DIPLOMA IN COMPUTER ENGINEERING (T13)

Course Overview

Digitalisation is taking over the world. By simply tapping on our smartphones, we can purchase products and have them delivered right to our doorstep. As more companies go digital, there is a strong demand for talent in the field of computer engineering, and you can be one of them!

The Diploma in Computer Engineering is where you will gain knowledge and skills in emerging fields such as the Internet of Things (IoT), data analytics, artificial intelligence, augmented and virtual reality and smart manufacturing. With a strong understanding of the software design and application development process, you can bring your innovative ideas to life in this digital economy.

Internationally recognised industry certifications from National Instruments, UI Path, Microsoft and Unity3D will also place you in good stead in the workforce. In addition, you will get opportunities for year-long internships offered by GovTech and have the option to join a direct pathway programme leading to a university degree from SUTD!

As a professional well-versed in hardware and software skills, you will have an advantage over others who specialise in only one of these areas. Be part of the vital talent pool that supports the next phase of Singapore's economic transformation.

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

Get the opportunity to attain the below certification(s) throughout the course of your study:

- National Instruments certification
- UI Path certification
- Microsoft and Unity3D certification

IN-DEMAND SKILLS
Stay in demand with this course that gives you skills and knowledge to meet the increasing digitalisation needs at the workplace.

DIVERSE CURRICULUM
Broad-based curriculum offers graduates a flexible and wide range of choices for further studies at either local or overseas universities.

SCHOLARSHIP OPPORTUNITIES
Gain access to scholarships from both industry and the government.

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 following subjects^	1-6
Any two other subjects (except CCA)	-
2023 Planned Intake	**100**
Net ELR2B2 aggregate range (2023 JAE)	**4 - 13**

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.

What You'll Learn

YEAR 1 | YEAR 2 | YEAR 3 | TPFUN

Get a clear understanding of engineering fundamentals and discover your competencies, interests and career aspirations through lab work, industrial visits and hands-on learning opportunities, which will prepare you for your next 2 years.

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	5

	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.		
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 introduces the concepts in algebra and trigonometry that are fundamental to an engineering course. Topics include expressions and equations, functions and graphs, trigonometry, complex numbers, matrices and vectors. These also constitute pre-requisite knowledge for a course in Calculus.	**4**	^
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	**4**	^

	and procedure to test hypothesis for a claim made about a population mean.	
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 1 | **YEAR 2** | YEAR 3 | TPFUN

Envision and build smart iOT systems through the power of technology. Tap on hardware such as microcontrollers, sensors and actuators, utilise software systems such as database and enterprise applications and integrate them with programming, networking and artificial intelligence.

Core Subjects

Subject Code	Subject	Credit Units
ESE3012	**Artificial Intelligence & Machine Learning** This subject will provide you with the fundamental concepts of Artificial Intelligence (AI) and Machine Learning (ML). It will cover knowledge and skills in AI techniques and tools to build intelligent learning models from real-world data, through training, testing, validation and optimisation. Through hands-on group projects, you will build AI-based applications to add intelligence to existing systems.	**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**

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**	^
ESE3014	**Full Stack Development** This subject will provide you with the basic knowledge of full stack application development. Full stack (web or mobile stack) refers to the development of both the front-end and the back-end portions of an application, thereby introducing all the necessary steps from conceptualisation of the application idea to the implementation of the final product. The subject will cover the various aspects of designing and implementing the client-end application as well as the design, implementation of a database, and the appropriate retrieval of the data, from the client application through a business logic layer.	**5**	^
ESE3013	**Intelligent Automation** This subject will provide you with basic knowledge and hands-on digital transformation skills on rapid multi-experience application development and integration of users, tasks and systems towards enhancing productivity, human augmentation and automatic data-driven decision-making. It will cover techniques on how to leverage on data from information systems and Internet of Things (IoT) devices for agile response and productivity. This subject will enable you to automate data-driven decision making through integration of advanced analytics and learning models to applications.	**3**	^

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.	**4**
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**
ESE2004	**Object-oriented Programming** This subject equips you with a good understanding of software design and development process. Important phases of the software development process will be covered. More emphasis will be placed on object-oriented software design using UML (Unified Modelling Language), software documentation and testing methodologies in order to gear you towards a more practice-oriented industry.	**5**

Cluster Elective Subjects

Students must choose the same Elective Cluster in both Year 2 and Year 3

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

Industrial Internet Of Things Elective Cluster

Subject Code	Subject	Credit Units
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	4

	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.	

Intralogistics & Cybersecurity Elective Cluster

Subject Code	Subject	Credit Units
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

Virtual Reality Elective Cluster

Subject Code	Subject	Credit Units
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.	4

YEAR 1 YEAR 2 **YEAR 3** TPFUN

You are now ready to embark on your Student Internship Programme and Major Project where you will apply the knowledge and skills you have acquired.

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

Cluster Elective Subjects

Students must choose the same Elective Cluster in both Year 2 and Year 3

Industrial Internet Of Things Elective Cluster

Subject Code	Subject	Credit Units
ECC2013	**Mobile Device Applications Development** This subject covers the development of applications on mobile and wireless computing platforms. It provides an overview of Mobile Web and Mobile Applications, their importance and benefits, as well as the technologies and methodologies for their development, such as the architectures, frameworks, standards, programming languages, design process and tools.	4

Intralogistics & Cybersecurity Elective Cluster

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

Virtual Reality Elective Cluster

Subject Code	Subject	Credit Units
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.	4

University Pathway Programme (SUTD)

Subject Code	Subject	Credit Units
ESE3015	**Computational Thinking for Design** This subject covers programming both	4

	in the architectural design and computing contexts targeted at novice programmers. It will introduce students to programming and design computing skills that are essential for their studies. Students will learn visual programming and python programming together with design concepts, and will apply these skills in related projects.		
EMA3002	**Modelling & Analysis** The main objective of this subject is to provide students firm foundations of single variable calculus so that they can apply calculus to model, solve and analyse applied math problems. It aims to motivate students on the importance of calculus through a plethora of applications in engineering, physical and biological sciences, computer science, finance, economics, probability and statistics and other topics. On top of the basic concepts, techniques and applications of two branches of calculus - differentiation and integration, students will also learn to use simple software to implement numerical methods in calculus.	**4**	^
ESC3002	**Physical World** This subject provide students with the ability to understand and explain the inner mechanism of the physical world based on the principles of mechanics and thermodynamics. It aims to help students appreciate the beauty of physics and enable them to apply key concepts learnt to evaluate and address physics-based problems to make a positive impact on the world. By using concepts established through simplified mathematical models, reverse engineering case studies and experiential learning through hands-on demonstrations, connections between physics concepts and theoretical models are reinforced with practice.	**4**	^
ECS3003	**Global Humanities: Literature, Philosophy & Ethics**	**4**	^

	This subject examines stories as a way to understand ourselves and our world. Some of these stories have endured for centuries and spread far beyond their locus of origin. They raise questions that resonate with our lives even today. This subject will equip you with critical reading, thinking, and writing skills by exploring different ways of reading and interpreting classic texts. You will learn to identify the connections between various texts and between thinkers in history – ranging from those in ancient China and Greece to those in contemporary Singapore.	

Special Electives

Students can opt to take Special Electives when offered. These optional subjects aim to stretch the students' potential to enable them to meet their aspirations. They are taken in addition to the diploma elective cluster 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	2

	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.		
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**	^

YEAR 1 YEAR 2 YEAR 3 **TPFUN**

You will also take this set of subjects that equips you with the crucial 21st-Century life skills you need to navigate the modern world as an agile, forward-thinking individual and team player.

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	**12**	^

	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.		
ETX1001	**Effective Communication** This subject introduces the fundamentals of effective communication. It also covers how to communicate with and convince an audience through writing and speaking tasks. The skills in this subject will include the application of strategies for communication, appropriate vocabulary, language features, visual aids, tone and style. The **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) framework will also be applied when planning and engaging in written and verbal communication. There will be opportunities to communicate and collaborate through active learning activities, apply digital and information literacy skills and build competence through self-directed learning.	**3**	
ETX1002	**Professional Communication** This subject covers professional communication skills for the workplace and employability skills in the areas of career preparation. It covers communication and interpersonal skills, including effective virtual communication etiquette, and conducting oneself professionally in the workplace. In addition, essential career preparation skills such as resume writing and interview skills, needed to seek and secure work would be included. The **M**essage, **A**udience, **P**urpose and **S**trategy (MAPS) framework would also be applied when engaging in written and verbal communication. There will be opportunities to communicate and collaborate through active learning activities, apply digital and information literacy skills and build competence through self-directed learning.	**3**	

GTP1301	**Current Issues & Critical Thinking** This subject covers current issues, including diverse local and global concerns, that will impact lives and may have critical implications for Singapore. There will be opportunities to build competence through self-directed learning, communicate and collaborate in active discussions and objectively analyse issues using digital and information literacy skills and critical thinking scaffolds.	**3**	^
GTP1201	**Career Readiness** This subject focuses on personal management skills. It develops an understanding of one's career interests, values, personality and skills for career success. It covers the necessary knowledge, skills and attitudes needed to succeed in the workplace and achieve professional goals. There will be exposure to apply digital and information literacy skills, build competence through self-directed learning methods, and acquire the skills of being a lifelong learner.	**1**	^
GTP1202	**Career Management** This subject focuses on career management skills. It covers the importance of workplace readiness skills to adapt and respond to the changing job market environment. Career ownership and continuous learning for lifelong employability will be emphasised. There will be exposure to apply digital and information literacy skills, build competence through self-directed learning, and acquire the skills of being a lifelong learner.	**1**	^
EGS1002	**Global Studies** This subject provides essential skills and knowledge to prepare students for an overseas experience. They will examine the elements of culture and	**3**	^

	learn the key principles of cross-cultural communication. In addition, they will gain an appreciation and awareness of the political, economic, technological and social landscape to function effectively in a global environment. The subject prepares students to be responsible global citizens and leaders who can contribute to the global community through effective communication and collaboration.		
GTP1302	**Guided Learning***	**3**	
	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. Students will enhance their problem solving and digital literacy skills through this subject.		
EIN1001	**Innovation & Entrepreneurship**	**2**	
	The subject is designed for learners from all disciplines to embrace innovation in either their specialised field or beyond. Learners will be taught to apply the Design Thinking framework to develop problem statements, ideate and identify feasible solutions. Learners will be exposed to several tools for prototyping. In addition, commercial awareness will be imbued in learners through various innovation and entrepreneurship concepts or tools. This subject also prepares students to be self-directed lifelong learners who are digital and information literate. It nurtures communicative and collaborative citizens who can use objective analysis in problem-solving.		

GTP1101	**Leadership Fundamentals** This subject focuses on self-leadership based on the values of integrity, respect, and responsibility. Increasing awareness of self and others will lay the foundations for personal and relationship effectiveness. Consequential thinking, clear articulation of personal values and visions, emphatic listening, and collaboration in serving others are some of the essential skills covered in this leadership journey. There will be opportunities to build and to apply the concepts of being a values-centred leader.	**2**	^
GTP1102	**Leadership in Action** This subject focuses on Service Learning as an experiential platform to apply the tenets of Self and Team Leadership. Service Learning will be the capstone project for this subject, which will require an analysis of the diverse needs of the community, collaboration with community partners and demonstration of learning, including key elements of empathy. There will be opportunities to build and to apply the concepts of being a values-centred leader.	**1**	^
LSW1002	**Sports & Wellness** The subject enables students to build a good foundation for healthy living. Students will have the opportunity to participate in hands-on practical sessions where they will experience and develop both physical and technical skills in their chosen sports or fitness activities. Through a structured curriculum that facilitates group participation, practice sessions and mini competitions, students will be able to build lifelong skills such as resilience, leadership, communication and teamwork. Physical activity sessions will also be supplemented by health-related topics that span the dimensions of health, such as diet,	**2**	^

	nutrition, stress and weight management, to provide students with a holistic approach to healthy living. This subject also prepares students to be self-directed and accountable for lifelong learning for good health.		
TGS1001	**Sustainability & Climate Action***	**3**	
	This subject prepares students to be responsible global citizens and future leaders who can contribute to the global community. It introduces the topics of sustainability and explores how human societies can act to build a sustainable future. This subject focuses on the impact of climate change, potential solutions to climate change, and the future of the green economy from global and local perspectives.		

** Students must choose to take either **Sustainability & Climate Action** or **Guided Learning**.*

GRADUATION REQUIREMENTS

Cumulative Grade Point Average	min of 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	125 credit units