DIPLOMA IN ELECTRONICS (T65)

Course Overview

Smart electronics devices, flexible hybrid electronics, 5G mobile network, advanced manufacturing, artificial intelligence, internet of things and autonomous vehicles are some of the cutting edge technologies that become more and more pervasive in today's hyper-connected world. Electronics circuits and devices are the key enablers of the technological advancements behind the current digital transformation. You will go through a multi-disciplinary experiential learning journey and have opportunities to acquire specialised skills at the TP Advanced Manufacturing Centre (TP AMC) as well as the Healthcare Engineering Centre (HEC) and embark on a fulfilling career as associate engineers or technologists in leading technology companies.

Through industry-relevant curriculum, hands-on training, skill-based service learning and student internship programmes in local or overseas companies, this course develops students holistically in both technical and life skills so that they can have a head start in a broad range of career options that require knowledge and skills in circuit analysis, robotic programming, User Interface (UI) design, data analytics, electronics prototyping and coding.

In your final year, students can select one of the following elective clusters:

- Advanced Skills Practices
- Avionics
- Industrial Artificial Intelligence
- Intralogistics & Cybersecurity
- Robotics
- Semiconductor Technology

Join this course and be part of future-ready workforce! Diploma in Electronics graduates can obtain up to one year of advanced standing in local or overseas university degree programmes.

To download a copy of our 4-page course brochure, click here.

Watch video

Entry Requirements

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

Subject	Grade
English Language (EL1)	1-7
Mathematics (E or A)	1-6
Any one of the listed subjects^	1-6
Any two other subjects, excluding CCA	-
2021 Planned Intake	**50**
Net ELR2B2 aggregate range (2021 JAE)	**11 - 18**

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

*SPM / UEC holders must have a minimum of grade 6 for the Bahasa Inggeris (English Language) subject.

^ List of acceptable subjects: Biology, Biotechnology, Chemistry, Combined Science, Computing/Computer Studies, Design & Technology, Electronics/Fundamentals of Electronics, Physics/Engineering Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry)/Physical Science.

See also the minimum entry requirements for:

- International Students

What You'll Learn

YEAR 1

Acquire fundamental electronics knowledge and practical skills and learn to apply technical concepts in real-life applications related to smart nation applications, Internet of Things (IoT) technology, biomedical engineering, robotics and automation that are widely used today.

** Students must choose to take either one of these three subjects or TGL1001 Guided Learning.*

TP Fundamentals (TPFun) Subjects

	Subject Code	Subject	Credit Units	
^	**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 **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) when writing and delivering oral presentations.	**2**	^

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 **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) will also be applied when engaging in verbal and written communication.	2	
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.	3	
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.	2	
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.	2	
LEA1011	**Leadership: Essential Attributes & Practice 1** 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.	1	

^	**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.	**2**	^
^	**MCR1001**	**Career Readiness 1** 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.	**1**	^

Core Subjects

	Subject Code	Subject	Credit Units	
^	**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.	**6**	^
^	**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.	**4**	^
^	**EEE1003**	**Digital Fundamentals 1** This subject provides 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.	**5**	^
^	**EEE1004**	**Digital Fundamentals 2** This subject builds upon the fundamentals of digital electronics acquired in Digital Fundamentals 1. It introduces 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.	**5**	^

	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.	**6**	
	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.	**3**	
	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.	**5**	
	EMA1002	**Engineering Mathematics 2** This subject introduces the basic concepts of calculus and statistical method to test a hypothesis. Basic concepts in calculus include limits, derivatives and integrals. Applications of the derivative and integrals in engineering will be discussed. Basic statistical method in hypothesis testing includes normal distribution, confidence interval of population mean and procedure to test hypothesis for a claim made about a population mean.	**4**	
	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 & Optics and Materials. This subject provides a foundation for a further in depth study of the various engineering disciplines.	**3**	

YEAR 2

Be trained to handle advanced electronics, connected devices, motors & drives, control systems, embedded systems and data analytics, while acquiring further practice-based skills which are relevant for the industry.

TP Fundamentals (TPFun) Subjects

Subject Code	Subject	Credit Units
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 **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) will be covered.	**2**
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.	**3**
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.	**3**
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.	**3**

^	**LEA1012**	**Leadership: Essential Attributes & Practice 2** 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.	**1**	^
^	**MCR1002**	**Career Readiness 2** 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.	**1**	^
^	**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.	**3**	^

** Students must choose to take either one of these three subjects or TGL1001 Guided Learning.*

Core Subjects —

	Subject Code	Subject	Credit Units	
^	**EEE3005**	**Advanced Electronics & Communications** This subject provides the basic concepts of designing and using linear integrated circuits for different functions such as amplifiers and voltage-controlled oscillators. The design of attenuators and filters, and fundamentals of sensors and transducers will be discussed too.	**4**	^
^	**ECT2005**	**Circuits & Control Systems** This subject introduces 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 first and 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.systems such as direct digital control system, distributed control system and fieldbus control system are also covered in detail.	**4**	^

	ESE1008	**Data Visualisation & Analytics** This subject covers the data analytics lifecycle, including gathering, cleaning, processing and visualising of data. Exploratory data analysis methods, descriptive and predictive analytics, and the presentation of insights, will also be covered.	**3**	
	EEE2006	**Digital Sensors & Integrated Circuit Applications** This subject covers the applications of Integrated Circuits (IC) which form the building blocks in the field of electronics. It covers the development of digital sensors and industry practices for its deployment, including the handling procedure for Electrostatic Discharge (ESD) sensitive devices. Various applications using operational amplifier (op-amp), filters, wave shapers, analogue-to-digital converters, timers and voltage regulators will be used in the development of digital sensors.	**4**	
	EMA2003	**Engineering Mathematics 3** This subject introduces Ordinary Differential Equations (ODE). In particular, it focuses on the formulation of engineering problems into first and second order differential equations. Some techniques in solving ODE and the applications of ODE will be discussed, including the use of Laplace Transforms and the calculation of Fourier series.	**4**	
	EED2011	**Integrated Project** This subject covers the basic principles in the development of product design through hands-on experience. The project will involve the use of mechanical hardware, electronics, software and data visualisation to demonstrate solutions to real world problems in advanced manufacturing.	**3**	
	EMC3006	**Microcontroller Applications** This subject provides you with working knowledge on microcontroller architecture, the features and characteristics of the internal peripherals in the microcontroller, such as interrupts, Timer and PWM, in order to design and implement an embedded system that involves hardware and software interfacing. The subject also covers the features of evolving microcontrollers that support Internet of Things (IoT) applications.	**5**	
	EEE3004	**Power Electronics & Drives** This subject is an introduction to the study of machines, power semiconductor devices and their applications as power converters and motor drives. Topics covered include basic principles of DC and AC motors, fundamentals of controlled rectifiers and drives, principles of DC choppers and drives, and inverters. The uses of semiconductor devices in power applications and thermal effects on the performance of these devices due to high power will also be discussed.	**4**	

	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.	**3**	

YEAR 3

Get an authentic workplace experience through your internship and prepare for the industry by working on a relevant Major Project. You can also specialise in one of our five cluster electives: Aerospace Electronics, Industrial Artificial Intelligence, Robotics, Semiconductor Technology or Intralogistics & Cybersecurity.

TP Fundamentals (TPFun) Subjects

	Subject Code	Subject	Credit Units	
	ESI3001	**Student Internship Programme** This structured programme is designed to link your learning with the real work environment. You will be placed in organisation(s) with opportunities to apply the concepts and skills acquired in the course of your study. Besides reinforcing technical concepts and mastering of skills in areas that you have been trained, the practical training will enable you to build important skills such as problem-solving, communication, teamwork, and to cultivate good attitude and a strong work ethic.	**12**	
	LEA1013	**Leadership: Essential Attributes & Practice 3** 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.	**1**	
	MCR1003	**Career Readiness 3** 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.	**1**	

Core Subjects

Subject Code	Subject	Credit Units
EMP3002	**Major Project** In this subject, you will work in teams to integrate and apply your skills and knowledge to implement your projects in a practical work-and-learn environment. Besides research, design, analytics, project management, communication and problem solving skills, the emphasis will also be on innovation, teamwork and self-learning.	8

#Students to choose one of these elective clusters

Cluster Elective Subjects

Advanced Engineering Skills Elective Cluster

Subject Code	Subject	Credit Units
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.	8

Avionics Elective Cluster

Subject Code	Subject	Credit Units
EAE3018	**Aircraft Digital Systems** This subject gives a general knowledge of the theoretical and practical aspects of aircraft digital fundamentals. It covers study in the area of electronic instrument systems, logic circuits, fibre optics, 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. The aims of this subject are to equip students with the knowledge and skills to: • Identify the layout of electronic/digital aircraft systems in modern wide body transport aircraft. • Understand the digital fundamentals of aircraft electronic instrument systems as required by the SAR-66 Module 5 of the Civil Aviation Authority of Singapore.	5

EAE1006	**Avionic Systems** This subject gives a broad overview of aircraft avionics and architecture at the system level, and provides a context for follow-on training. The subject introduces students to the key avionics deployed on-board an air transport aircraft, including the crew information systems, the safety and surveillance systems, the flight and engine control systems, the navigation systems as well as the communications and information systems. The aim of this subject is to equip students with the knowledge to have a good appreciation of the integrated avionic systems onboard an aircraft.	4	

Industrial Artificial Intelligence Elective Cluster

Subject Code	Subject	Credit Units	
ECC3011	**Edge Computing & Machine Learning** This subject covers the technical skillsets required for deploying Artificial Intelligence (AI) models and machine learning in Edge Computing devices. It covers the fundamentals of AI and Machine Learning, the implementation of fine-tuning and transfer learning on pre-trained models, as well as the process of optimising, flattening and deploying of AI models and Machine Learning algorithms in the Edge Computing devices.	4	
ECC2014	**Industrial IoT Analytics** This subject covers the essential concepts and skills needed for implementing digital transformation in smart manufacturing plants. It covers the application of industrial software platforms to wirelessly interconnect sensors, Internet of Things (IoT) devices and equipment. Students will learn to develop dashboard for acquiring, analysing and displaying data that is commonly found in Advanced Manufacturing. Modern approaches in activation of hardware and software responses when interventions are required for process improvement or corrective actions are also covered in detail.	4	

Intralogistics & Cybersecurity

Subject Code	Subject	Credit Units	
BLO2010	**Distribution Centre Management** This subject provides an overview of the role of a Distribution Centre (DC) in the supply chain. It also covers the various activities performed within a DC and the significance of these activities on customer service and total logistics costs. It focuses on the major resources to be applied in a DC and explains how they interact with one another in contributing to the DC's effectiveness and efficiency. It will also cover the significance of providing DC services to the Third-Party Logistics industry.	4	

CCF2C02	**IOT Security** This subject covers the knowledge and skills required to analyse and troubleshoot IoT vulnerabilities and threats. You will use latest technologies to perform risk assessments and recommend mitigation strategies for common security issues in IoT systems.	4	

Robotics Elective Cluster

Subject Code	Subject	Credit Units
EMF3005	**Robotics & Automation** This subject covers factory automation systems which are the foundation for advanced manufacturing systems. It provides the essential concepts and background on industrial automation, robotics and their applications, as well as their integration into a complete manufacturing system. You will also learn the working principles and applications of automation equipment and how to automate production processes to achieve quality and high productivity. Both hardware and software links between the main factory automation components are introduced.	4
EMF2002	**Smart Manufacturing System** This subject introduces the core elements of a smart manufacturing system where real-time manufacturing data enables flexibility and increases productivity. An introduction to advanced manufacturing and key enabling technologies such as Radio Frequency Identification (RFID) systems, Manufacturing Executions Systems (MES) and Augmented Reality (AR) are used to lay the foundation for understanding the application and benefits of smart manufacturing.	4

Semiconductor Technology Elective Cluster

Subject Code	Subject	Credit Units
EMI3005	**Cleanroom Equipment & Technology** This subject introduces contamination control in a cleanroom and the factors to control the environment. It includes 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.	4
EMI2008	**IC Process Integration** This subject covers the basic concepts of IC, IC fabrication and IC wafer fabrication, as well as producing process flow, conceptual mask layouts and test structures for CMOS process. It also covers the basic concepts of process in-line monitoring and characterisation of basic solid state devices.	4

Special Electives

Students can opt to take Special Electives when offered. These optional subjects aim to stretch the students' potential to enable them meet their aspirations. They are taken in addition to the diploma cluster elective subjects.

Special Electives

Subject Code	Subject	Credit Units
EED3009	**Special Project 1** The focus of this subject is on the application of students' existing domain knowledge to develop a deliverable. The subject will introduce new skills and knowledge specific to the project, as and when required.	2
EED3010	**Special Project 2** This subject provides opportunities for students to apply the acquired knowledge and skills, along with their fundamental and in-depth knowledge from different subjects to designing, developing, and implementing a well-engineered project solution.	2
EED3011	**Higher Engineering Skills 1** Higher Engineering Skills 1 and 2 aim to impart some special design and hands-on skills that allow you to acquire knowledge and skills that are not normally incorporated into a diploma programme. These Special Elective subjects will equip you with the skills and knowledge to participate in competitions and enable you to tackle real challenges.	2
EED3012	**Higher Engineering Skills 2** Higher Engineering Skills 1 and 2 aim to impart some special design and hands-on skills that allow you to acquire knowledge and skills that are not normally incorporated into a diploma programme. These Special Elective subjects will equip you with the skills and knowledge to participate in competitions and enable you to tackle real challenges.	2
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.	4

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	8 credit units
Total Credit Units Completed	min 126 credit units