with knowledge of both mechanical engineering and electronics, and their ability to integrate them with intelligent control systems. This is exactly the versatility that you will get from this course.

Mechatronics is the only discipline of engineering that gives you such versatility. This course begins by giving you a solid foundation in fundamental engineering knowledge and skills, which will then expand into areas such as automation, robotics, mechatronics design, programmable logic controllers, electromechanical, pneumatics, vision systems, sensors integration, microcontroller programming, control engineering and aerospace engineering.

In your final year, you are offered a wide choice of elective subjects. The subjects are categorised into four elective clusters involving key areas of technology: Aerospace Systems, Process Control & Automation, Robotics & Automation, and Semiconductor Technology. By applying these knowledge and skills in product design and automation processes, Mechatronics gives you the flexibility to work in a wide range of high-value industries such as aerospace, automation, clean room, manufacturing, medical, robotics, R&D support and wafer fabrication.

## Career Opportunities

The opportunities and benefits to be gained from designing smart products and automated systems are huge, and will continue to grow rapidly in the coming years. You will excel in a wide spectrum of industries as diverse as electronics, manufacturing, food processing, pharmaceuticals, chemicals and aerospace. You may also choose to do R&D work, equipment design and development, planning, project management, as well as technical sales and marketing, qualifying you to work in high-tech manufacturing environments and the growing petrochemical industry. Your diploma will also enable you to take up local and overseas degree programmes in electronic, mechanical, aerospace or computer engineering.

## Graduation Requirements

Cumulative Grade Point Average : min 1.0  
TP Fundamentals Subjects : 36 credit units  
Diploma Core Subjects : 83 credit units  
Diploma Cluster Elective Subjects : min 7 credit units  
Total Credit Units Completed : min 126 credit units

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Applicants should not be suffering from severe colour vision deficiency, uncontrolled epilepsy, profound hearing loss or severe vision impairment.*

## Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS				
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS	
ECS1005	Communication & Information Literacy	1	2	
ECS1006	Workplace Communication	1	2	
ECS1007	Persuasive Communication	1	2	
EGS1002	Global Studies	1	3	
EGS1003	Managing Diversity at Work*	1	3	
EGS1004	Global Citizenship & Community Development*	1	3	
EGS1005	Expressions of Culture*	1	3	
EIN1001	Innovation & Entrepreneurship	1	2	
GCC1001	Current Issues & Critical Thinking	1	2	
LEA1011	Leadership: Essential Attributes & Practice 1	1	1	
LEA1012	Leadership: Essential Attributes & Practice 2	1	1	
LEA1013	Leadership: Essential Attributes & Practice 3	1	1	
LSW1002	Sports & Wellness	1	2	
MCR1001	Career Readiness 1	1	1	
MCR1002	Career Readiness 2	1	1	
MCR1003	Career Readiness 3	1	1	
TGL1001	Guided Learning	1	3	
ESI3001	Student Internship Programme	3	12	

*\* Students must choose one of these three subjects or TGL1001 Guided Learning.*

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EDR1003	Engineering Drawing	1	4
EED1001	Electronic Prototyping	1	3
EEE1001	Circuit Analysis	1	6
EEE1002	Electronic Devices & Circuits	1	6
EEE1003	Digital Fundamentals 1	1	5
EEE1004	Digital Fundamentals 2	1	5
EMA1002	Engineering Mathematics 2	1	4
EMA1003	Engineering Mathematics 1	1	4
EME1002	Statics & Strength of Materials	1	4
ESC1004	Engineering Physics	1	3
ESE1006	Computer Programming for Problem Solving	1	4
ESE1007	Engineering Analytics	1	3
EED2007	Mechatronics Design Project	2	4
EMA2003	Engineering Mathematics 3	2	4
EME2004	Programmable Automation	2	4
EME2007	Machining Technology	2	4
EME2008	Principles of Dynamics	2	5
EME2011	Engineering Design	2	3
EMP3002	Major Project	3	8

## DIPLOMA SUBJECTS - CLUSTER ELECTIVES

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
<u>Advanced Engineering Skills</u>			
EED3014	Advanced Skills Practices	3	8
<u>Aerospace Systems</u>			
EME2009	Thermodynamics	2	3
EAE3008	Gas Turbine Engine	3	4
<u>Process Control &amp; Automation</u>			
ECT2004	Instrumentation & Computer Control	2	4
EMF3004	Automation & Machine Vision	3	4
<u>Robotics &amp; Automation</u>			
ECT3002	Analytical Robotics	3	4
EMF3004	Automation & Machine Vision	3	4
<u>Semiconductor Technology</u>			
EMI2008	IC Process Integration	2	4
EMI3005	Cleanroom Equipment & Technology	3	4

## DIPLOMA SUBJECTS – SPECIAL ELECTIVES

You can opt to take Special Electives when offered. These optional subjects, taken in addition to the diploma cluster electives, will stretch your potential and help you to meet your aspirations.

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
EED3009	Special Project 1	3	2
EED3010	Special Project 2	3	2
EED3011	Higher Engineering Skills 1	3	2
EED3012	Higher Engineering Skills 2	3	2
EMA3001	Higher Engineering Mathematics	3	4

# Common Engineering Programme



The School of Engineering also offers a special common gateway programme which allows you to decide on the course to take only after one or two semesters. You will graduate with the same diploma as students who had enrolled for a particular course right from the start.

The Common Engineering Programme is a single gateway to eight different engineering diploma courses, which gives you extreme flexibility. You do a common first year, before streaming into the diploma of your choice in your second or third semester, so that you have more time to find out your strengths and interests, or to observe the economic and industry trends, before deciding on the field to specialise in. So if you are unsure about the engineering course to take, then this flexible programme would suit you. You also get a second chance to enter our highly-popular Aerospace courses using your first semester polytechnic results.

You may choose from these eight diploma courses:

- Aerospace Electronics
- Aerospace Engineering
- Biomedical Engineering
- Business Process & Systems Engineering
- Clean Energy
- Computer Engineering
- Electronics
- Mechatronics

## Application

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

## Entry Requirements for Singapore-Cambridge GCE O Level Qualification Holders

To be eligible for consideration for admission, applicants must obtain 26 points or better for the net ELR2B2 aggregate score (i.e. English Language, 2 relevant subjects and best 2 other subjects, including CCA Bonus Points) and meet the minimum entry requirements of this course. CCA cannot be used to meet the minimum entry requirements.

For details on GCE O Level Minimum Entry Requirements, refer to page 125.

*Note: Any special entry requirements for a specific diploma course, such as health status, will also apply if you choose to branch into that course.*

# Subject Synopses

## **BHT1010 Introduction to Hospitality & Tourism**

This subject provides an overview of the multi-faceted nature of the hospitality and tourism industry. You will gain an insight into how the key sectors are organised and structured and how they relate to each other as an industry. The concept of tourism demands and tourism consumer behaviour will be introduced. Lastly, you will explore trends, issues and challenges facing the industry.

## **BHT2003 Club & Resort Business**

This subject covers the various definitions and classifications of club and resort business, resort planning and development, as well as operations and marketing of clubs and resorts. It gives you an appreciation of the operational challenges faced by clubs and resorts.

## **BHT2005 Event Management**

This subject introduces the scope of events and their application in the context of the tourism industry. From this macro perspective, you will build a foundation in event conceptualisation, development and production, covering topics such as marketing of events, human resource management and budgeting, and staging.

## **DNG1342 Drawing Essentials**

This subject introduces you to the basics of sketching and drawing techniques. A primary component of this module is to understand the importance of proportion in drawing and the effect of light and its different tones on various surfaces.

## **DNG1344 3D Art Fundamentals**

This subject introduces you to the fundamentals of art through a variety of 3D techniques and media. It focuses on inculcating visual and observational skills through the tactile qualities in texture and form by feeling and working with different 3D materials.

## **DNG1345 Ideation**

This subject introduces you to some idea generation, analysis and synthesis techniques within a problem-solving framework. Through these techniques, you will explore and develop fluidity of thought as well as an analytical mind. This subject introduces visual literacy through which you develop your personal visual language to communicate a great variety of concepts. You will also develop and demonstrate your aesthetic awareness and design sensibility.

## **DNG2371 Interface Design**

This subject introduces you to the basic principles of graphic user interface (GUI) and user experience design. It focuses on the basic rules of visual information organisation and hierarchy, and explores the process of navigation on screen. It also examines the choice of appropriate styles and graphic treatment for the intended audience, and the use of conceptual models for creating appropriate user experience.

## **EAD1001 Introduction to Civil Aviation**

This module provides you with an overview of the civil aviation industry and introduces the key concepts and interaction of components in the aviation system including airports, airlines, air navigation service providers, civil aviation authorities and supporting organisations with emphasis on the key legislative and economic regulations.

## **EAE1002 Aircraft Electrical Fundamentals**

This subject provides you with broad-based knowledge on electrical theories, components and devices. It also covers electrical machines. In addition, you will be equipped with the knowledge that is expected under the Singapore Airworthiness Requirements (SAR66), so that you will be competent in getting your aircraft maintenance certification later on.

## **EAE1004 Fundamentals of Aeronautical Science**

This subject gives a broad overview of the basic concepts involved in aeronautical science. Beginning with units for different quantities, it covers mechanical forces, principles of moments, stress and strain, properties of solids, fluids and gases, simple harmonic motion, momentum and energy, gyroscopic principles, viscosity and compressibility, heat capacity and heat transfer, laws of thermodynamics, latent heat, principles of light, lenses and mirrors, and fibre optics. Transverse and longitudinal waves, intensity and pitch of sound, and vibrating strings and pipes are also included. The syllabus is tailored to follow all topics from the Singapore Airworthiness Requirements (SAR- 66) on Physics (Module M2).

## **EAE1006 Avionic Systems**

This subject gives a broad overview of aircraft avionics and architecture at the system level. It covers the key avionics deployed on-board an aircraft, including the crew information systems, the safety and surveillance systems, the flight and engine control systems, the electrical power system, the navigation systems as well as the communications and information systems.

## **EAE1008 Aircraft Electronics & Digital Systems**

This subject covers the basics of semiconductors, printed circuit boards, servomechanisms, electronic instrument systems, logic circuits, fibre optics, electronic displays, electronic sensitive devices, electromagnetic environment and digital aircraft systems. The depth of coverage will adhere to the requirement of SAR-66 (Category B1) for M4 – Electronic Fundamentals and M5 - Digital Techniques/ Electronic Instrument Systems.

## **EAE2002 Aviation Legislation & Human Factors**

This subject provides you with basic knowledge and understanding of aviation legislation and human factors for novice engineers studying for their Singapore Airworthiness Requirements (SAR-66) aircraft maintenance licences. Knowledge of this subject has a significant impact on the safety standards and responsibilities expected of the holder of an aircraft maintenance licence.

## **EAE2003 Aircraft Electronics & Servomechanisms**

This subject provides you with broad-based knowledge in the theory and operation of semiconductor devices such as diodes, transistors and integrated circuits. It also covers the use of printed circuit boards, typical synchros and issues related to feedback control systems in servomechanisms. In addition, you will be equipped with the required knowledge in SAR-66 so that you can be competent to get certified in aircraft maintenance.



### **EAE3008 Gas Turbine Engine**

This subject equips you with basic technical knowledge of aircraft propulsion methods, thermodynamic cycles, combustion, gas turbine engines, effects of atmospheric variations (temperature, density, pressure altitude) on engine auxiliary systems (such as fuel system, lubrication system, ignition, starting, fire protection and auxiliary power unit), and current developments in propulsion systems. The syllabus is aligned with the Singapore Airworthiness Requirements (SAR- 66) Module M15 on Gas Turbine Engine.

### **EAE3009 Basic Aerodynamics**

This subject introduces you to the principles of aerodynamics and flight controls. It is designed to give a good balance between theoretical knowledge with applications using classroom lessons, wind tunnel and computational fluid dynamics experiments. The syllabus includes all topics in the Singapore Airworthiness Requirements (SAR-66) Module M08 on Basic Aerodynamics.

### **EAE3018 Aircraft Digital Systems**

This subject covers the general knowledge of the theoretical aspects of aircraft digital fundamentals. This involves understanding and the ability to apply this knowledge in the area of electronic instrument systems, logic circuits, fibre optics, aircraft data buses, electronic displays, electronic sensitive devices, electromagnetic environment and digital aircraft systems as required by Singapore Airworthiness Requirements (SAR-66) of the Civil Aviation Authority of Singapore.

### **EAE3020 Aerospace Maintenance Practices**

This subject provides you with a basic knowledge and understanding of aircraft hardware and maintenance practices for *ab initio* engineers studying for their Civil Aviation Authority of Singapore (CAAS) Singapore Airworthiness Requirements (SAR-66) basic knowledge examination in the modules Materials and Hardware (M06) and Maintenance Practices (M07), leading to the aircraft maintenance licence for category B1 maintenance engineers. This subject covers ferrous, non-ferrous and composites materials, types of corrosion and their identification, bolts and rivets fastener, piping, control cables and also the electrical components of the aircraft systems. It also includes broad-based knowledge of safety precautions, work practices in an aircraft maintenance environment, mechanical and electrical tools, generic aircraft systems and inspection techniques.

### **EAE3021 Aerospace Maintenance Practices**

The subject provides fundamental knowledge and understanding of aircraft maintenance practices as well as materials and hardware for *ab initio* engineers studying for their Civil Aviation Authority of Singapore (CAAS), Singapore Airworthiness Requirements (SAR-66) basic knowledge examination paper for the subject module Materials and Hardware (M06) and Maintenance Practices (M07) leading to the aircraft maintenance licence for category B2 maintenance engineers. This subject covers safety precautions, work practices in an aircraft maintenance environment, mechanical and electrical tools, generic aircraft systems and inspection techniques, ferrous, non-ferrous and composites materials, types of corrosion and their identification, bolts and rivets fastener, piping, control cables and also the electrical components of the aircraft systems.

### **EAL1003 Airline Operations**

The subject covers the fundamentals of airline operations. Topics covered include ground operations such as handling of passengers, baggage, catering, cargo, ramp handling services and aircraft servicing. Other topics include airline flight operations such as flight control centre, flight crew and cabin crew scheduling, flight operations procedures and requirements, airline operational efficiency and punctuality, and flight delay management.

### **EAL1004 Principles of Aeronautical Science**

This subject provides you with a basic understanding of the fundamentals of flight. Topics covered include the component parts of an aeroplane, atmosphere, theory of flight, the various aeroplane instruments and basic performance of an aeroplane.

### **EAL2005 Airline Management**

This subject covers the fundamentals of airline business and management. The contents include airline business models, key airline performance indicators, airline marketing, airline route and network development and airline administration. Other topics covered include management of airline profitability using airline simulation and SWOT analysis.

### **EAL3004 Management for Air Cargo**

This subject introduces you to the fundamentals of air cargo management, including the importance of air cargo to the economy. You will learn about the typical airfreight process, handling of special cargo, cargo loading operations, documentation, pricing and how air freight supports e-commerce. Topics covered include the preparation of air waybills, calculation of cargo pricing and charges as well as the planning of local distribution strategies in Singapore.

### **EAL3005 Air Navigation**

This subject provides you with a basic understanding of the concept of air navigation that is required in flight operations. Topics covered include general navigation charts such as the form of the earth, map projections and dead reckoning as well as radio navigational aids, global navigation systems and aircraft navigation systems.

### **EAL3006 Flight Planning**

This subject introduces you to the concept of flight planning and monitoring that are required in flight operations. Topics covered include regulation, operational procedures, communication, navigation aids, aviation publications, weather information, basic aircraft performance and fuel planning and how these are consolidated in the generation of flight plans.

### **EAM1001 Airport Operations & Management**

This subject provides an overview of airports, key players in airport operations, passenger terminal operations, airport access and landside operations, airside operations, wayfinding and signage system, contingency planning and airport security.

### **EAM2007 Aviation Safety & Security**

This subject covers aviation security and safety issues related to airport operations and safety. This includes the security threats, safety hazards and human error in aviation within the management framework of security and safety risk management.

### **EAM3002 Airport Administration**

This subject introduces the fundamental concepts and principles involved in the organisational and financial administration of modern international airports. Topics covered include airport systems, airport planning, estate management, airport finance, airport commercial management, airport performance and internal audit. An overview of the various airport ownership models is also included.

### **EAM3003 Meteorological Studies**

This subject introduces the concept of meteorology that is required in flight operations. Meteorological concepts such as the Earth's atmosphere, pressure, density, synoptic charts, pressure systems, altimetry, temperature, humidity, adiabatic and stability, turbulence and low and upper winds are discussed in detail. In addition, clouds, cloud formation and precipitation, thunderstorms, visibility, icing, documentation, weather charts, air masses, occlusions, other depressions, global climatology, surface winds, general weather, area climatology, route climatology and satellite observations are also covered.

### **EAT2006 Airport Systems**

This subject provides you with an overview of the key facilities and systems in both the landside and airside of an airport. Topics covered include the functions and operation of various airport systems such as Passenger Check-in Systems (PCS), Flight Information Display Systems (FIDS), Baggage Handling System (BHS), Automated People Mover System (APMS) and Passenger Loading Bridges (PLB). On the airside, topics covered include the cause of wear and tear of aircraft pavements, methods of assessing the condition of aircraft pavements, the programming of maintenance works as well as techniques of repair and their compliance to international operational standards and requirements.

### **EAT2007 Airfield Systems**

This subject covers the fundamentals of airfield systems. Topics included are aeronautical telecommunications, functions of air and ground radar systems, automatic dependent surveillance and controller-pilot data link communication, aerodrome approach aid and requirements of the various categories of aerodrome ground aids used in air traffic services.

### **EAT3001 Air Traffic Management**

This subject covers theoretical and practical skills in Air Traffic Management. Topics included are Fundamentals of Aviation Law, Emergency Procedures, Fundamentals of Air Traffic Management, Aerodrome Control, Approach Control and Area Control.

### **EBD1004 Virtual Design & Facility Planning**

This subject will develop skills to interpret 2D technical drawings for facilities. The use of measured drawing for mapping existing facilities and generating 2D Computer-Aided Design (CAD) drawings will provide you with a deeper understanding of facility planning. You will be introduced to the Building Information Modelling (BIM) software for architecture and use it to create 3D models from existing CAD drawings of facilities. You will apply the knowledge and skills you have gained to create a new virtual design for facilities.

### **EBD2005 Security & Surveillance**

This subject covers an overview of security and surveillance systems. The fundamental requirements of such systems are discussed before moving on to security planning and a review of surveillance technologies. Emphasis will be placed on the design, analysis and evaluation of a physical security system based on the operations of the facility.

### **EBD2009 Building Information Modelling Collaboration**

This subject covers the use of Building Information Modelling (BIM) software to design and develop 3D digital models of building services systems that meet the intended objectives. Emphasis will be placed on using BIM to integrate and coordinate the digitised models for architectural as well as Mechanical, Electrical & Plumbing (MEP) applications through interdisciplinary collaboration work. The use of the federated model containing information for energy modelling, project construction management and BIM Facility Management (BIMFM) will also be discussed.

### **EBI3004 Audiometry & Hearing Devices**

This subject focuses on the hearing health sector in biomedicine. It covers the science of hearing assessment and technologies available to remediate hearing loss, and includes foundational topics like the properties of sound, the physiology of hearing and the causes of hearing impairment. It teaches the skills needed to conduct a proper screening for hearing impairment. The underlying technologies behind modern digital hearing aids will also be covered.

### **EBI3008 Medical Imaging & Informatics**

This subject covers the underlying principles, instrumentation, methodology and techniques of the five major medical imaging modalities used in the healthcare system. These include ultrasound imaging, X-ray imaging, computed tomography, nuclear medicine imaging and magnetic resonance imaging. It also covers the fundamentals of methods and processes to support the implementation and maintenance of the healthcare information systems, in terms of the network infrastructure, clinical workflow, standards, and patient data privacy and security.

### **EBM2004 Project Management**

This subject focuses on the knowledge and practices which are widely applied in project management in various industries. It covers topics on the foundational elements of project management, the environment in which projects operate, the role of the project manager, project management processes and project management knowledge areas based on the Project Management Body of Knowledge (PMBOK) published by Project Management Institute, Inc. The subject encompasses both theory and practical skills on using project management tools. It also analyses the environment in which the projects operate and explains how the various processes in the different knowledge areas are integrated and interrelated.

### **EBM2005 Fire & Life Safety Management**

This subject introduces the roles and responsibilities of a Fire Safety Manager (FSM) for both commercial buildings and industrial premises. It covers topics on the provisions of the Fire Safety Act and Regulations, evacuation guidelines, fire safety design and tactics and maintenance of fire-fighting and protection systems based on the Singapore Civil Defence Force (SCDF) FSM course.

### **EBM2006 Building Management Systems**

This subject covers the fundamental knowledge required in the design and operation of a Building Management System (BMS). The concept of controls and monitoring with sensors and Direct Digital Controllers will be introduced. The roles of BMS in building controls, facility management and energy management will also be covered.

### **EBM3004 Business Continuity Management**

This subject introduces you to the fundamentals of the Business Continuity Management (BCM). It delves into the business continuity planning process which includes managing projects in BCM, analysing business risks and impact, evaluating BCM strategies as well as developing, testing and exercising the BCM plans and managing the BCM programme. Other topics covered includes the development of business continuity, emergency response and operations, crisis management plans and coordination with external agencies.

### **EBM3005 Energy Management & Audit**

This subject covers two main areas: energy management and energy audit. For the former, the subject illustrates the intrinsic value and concept of energy management as well as the considerations and steps involved in implementation. For Energy Audit, the emphasis is on the method and procedure in auditing energy efficiency and evaluating the energy performance of buildings and its subsystems. These will include the use of energy performance benchmarks and a comparison with acceptable practices and prevailing codes and regulations. Finally, the subject discusses how the life-cycle-cost concept is used to evaluate the economic viability of any proposal to improve energy performance.

### **EBS1004 Human Anatomy & Physiology**

This subject provides you with a basic understanding of human anatomy and physiology. Topics covered include the anatomy of the organs and organ systems and their functions.

### **EBS2004 Medical Biochemistry**

This subject explores the constituents of biological systems, their properties, theoretical knowledge, practical techniques of biochemistry and use of the E. coli system as a model for understanding molecular genetics. This will provide an understanding of the functions, and explain the needs of, carbohydrates, lipids, proteins, metabolism, Deoxyribonucleic Acid (DNA) structure, DNA replication and protein synthesis.

### **EBS2005 Clinical Laboratory Equipment**

This subject provides an understanding of the equipment widely used in clinical laboratories. Topics covered include the principles and applications of commonly-used clinical laboratory equipment. Essential insights on clinical laboratory practices are also covered.

### **EBT1003 Facilities Operations & Maintenance**

This subject gives an overview of the facility management profession which encompasses multiple disciplines to ensure functionality of the built environment. Topics include an introduction to facility management operations, air-conditioning systems, electrical systems, water and plumbing services and lift/escalator systems.

### **EBZ1002 Principles of Economics**

This subject provides you with a broad introduction to the theoretical knowledge and application of the key principles of economics and the related economic behaviour in the business environment within the Singapore economy. Some of the key principles and theories include supply and demand, market structures, GDP measurement, aggregate demand and aggregate supply and macroeconomic policies.

### **EBZ1004 Business Fundamentals**

This subject provides you with an overall view pertaining to the four pillars of business: Management, Marketing, Money and Manpower. Introductory topics correlating to the four pillars of operation - Management Fundamentals, Marketing Principles, Financial Statements and Organisation Behaviour, will be taught.

### **EBZ2002 Marketing Intelligence**

This subject provides you with an overview of the role of marketing intelligence in decision making processes. It covers the methodologies in marketing intelligence and the use of timely and accurate information for making vital and sound business decisions.

### **EBZ2003 Engineering Economy**

This subject provides a basic understanding of the economic aspects of engineering applications, elements of costs and costing methods, and the relationship between cost behaviour and profit. You will be expected to analyse different investment alternatives for economic decision making. The subject also discusses using EVA (Economic Value Added) to measure business performance.

### **EBZ2006 Service Quality & Management**

This subject introduces the key concepts and principles of Service Quality and Management. Topics covered include concepts of quality services, essential skills in customer services, principles and strategy of service management, methods for service quality measurements and service recovery.

### **EBZ3008 Technopreneurship**

This subject covers the basic fields of technopreneurship. It examines the traits of successful technopreneurs and the basic start-up of new businesses. Through project work, you have the opportunity to conduct field research, identify, evaluate and select viable businesses, and then develop feasible business plans applying the knowledge and tools covered in different topics such as marketing, customer orientation, pricing, communication, financial judgement, managerial importance, service orientation and competitive strategies.

### **ECA3002 Virtual Reality**

This subject emphasises the importance of virtual prototyping in manufacturing and e-commerce applications. You will be taught three main areas: modelling, behaviour programming and display systems. You will work on a 3D web page which incorporates an interactive virtual world, standard HTML, text, sound, animation and graphics.

### **ECA3003 3D Modelling**

This subject equips you with different techniques and strategies to model 3D objects and generate 2D drawings using Computer- Aided Design software. Fundamental knowledge of solid modelling and creating of proper product drawings will be covered. You will also master the skills of creating assembly models, which will be used in the last part of the course to generate product assembly animation and realistic product rendering.

### **ECC1002 Networking Fundamentals**

This subject covers fundamental concepts essential for the understanding of computer networks. It includes basic knowledge of networking, Open Systems Interconnection (OSI) model, Local Area Network (LAN) and Wide Area Network (WAN). It provides opportunities to interconnect simulated networks separated over large geographical area.

### **ECC2012 Network Infrastructure Technologies**

This subject covers the basic theories of routing and switching and their applications in a networking environment. It focuses on IP addressing scheme, routing protocols, basic access control lists, switching architectures and operation of a Wide Area Network (WAN). It provides opportunities for you to interconnect networks separated over large geographical area.

### **ECC2013 Mobile Device Applications Development**

This subject covers the development of applications on mobile and wireless computing platforms. It provides an overview of mobile applications, its importance and its benefits. It also introduces the technologies and methodologies for their development, including the architectures, frameworks, standards, programming languages, design process and tools.

### **ECE2007 Fuel Cell & Energy Storage Systems**

This subject covers the fuel cell technology and the control systems associated with their balance of plant (BOP). The integration and functions of an energy storage system with the fuel cell system will also be discussed.

### **ECE2008 Solar Cell & System**

This subject introduces you to the operating principles and applications of solar cells. Topics include solar cell and panel characteristics and solar photovoltaic (PV) system design, installation and maintenance. The emphasis will be on standalone and grid-connected PV power generation systems.

### **ECE3005 Industrial Sustainability & Energy Efficiency**

This subject covers the techniques used in process control and optimisation of energy efficiency in industrial processes. Enforcement of new requirements such as the Energy Conservation Act and implementation of relevant standards such as ISO50001 will also be discussed.

### **ECS1005 Communication & Information Literacy**

In this subject, you will learn how to conduct research for relevant information and validate information sources. You will also learn to recognise and avoid plagiarism, and follow standard citation and referencing guidelines when presenting information. In the course of learning, you will be required to plan, prepare and present information appropriately in written and oral form. You will also be taught to consider the **Message**, **Audience**, **Purpose** and **Strategy** (MAPS) when writing and delivering oral presentations.

### **ECS1006 Workplace Communication**

In this subject, you will be taught how to conduct effective meetings while applying team communication strategies and the skills for documenting meeting notes. You will be required to write clear emails, using the appropriate format, language, tone and style for an audience. You will also be taught to communicate appropriately in and for an organisation when using various platforms. In all aspects, the principles of applying **Message**, **Audience**, **Purpose** and **Strategy** (MAPS) will be covered.

### **ECS1007 Persuasive Communication**

In this subject, you will be taught how to use persuasive language in written documents. You will be required to use information to your advantage to verbally communicate and convince an audience about your idea, product or service. Skills such as persuasive vocabulary, language features, graphical illustrations, tone and style would also be covered. The **Message**, **Audience**, **Purpose** and **Strategy** (MAPS) will also be applied when engaging in verbal and written communication.

### **ECT2004 Instrumentation & Computer Control**

This subject introduces you to the fundamentals of instrumentation and measurement. Topics include measuring devices, final control elements, controller principles, single and multiple loop control systems and process documentation. Basic programming skills in simulation, real-time control, data transfer from sensors to computers and computer-to-computer communication are also covered.

### **ECT2005 Circuits & Control Systems**

This subject introduces you to various concepts involved in the study of circuits and control systems. It provides you with the theories and practical knowledge of transient and steady state response of second order circuits, the structure of feedback control systems and stability analysis. The controllers and compensator design techniques used in control systems are also discussed. You will learn all the necessary skills to simulate, interpret and analyse the performance of various control systems and electric circuits.

### **ECT3002 Analytical Robotics**

This subject introduces various concepts involved in the study of robotic systems. It begins with an introduction to the different types of robotic systems, mechanical forces and the Law of Motion, different types of actuators, as well as various types of sensors and their application in robotics. Basic kinematics is also discussed to analyse the pose and orientation of the object in space. Various mobile robot design considerations and embedded system design are also explored to emphasise the application aspects

### **ECT3004 Efficient Drive & Control Systems**

This subject covers the control and optimisation of motor driven systems for energy efficiency. Applications of motor driven systems in the manufacturing industry will also be discussed.

### **EDM1001 Modelling & Animation**

This subject provides you with the basic theory and skills for 3D animation production. You will be equipped with an understanding of the fundamentals of how animation software tools work, and gain experience in completing a 3D animation production development cycle.

### **EDM1002 Fundamentals of Digital Media Processing**

This subject equips you with the fundamental knowledge of image, texture and audio editing using media processing techniques. These techniques are necessary basic building blocks in interactive digital media content development. Basic video editing skills will also be taught. The subject emphasises practical-based learning, through which you will acquire the essential knowledge and skills.

### **EDM2004 Advanced Digital Animation & Special Effects**

This subject equips you with the knowledge and skills in applying advanced tools and techniques in 3D animation. It uses a practice-oriented approach to train you to rig a character and create physically realistic object motion, to apply visual effects techniques to create natural environment and phenomena with appropriate lighting and advanced render setting, and to create texture on 3D models directly.

### **EDM2005 Interactive Digital Media Project**

This subject provides you with an opportunity to integrate knowledge learned in previous semesters to develop an Interactive Digital Media (IDM) production through working on a project in a team. Emphasis will be placed on your ability to be creative and work in teams, as well as problem-solving skills. The nature of the project could either be software or hardware, or a combination of both.

### **EDM2007 Fundamental 3D Interactive Digital Media**

This subject provides you with the knowledge and hands-on experience in creating interactive 3D applications. Topics include 3D object creation, modelling, and scene composition.

### **EDM2010 3D Modelling for Virtual Reality**

This subject covers theories and skills for 3D modelling and basic animation. You will be equipped with an understanding of the fundamentals of how 3D software tools work, and gain experience in completing a 3D modelling and animation production development cycle. The subject uses a practice-oriented approach to equip you with the skills to develop 3D assets, create a virtual environment and enhance realism with appropriate lighting, texturing techniques and advanced render setting.

### **EDM3002 3D Real-time Visualisation**

The subject equips you with the skills and techniques to be competent in creating 3D real-time photorealistic interactive media content. Topics include the use of special rendering techniques, High Dynamic Range Imaging (HDRI) techniques, Low Polygon and High Polygon Modelling, Global Illumination, Texture Baking, and their corresponding methodology in reducing latency in real time 3D scenes.

### **EDM3003 Interactive 3D Display System**

This subject provides you with the necessary knowledge of how various input and output interactive systems work. These systems include stereoscopic, auto-stereoscopic and holographic displays, pinch gloves, wands, as well as passive and active sensors. You will also learn how to use and apply these applications in various scenarios.

### **EDM3004 Interactive Programming for Virtual Reality**

This subject covers the fundamental theories and practical skills of 3D interactive design and development. It includes topics such as scripting for 3D assets with behaviour and interactivity, lighting, audio, animating 3D objects, user interfaces and deployment of the interactive applications. You will build upon the foundational skills you have acquired in 3D modelling, texturing and programming from previous semesters to create interactive and real-time applications such as Virtual Reality and Augmented Reality.

### **EDR1003 Engineering Drawing**

Engineering drawing is essential for communicating engineering design. This subject will introduce you to the understanding and preparation of two-dimensional mechanical engineering drawings with the use of both manual and Computer Aided Design/ Drafting (CAD) software. You will also learn general methods of dimensioning according to international and local standards.

### **EED1001 Electronic Prototyping**

This subject introduces you to the use of hand tools and standard laboratory equipment for the construction and testing of electronic prototypes. You will also learn to identify basic electronic components for project work and how to use them to build electronic devices.

### **EED1002 Printed Circuit Board Design**

This subject provides you with the basics in designing a printed circuit board (PCB) through the use of a PCB design software. You will learn the various parts of a PCB and the terminologies used, and understand the various processes involved in the design and fabrication of a PCB. You will also have the opportunity to assemble and test a PCB prototype and apply basic troubleshooting skills to isolate faults in electronic circuits.

### **EED2007 Mechatronics Design Project**

This subject covers the basic principles in the development of a Mechatronics product design through hands-on experience. Project ideas will be developed using Computer Aided Design, and you will then build the designs using the proper prototyping techniques. Microcontrollers will be used to control the various functions of the product.

### **EED2010 Aerospace Design Project**

This subject equips you with the skills to design an aerospace product using current and emerging technologies. It is designed to expose you to the multi-disciplinary aspects of aerospace engineering in which domain areas such as airframe and propulsion are linked by cross-cutting areas such as digital manufacturing and computer programming in the development of a product such as an unmanned aerial vehicle. This is a flexible project-based learning subject in which the theme is changed regularly to keep abreast of the latest trends and technologies.

### **EED3009 Special Project 1**

The focus of this subject is on the application of your existing domain knowledge to develop a deliverable. The subject will introduce you to new skills and knowledge specific to the project, as and when required.

### **EED3010 Special Project 2**

This subject provides opportunities for you to apply your acquired knowledge and skills, along with your fundamental and in-depth knowledge from different subjects, in designing, developing, and implementing a well-engineered project solution.

### **EED3011 Higher Engineering Skills 1**

Higher Engineering Skills 1 and 2 provide opportunities for you to develop different engineering skills – these skills could include hardware and software design and developmental skills, testing and measurement skills. The focus is on the practical aspects of engineering and the development of deft hands-on skill-sets. Creative and innovative ideas will also be encouraged. Exposure to new technologies, which may not be covered in the curriculum, will be introduced when necessary.

### **EED3012 Higher Engineering Skills 2**

See Higher Engineering Skills 1 above.

### **EED3013 Rapid Prototyping & Model Making**

Using various advanced rapid prototyping methods as well as basic processing of wood, metal and plastics, you will acquire a working knowledge of constructing physical 3D models for product presentation.

### **EED3014 Advanced Skills Practices**

This subject provides opportunities for you to integrate and apply your knowledge for high level competitions or projects in practical learning situations. The project or skills training can involve substantial work related to either a high level industrial program or an end-user product, as well as advanced training to develop technical abilities to execute specific tasks competitively. It could also involve the development, evaluation of workable designs and implementation of ideas related to an innovative product suitable for manufacturing, or an improvement to existing products or processes. You may be required to work on software, hardware, or a combination of both hardware and software.

### **EEE1001 Circuit Analysis**

This subject provides a good foundation in DC and AC network analysis. You will learn the basic principles of electric circuitry and how to apply circuit theorems to analyse DC and AC networks.

### **EEE1002 Electronic Devices & Circuits**

This subject covers the theory and practical knowledge of electronic devices such as diodes, bipolar junction transistors, field effect transistors and their applications. It also focuses on the fundamentals of operational amplifiers and their applications, and the rudiments of circuit troubleshooting and testing.

### **EEE1003 Digital Fundamentals 1**

This subject provides you with basic knowledge of digital electronics and circuits. Topics include number systems, operations and codes, logic gates, Boolean algebra and logic simplification, combinational logic, functional blocks, latches and flip-flops.

### **EEE1004 Digital Fundamentals 2**

This subject builds upon the fundamentals of digital electronics acquired in Digital Fundamentals 1. It introduces you to the digital concepts of the various building blocks in a computer's digital system. You will acquire the theoretical and practical knowledge of registers, counters, memory devices, and conversions between digital and analogue signals and integrated circuit technologies. Digital troubleshooting techniques are also explored in the laboratory work.

### **EEE1005 Digital Fundamentals**

This subject provides you with a basic knowledge of digital electronics. You will learn the theoretical and practical knowledge of fundamental digital concepts and basic building blocks of digital electronic circuits. Topics covered include number systems, Boolean algebra and combinational logic, sequential logic and memory devices.

### **EEE1006 Engineering Fundamentals**

This subject provides you with a strong foundation in basic engineering concepts, electrical principles, circuit theorems, digital electronics and electronic devices.

### **EEE2005 Integrated Circuit Applications**

This subject covers the applications of common integrated circuits. The fundamental concepts of operational amplifiers and their applications will be taught. You will learn how to use operational amplifiers to design clippers, clampers, comparator circuits and active filters. The applications of the 555 timer and voltage regulators will also be discussed.

### **EEE3004 Power Electronics & Drives**

This subject is an introduction to different types of motors, power electronic devices and power converters, and in particular, how they are applied in motor drive systems. The power semiconductor devices typically employed in such circuits and the required thermal management of these devices are explored.

### **EEE3005 Advanced Electronics & Communication**

This subject covers essential concepts in electronics to equip you with knowledge and skills in designing advanced electronic circuits and systems for processing analogue signals. It introduces the basic principles and behaviour of analogue signals and signal transmission in electronic communication systems.

### **EER1001 Electrical Services for Facilities**

This subject provides the basic theoretical and practical knowledge for the design of electrical distribution and installation in facilities. It also introduces you to the safety requirements and regulations governing electrical distribution and installation.

### **EER2001 Electrical Systems & Power Distribution**

This subject covers the operation of a power distribution network system in the transmission and distribution of electricity. The topics include system earthing, circuit breakers, fuses, cables, and transformers. The different types of network protection scheme and calculations of fault will also be taught.

### **EER3002 Electrical Diagnostics & System Integration**

This subject covers the technical requirements and design considerations that are critical for system integration of modern electrical systems with renewable energy sources as well as energy storage systems. Advanced metering infrastructure and major control principles in smart grid and advanced diagnostics techniques for evaluating failure modes in electrical systems will also be covered.

### **EFM1002 Workplace Safety & Health for Facility Management**

This subject gives you an overview of a safe working environment in the area of facilities management. You will be equipped with the skills of identifying and reducing workplace related risks at source, and you will also be exposed to common practices taken in the industry to ensure a safe workplace.

### **EFM2004 Contract Management**

This subject covers the knowledge of contract management that is aligned to the practices in the real estate industry. You will learn about all aspects of contract management which includes administration, procurement procedures, valuation of services and products, tenant management, and service delivery.

### **EFM3001 Sustainable Facility Management**

This subject covers the roles of Facility Management (FM) in environmental sustainability. It will cover the integration of both areas so that you can see a connection between reducing carbon footprint and emission of the assets/properties under effective and thoughtful FM. It will also examine the policies and practices that FM should implement to achieve the said goals. The subject will describe the framework and strategies for achieving 'greener' results at the inception, design, construction to operational stage of a building. The subject will also provide an overview of the standards or rating systems that can be used to gauge the attainment of the sustainable goals.

### **EGB1001 Introduction to Green Development**

This subject covers the fundamentals of a green development specifically within the local green building sector. You will learn the concepts, development and trends in the design and management of a green building. There will also be an overview of the current trends of green buildings.

### **EGB2002 Air Conditioning & Mechanical Ventilation**

The Air Conditioning and Mechanical Ventilation (ACMV) system is one of the most important systems of a building and represents a significant portion of its total energy consumption. The subject will cover the use of psychrometric chart and pressure enthalpy diagram to facilitate the understanding of the working principal behind the air conditioning system. Various types of ACMV systems and energy saving strategies will be explored.

### **EGB2003 Hydraulics & Drives**

This subject is designed to expose you to hydraulic and motor-driven systems used in buildings. It starts with introduction to fundamentals of fluid mechanics (Bernoulli's and continuity equations), losses in fluid flow in pipes and follows by sizing of pumps. The motor-driven systems portion of this subject includes fundamentals of electric motors, selection and sizing of motors for different applications. Efficiency of motor-driven systems and motor installation are explained at the end.

### **EGB2004 Tropical Architecture for Sustainability**

This subject introduces you to passive design principles in tropical architecture, and will showcase all the examples of sustainable design from different parts of Asia from both past and present for contrast and comparison. Both traditional as well as cutting-edge technologies will be discussed, with emphasis on how materials are used in solving environmental problems. Topics covered include Tropical Architecture, Southeast Asian Indigenous Buildings, Late-modern Architecture and Green Buildings. Issues regarding contemporary urbanisation and sustainability will also be explored.

### **EGB2005 Green Building Modelling & Simulation**

This subject provides you with an in-depth modelling and simulation concept of green buildings. Starting with climate analysis, you will be taken through hands-on stage-by-stage simulation tasks to demonstrate the impact of solar geometry on the building façade and indoor spaces followed by the passive cooling and ventilation strategies that are relevant to tropical cities such as Singapore. The simulation portion of this subject includes solar radiation analysis, shading design, lighting design, overshadowing, site analysis and the use of computational fluid dynamics (CFD) to analyse the performance of a naturally ventilated building.

### **EGB3003 Total Building Performance**

This module provides an overview of the key factors that affect the performance and efficiency of buildings. It introduces the performance mandates of a building and focuses on integrated approaches to meet the building performance criteria. Topics include spatial performance, thermal comfort and evaluation, air quality and acoustic performance, lighting aspects and building integrity performance.

### **EGB3004 Sustainable Design**

This subject covers architectural design concepts used in building analysis of sustainable or green facilities. You will learn about the processes and practices of incorporating environmental and sustainable issues into integrated planning and the designing of green facilities. Principles for human-habitat and concepts of passive design will be applied in solving practical problems related to buildings. Air-flow simulation, sketches of models and charrettes will be used to visualise the design strategies and solutions, so as to effectively design spaces that can provide optimal year-round comfort and reduce energy consumption while limiting the impact on the environment.

### **EGS1002 Global Studies**

This subject provides essential skills and knowledge to prepare you for an overseas experience. You will examine the elements of culture and learn the key principles of cross-cultural communication. In addition, you will gain an appreciation and awareness of the political, economic, technological and social landscape to function effectively in a global environment.

### **EGS1003 Managing Diversity at Work**

This subject explores the concepts of identity, diversity and inclusion at the workplace. It examines the relationship between identity and diversity, the benefits and challenges of diversity and the strategies that promote inclusion and inspire collaboration in a diverse workplace. Examples of the elements of diversity covered in this subject include nationality, generation, ethnicity and gender. A one week residential stay is mandatory for this subject.

### **EGS1004 Global Citizenship & Community Development**

Students will examine the meaning and responsibilities of being a Global Citizen, in order to contribute towards a more equitable and sustainable world. In addition, students will learn how sustainable solutions can support community development, and, execute and critique a community action plan that addresses the needs of a specific community/cause.

### **EGS1005 Expressions of Culture**

This subject provides a platform for an understanding of culture and heritage through modes of expression. Students will be introduced to global and local cultures via everyday objects, places and human behaviour seen through time and space. Students will explore issues and challenges in culture and heritage sustainability in community, national and global contexts.

### **EIN1001 Innovation & Entrepreneurship**

The Innovation & Entrepreneurship subject is designed for learners from all disciplines to embrace innovation in either their specialised fields or beyond. You will first learn the Design Thinking framework, where you will develop problem statements and ideate solutions. Next, you will discover the tools for prototyping and innovation, such as 3D printing and laser cutting, at TP's Makerspace+ facility. Finally, you will acquire commercial awareness through the LEAN Startup framework of idea crystallisation, prototype building, customer testing and validation, refinement of business model canvas, and crowdfunding or crowdsourcing avenues.

### **EMA1002 Engineering Mathematics 2**

The subject introduces the concept of calculus. Differentiation and integration techniques will be covered. These concepts will be used to formulate and solve mathematical problems. Various differentiation techniques (e.g., chain rule, product and quotient rules), and integration techniques (e.g., substitution, use of the mathematical table, integration by parts, partial fractions decomposition) will also be covered.

### **EMA1003 Engineering Mathematics 1**

This subject teaches pre-calculus techniques required for an engineering course. It trains you in engineering problem-solving approaches using the appropriate mathematical tools. Topics such as simultaneous equations, matrices, trigonometric, exponential and logarithmic functions, complex numbers and vectors will be covered.

### **EMA2003 Engineering Mathematics 3**

This subject introduces ordinary differential equations and approximation using the Maclaurin series and Fourier series. You will learn how to formulate engineering problems using first and second order differential equations and to solve initial value problems using techniques such as Laplace transforms. The application of statistics – Hypothesis Testing – will also be taught.

### **EMA3001 Higher Engineering Mathematics**

The subject introduces mathematical concepts and techniques used in advanced engineering courses. You will learn topics in calculus such as limits and continuity, infinite series, improper integrals, multiple integrals, higher order differential equations, 2D and 3D analytic geometry, and partial differentiation.

### **EMC2001 Microcontroller Technology**

This subject provides you with a working knowledge of embedded systems, with emphasis given to the design and development of a microcontroller-based application that involves hardware and software interfacing. The subject also covers the features of evolving microcontrollers that support Internet of Things (IoT) applications. Modular programming technique is also emphasised as you work on your program solution.

### **EMC2006 Internet of Things Project**

This subject equips you with the knowledge and skills required for implementing the new paradigm in which things interact with things, people and the Internet or information systems. The subject provides knowledge, skills and design approaches in using embedded systems, sensors, actuators and appropriate data communication technologies such as sensor networks, edge and cloud computing to achieve such interaction. A systems engineering approach will be adopted, under which you will review key technologies from prior learning for the different levels of the IoT (Internet of Things) stack and figure out how these different levels could be integrated to form complete IoT systems.

### **EMC3002 Embedded Control & Applications**

This subject is an extension of the subject “Microcontroller Technology”. The subject provides you with a working knowledge of the features and characteristics of most of the internal peripherals in the microcontroller, such as interrupts, Timer, PWM and ADC, in order to design and implement an embedded system. The subject also covers the power management modes in microcontrollers essential for IoT applications. Modular programming technique is also emphasised as you work on your program solution.

### **EMC3005 System & Network Integration**

This subject equips you with the knowledge and skills essential for integrating heterogeneous subsystems into a smart system. The subject will adopt a systems engineering approach to examine current and emerging trends, key techniques and strategies for developing system and network integration solutions. You will be exposed to integration challenges such as legacy integration, human-system integration and system of system integration. Commonly used industrial connectivity standards and fieldbuses, as well as relevant hardware and software interfaces suitable for such integration, will also be covered. A mini-project will provide opportunity for you to apply your prior learning on embedded systems and programming along with those acquired in this subject to solve a system integration problem.

### **EMD2001 Medical Electronics**

This subject introduces you to the fundamental instrumentation theories for biomedical applications and design requirements for the measurement of bio-signals as well as signal processing techniques used in biomedical instrumentation. Topics include electrodes and transducers, bio-potential measurements, amplifier basics, differential and instrumentation amplifiers. Electronic feedback systems, filter designs, noise and electromagnetic interference issues are also discussed.

### **EMD2002 Medical Devices**

This subject provides you with knowledge on the working principles, safety and reliability issues related to the use of medical devices in the healthcare sector. You will learn the fundamental concepts of diagnostic devices, lifesaving and support devices, critical care devices and some of the specialised therapeutic devices used in pain relief and rehabilitation.

### **EME1002 Statics & Strength of Materials**

This subject consists of two main areas: the fundamentals of statics and strength of materials. Fundamentals of statics provide an introduction to the basic concepts of bodies in statics, whereas strength of materials introduces the methodology for designing structural members subjected to various loading conditions.

### **EME2004 Programmable Automation**

This subject provides you with the fundamentals underlying the contemporary manufacturing automation environment. Four main topics are covered in this subject; namely pneumatics, electro-pneumatics, programmable logic controllers and factory automation. You will gain the essential knowledge of the working principles and applications of automation equipment related to the topics covered, followed by an overview of how to automate production processes to achieve quality and high productivity. Both hardware and software links between the main factory automation components are introduced.

### **EME2007 Machining Technology**

This subject introduces you to the various manufacturing processes including computer-controlled processes and you get hands-on practice with conventional and Computer Numerical Control (CNC) machines. You will also learn about Computer-Aided Design and Manufacturing (CAD/CAM) system. Safety aspects are emphasised throughout the workshop sessions. You will acquire the fundamental knowledge and skills in designing for the manufacturing sectors such as the tool and die industry.

### **EME2008 Principles of Dynamics**

The application of dynamic systems theory can be seen everywhere in our daily lives, from vehicles moving on the road to planes flying in the air. In this subject, you will learn the fundamental principles of dynamics and apply them to the analyses of bodies in motion. The main topics covered include Newton’s laws of motion, the principle of work and energy, the principle of impulse and momentum, gyroscopic principles and periodic motion.

### **EME2009 Thermodynamics**

This subject equips you with the basic knowledge in thermodynamics, concepts of the temperature scales and measurements, the First Law of Thermodynamics, Ideal Gas Laws, Second Law of Thermodynamics and heat energy calculations using a P-V diagram. The syllabus is based on the guide for relevant topics on thermodynamics listed in the Singapore Airworthiness Requirements (SAR-6) Module 2 “Physics”. Knowledge of this subject allows you to understand the mechanisms of heat transfer and how gas turbine engines work.

### **EME2010 Fluid Mechanics**

This subject provides you with fundamental knowledge in applied mechanics of fluids under incompressible viscous flow conditions. It covers fluid properties, fluid statics, fluid in motion, governing equations, viscous flow through duct, minor losses, multiple-pipe system, drag and lift, and compressible flow. Knowledge of this subject will enable you to appreciate the aerodynamics of an aircraft and fluid-flow concepts in turbine engines and aircraft systems.

### **EME2011 Engineering Design**

This subject applies elementary engineering principles to the design and selection of common mechanical elements and systems. You will have the opportunities to explore topics such as material selection, mechanical joining, mechanism, motion transmission and design for machining and assembly. Computer aided Design (CAD) tools will be used to reinforce the learning of this subject

### **EMF2003 Medical Device Manufacturing Practices**

This subject provides the fundamental knowledge of medical devices design regulations and good practices in drug development cycle and documentation in the biomedical industry. It provides an overview of Good Manufacturing Practice (GMP), Good Laboratory Practice (GLP), Good Clinical Practice (GCP) as well as their importance in clinical practice.

### **EMF3002 Manufacturing Logistics & Simulation**

This subject covers the concept of logistics in manufacturing, manufacturing planning, purchasing, warehousing, and simulation. PC software will be used to enhance your learning.

### **EMF3004 Automation & Machine Vision**

This subject covers the fundamentals of factory automation systems. It provides you with the essential concepts and background of industrial automation, machine vision and their applications, as well as their integration into a complete manufacturing system.

### **EMI2001 Semiconductor Physics & Devices**

The subject covers the physics of semiconductors. The motion of electrons and holes in semiconductors is discussed. The fundamental principles underlying the formation of a p-n junction, different types of contact to semiconductors and a Metal Oxide Semiconductor (MOS) capacitor are explained. The subject also covers the operating principle of a photovoltaic cell and a Metal Oxide Semiconductor Field Effect Transistor (MOSFET).



### **EMI2002 Wafer Fabrication Process Technology**

The subject covers the various process technologies used in semiconductor IC wafer fabrication, such as oxidation, diffusion, ion implantation, thin film deposition, photolithography, and etching. For each process technology, it covers definition, process mechanism, process equipment, process parameters and process application. You will also be given practical training which involves carrying out the semiconductor wafer fabrication process, evaluating the process outcomes as well as operating the various equipment used in the cleanroom. Technology Computer Aided Design (TCAD) software will also be used to simulate the wafer fabrication.

### **EMI2005 IC Packaging & Failure Analysis**

This subject covers the technologies and processes of IC assembly as well as IC failure analysis. The IC assembly includes various processes such as die attachment, wire bonding and encapsulation. The latest advancements in IC packing such as flip chip and chip scale packaging will be discussed. IC failure analysis includes various techniques such as optical microscopy, X-ray imaging and electron microscopy.

### **EMI2008 IC Process Integration**

This subject covers the design of photo-masks, sequencing of processes to form a process flow, technologies in processing of solid state devices, isolation and interconnection structures, application of test structures for process monitoring as well as the characterisation and functionality testing of basic solid state devices.

### **EMI2009 IC Layout Design**

This subject covers the techniques of Integrated Circuit (IC) layout starting with the fundamental relationship of the channel width and channel length dimensions of a Metal- Oxide Semiconductor Field Effect Transistor (MOSFET) to its characteristics. The design steps and layout of MOS transistors, basic Complementary MOS (CMOS) logic gates and static CMOS circuits will be explored. Layout techniques and considerations for power supply distribution, yield improvement and transistor matching are also discussed. The importance of layout design rules and the impact of Nano CMOS device dimension on design will also be highlighted. Computer Aided Design (CAD) and IC Design tools are used for practical experience.

### **EMI3009 Microelectronics Test & Measurement**

This subject covers the test and measurement of semiconductor devices, a process integral to the manufacturing of semiconductor devices. Equipment and related software tools for testing and debugging of digital and mixed-signal devices are used for practical experience.

### **EMI3005 Cleanroom Equipment & Technology**

This subject introduces contamination control in a cleanroom and the factors to control the environment. These include wafer plant facilities, process equipment and vacuum technology. Practical training includes appreciating the environment in the cleanroom, identifying the various components of a deionised water purification plant and operating vacuum pumps and systems.

### **EMP3002 Major Project**

The Major Project gives you an opportunity to integrate and apply your knowledge in a practical learning situation. Besides research, design and project management skills, the emphasis will also be on innovation, creativity, teamwork and enterprise.

### **EPH3001 Principles of Photonics**

This subject explores the fundamentals of photonics theory including concepts and application of photonics. It delves into the laws of reflection and refraction, principles of wave optics (including interference, diffraction and polarisation), fundamentals of fibre optic theory, principles of lasers and laser safety, and the basics of holography.

### **EPH3002 Optical Communications**

This subject delves into the laws governing transmission of light through fibres, classification of fibres, loss mechanisms and dispersion in fibres, optical modulation, multiplexing and de-multiplexing, as well as the procedures used in the design and analysis of an optical communications system.

### **EPH3003 Optical Devices**

This subject equips you with the knowledge and concept of optical devices. It covers the structure and characterisation of coherent and non-coherent optical sources, namely: light emitting diodes and laser diodes, optical detectors, optical amplifiers, passive optical devices, modulators, switches, optical integrated circuits, sensors and photonic devices for imaging, display and storage.

### **EPZ1001 Introduction to Processes & Systems**

This subject provides you with a basic understanding of the concepts, tools and approaches to business process management as well as the context in which these approaches are made within larger systems of business organisations or entities.

### **EPZ3001 Customer Relationship Management**

This subject provides you with an in-depth view of Customer Relationship Management. It covers the basic concepts of CRM, leading to implementation of strategies within an organisation. Focus will be on using technologies to adopt a customer-focused approach and strengthening customer relationship.

### **EQM2001 Process Management & Innovation**

Process Management is the management of business as a series of processes resulting in the creation/ improvement of products and services that customers need. This subject provides the understanding of concepts, theories and methods a team leader needs to initiate and carry out process improvement activities. Key topics include process management, analysis, improvement, and innovation.

### **ESC1003 Chemistry**

This subject provides you with an understanding of the fundamentals of chemistry concepts and applications useful in the bioengineering field. Topics covered include the principles, theories and applications of physical, inorganic and organic chemistry, ranging from atomic structure and electron configuration, stoichiometry, the periodic table, chemical bonding, equilibria, electrochemistry, and thermochemistry, to topics of organic chemistry covering the hydrocarbons, haloalkanes, the hydroxy, carbonyl and carboxylic acids compounds. Essential practical sessions on chemical experimentation are also covered.

### **ESC1004 Engineering Physics**

This subject covers a spectrum of fundamental physics laws and concepts applicable to the scope of engineering physics. It covers a few core areas including Mechanics, Energy, Thermal Physics, Electromagnetism, Waves, as well as Optics and Materials. This subject provides a foundation for a further in depth study of the various engineering disciplines.

### **ESE1006 Computer Programming for Problem Solving**

This subject covers the process of decomposing a problem into a sequence of smaller abstractions. The abstractions are implemented in software in a structured top-down approach. Software implementation includes the process of designing, writing, testing, and debugging program code.

### **ESE1007 Engineering Analytics**

This subject covers the basic stages in preparing data for data analytics. These stages include collecting, cleaning, processing and visualising the data. Basic methods of descriptive and predictive analytics are also introduced. You will gain hands-on experience by applying data analytics techniques and using analytics software tools on case studies so as to facilitate more accurate and effective data-driven decisions.

### **ESE2004 Object-Oriented Programming**

This subject extends procedural programming concepts into the object-oriented (OO) paradigm. It covers the fundamentals of OO programming principles and software design methods and practices using Unified Modelling Language (UML). These will be applied in the development of event-driven Graphical User Interface (GUI) programs with the use of appropriate data structures and algorithms.

### **ESE2008 New Media Marketing Applications**

This subject gives an Introduction to new media marketing, the User Experience (UX), as well as the development and use of analytics measurement in new media. The subject will focus on the development of applications for Facebook.

### **ESE3006 ASP.NET Web Programming**

This subject focuses on providing appropriate knowledge and skills to develop ASP.NET Web applications on the .NET platform. After an introduction to different .NET related tools and languages, the procedure to create Web Form is demonstrated. Data accessing using ADO.NET is then covered followed by the use of web tools to enhance and improve functionality. Finally, the method to deploy ASP.NET web applications in mobile devices will be introduced using online emulators and HTML5 tools in Visual Studio.

### **ESE3010 Database Management System & Design**

This subject focuses on the design and creation of database e.g. using the Oracle Database System. The topics covered ranges from the initial design of the database using modelling tools (Entity-Relationship model using Unified Modelling Language), to the refinement of the models using Normalisation techniques. It will also include the learning of the database programming language, Structured Query Language (SQL), and JavaServer Pages (JSP) for web page creation, as well as Java Database Connectivity (JDBC).

### **ESI3001 Student Internship Programme**

The on-the-job training nature of the programme allows you to gain some industrial experience. Through this programme, you will be exposed to the work environment so that you can better appreciate and understand the problems and issues at the work place. The content and scope of learning varies from organisation to organisation. However, it is envisaged that after the programme, you would have, in general, developed your communication and interpersonal skills as well as the right work ethics, and also become more mature, confident and independent, and have a more realistic expectation of what a working environment is like.

### **ESZ1001 Systems Concepts & Tools**

This subject provides you with the basic knowledge and skills to apply systems thinking language and modelling approaches to solve real-world issues. Tools that will be introduced include causal loop diagrams, archetypes and system dynamics. You will also learn to use a software to model issues using the systems thinking and modelling approach. The relationship between systems thinking and the learning organisation will also be discussed.

### **ESZ1002 Quantitative Methods**

This subject introduces basic statistical concepts. Topics include descriptive statistics, probability distributions, estimation of population parameter, hypothesis testing, and simple linear regression.

### **ESZ2001 Decision Analysis**

This subject provides an introduction to the decision-making process and the models applicable to solve various decision problems. It covers methods and techniques for decision making such as linear programming, transportation model, network models and decision trees.

### **ESZ2002 Process Optimisation & Improvement**

This subject provides an overview on the concepts of quality improvement and process optimisation. It establishes the fundamental to quality concepts. You will learn how to analyse statistical control results, experimental designs, variations in processes and applying improvement techniques. Practical sessions using software applications will be integrated to enhance your learning.

### **ESZ3001 Supply Chain Management**

This subject covers the concept behind supply chain management in competitive business survival and key strategic drivers that improve supply chain management performance of an enterprise. It also covers the importance of managing inventory, selecting appropriate distributing and transportation network.

### **ESZ3002 Systems Modelling & Simulation**

This subject provides you with an introduction to fundamental concepts of system modelling and simulation. Topics include basic model development, input analysis, modelling and statistical analysis. A simulation software is extensively used as a vehicle to enhance the understanding and practical applications of the subject.

### **GCC1001 Current Issues & Critical Thinking**

This subject presents you with a panoramic view of current local and global issues, which may have long term implications for Singapore. You will learn to apply critical thinking tools to examine current issues, support your views with relevant research and up-to-date data, articulate an informed opinion and mature as civic-minded individuals.

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

LEAP 1, 2 and 3 are three fundamental subjects that seek to cultivate in you, the attitude, skills and knowledge for the development of your leadership competencies. This character-based leadership programme enables you to develop your life-skills through establishing personal core values, which will become the foundation for your leadership credibility and influence.

### **LSW1002 Sports & Wellness**

This subject will help you develop both the physical and technical skills in your chosen sports or fitness activities. Through a structured curriculum that facilitates group participation, practice sessions and mini competitions, you will learn to build lifelong skills such as resilience, leadership, communication and teamwork. Physical activity sessions will be supplemented by health-related topics to provide you with a holistic approach to healthy living.

### **MCR1001/MCR1002/MCR1003 Career Readiness**

This Career Readiness programme comprises three core subjects – Personal Management, Career Preparation and Career Management. It seeks to help you understand your career interests, values, personality and skills for career success. It also equips you with the necessary skills for seeking and securing jobs, and to develop professional work ethics.

### **TGL1001 Guided Learning**

The subject introduces students to the concepts and process of self-directed learning in a chosen area of inquiry. The process focusses on four stages: planning, performing, monitoring and reflecting. Students get to plan their individual learning project, refine and execute the learning plan, as well as monitor and reflect on their learning progress and project. The learning will be captured and showcased through a curated portfolio. The self-directed learning project will broaden and/or deepen a student's knowledge and skills.