School of Informatics & IT

Contents

Walk into any bank, airport, school, office, hospital, park, theatre, train station and you will notice the pervasive power and amazing influence of Information Technology. At the School of Informatics & IT, you will receive a very strong foundation in IT and an understanding of specialised areas like big data, analytics, financial technologies, cyber security, digital forensics, game design and software development.

As a leader in the field of IT education, we are recognised as a forward-looking and progressive School, providing a range of highly relevant courses. Our emphasis on developing problem-solving and thinking skills helps us to cultivate intelligent individuals who are independent, analytical and able to respond effectively to the needs of people and organisations. We have a strong culture of applied learning, innovation and enterprise to nurture professionals who are ready for the industry. Communication skills, critical thinking, global awareness and teamwork are also emphasised because these are key attributes for people working in a global economy.

Through our Student Internship Programme, you will have the chance to gain real life work experience in either local or overseas companies, organisations or research institutes. In fact, in your final year you can be attached to an organisation for up to one year as an intern. This rich experience will prepare you well as an IT professional and give you an edge when you seek employment.

Develop your talents and skills by taking part in enrichment programmes which include national and international competitions. You will also have the opportunity to complete professional IT certification exams and participate in local and global community projects. There are many opportunities for you to be involved in social outreach activities as well, to make a difference in the lives of others. After three years, you will graduate with the confidence, qualities and skills to add value to the organisations you join.

To ensure that our curriculum remains relevant to the industry, we work closely with employers to maintain quality, industry relevance and high academic standards. An advisory committee, comprising leading industry professionals from a range of companies such as Autodesk, Cisco Systems, Cyberark, Dell, Fujitsu, the Infocomm Media Development Authority of Singapore, IBM, SAS, ST Electronics and more, provide advice to the School on its strategic direction and development to ensure that the courses we offer prepare you well for the future.

Specialist Centres and Learning Enterprises

Agile IT Solutions Centre

This Centre is a Learning Enterprise where staff, students and industry engage in providing solutions to real-life business and organisational challenges by developing solutions using Agile methodologies and design thinking. The use of Agile methodologies help improve productivity in developing IT solutions, demonstrating in the process a keen sensitivity and responsiveness to user needs.

Innovation & Research Centre

This Centre is a Learning Enterprise for staff, students and industry to work together on translational research and innovation projects. It will host and enable participants to pursue applied industry research and participate in programmes that will help commercialise their innovations. The Centre's goal is to support participation in Research, Innovation and Enterprise (RIE) projects to nurture innovative scientists, IT engineers and competent IT professionals through funded projects.

TP-Pivotal Agile Cloud Digital Centre

The TP-Pivotal Agile Cloud Digital Centre enables the practice of industry-recognised cloud platform software development processes. The Centre provides an environment to deep dive into DevOps with pair programming and test-driven development methodology.

TP-Nvidia Technology Centre

The TP-Nvidia Technology Centre (NTC) facilitates engagement on industry projects using Deep/Machine Learning and AI technologies, and Nvidia's GPU (Graphic Computing Processes) platform. This is the only centre that Nvidia has set up at a polytechnic in Singapore.

Big Data & Analytics Hub

This Hub comprises the following facilities dedicated to nurturing competent professionals in the area of big data & analytics:

- **TP-IBM Retail Analytics Centre**
  Established in collaboration with IBM Singapore, this Centre exposes staff and students to IBM's business analytics technologies and methods used in a live production environment. IBM annually engages their retail clients to work with the School's staff and students at the Centre to carry out proof-of-concept and client projects in the area of retail analytics.

- **TP-Pivotal Data Science Academy**
  At this academy located in the School of Informatics & IT, full-time students taking the Big Data Management & Governance and Business Intelligence & Analytics diploma courses will take modules that support their coursework and lead to professional certifications. The academy also provides short elective courses and a six-week projects programme designed to solve hypothetical problems as well as real problems in the areas of Data Science and Engineering. Students taking part-time courses would also benefit from modules offered by this academy.

- **TP-SAS Business Intelligence & Analytics Centre**
  Established in collaboration with SAS Institute, this Centre provides the latest infrastructure, facilities, software, and datasets to facilitate learning of comprehensive business intelligence and analytics skill sets in a data-rich environment. This Centre is capable of supporting the end-to-end business analytics life cycle, and focuses on areas such as business intelligence, data mining, social media analytics and predictive analytics. It also promotes industry collaboration and capability building by enabling students and staff to undertake relevant industry projects, and conduct applied research and development in advanced analytics.

- **TP-Thomson Reuters Financial Risk Management Centre**
  Established in collaboration with Thomson Reuters and equipped with its financial software, and premium financial information terminals, this Centre provides students with the unique opportunity to learn in a live financial market environment that familiarises them with investment banking and risk management operations.

TP-Autodesk Serious Games Hub

This Hub comprises the following facilities dedicated to nurturing competent game designers & developers:

- **Select-Start Studios**
  These Studios provide an environment, which supports the development of digital games for education, business, human resource training, entertainment and a host of other purposes. It provides students with a real world learning environment and experience at each crucial stage of the game development process. Within the Studios, students will have spaces for game design and game development.

- **Ui/Ux Future Lab**
  Students at the Ui (user interface) and Ux (user experience) labs will learn about human computer interaction and engage in testing out their applications. Beyond evaluating current user interfaces and user experiences the Ui/ Ux Future Lab is also equipped to work on new forms of interactions for future devices and applications. The labs have the latest equipment such as a state-of-the-art eye tracker system for evaluations. The results of the evaluations help students refine their interface and improve the overall user experience.

- **Game Certification Centre**
  At the Game Certification Centre, we validate the skills and professional development for the game industry. This gamification centre provides certification for game technologies related to the industry. Such technologies include the latest game engines and industry recognised certifications, such as the Autodesk Professional certifications. We are currently the only polytechnic, which provides Autodesk Professional certifications for the media and entertainment industry

IT Security & Forensics Hub

This Hub comprises the following facilities dedicated to nurturing competent cybersecurity & digital forensics professionals:

- **Temasek Advanced Learning, Nurturing and Testing Laboratory (TALENT Lab)**
  With the purpose of grooming the next generation of cyber security professionals, the Ministry of Home Affairs and Temasek Polytechnic have jointly collaborated to set up the Temasek Advanced Learning, Nurturing and Testing Laboratory (TALENT Lab). The TALENT Lab provides a conducive and realistic environment for students to practice their 'defend and protect' skillsets through near real-life cyber security scenario simulations. They also learn how to design and validate their innovations in dealing with the latest cyber-threats. This practical approach prepares students well for future careers in cyber security and digital forensics.

- **TP-Cisco Internet of Everything (IoE) Centre**
  The Internet of Everything (IoE) Centre at the School of Informatics & IT is a collaboration with Cisco which enables government agencies to funnel industry specific IoE solutions development and other related activities to it. Cisco helps to develop TP staff and students' technical capabilities in the area of IoE from embedded device level, design interface level, and networking level to the application level.

- **TP-IBM Security Operations Centre**
  The TP-IBM Security Operations Centre provides knowledge and skills training to staff and students in IBM's cyber security operation and incident management processes, methods and cyber security technologies such as IBM QRadar. Staff and students get opportunities to work alongside IBM security professionals on security projects as well as leverage IBM's Global Academic Initiative to support TP's cyber security related subjects. Students who are attached to this on-campus centre will gain unique hands-on experience in all aspects of cyber security monitoring and analysis, under the supervision of TP staff as well as IBM consultants and experts.

- **TP-RSA Security Operations Centre**
  This Centre provides an environment equipped with the most advanced cyber security and analysis technologies including RSA Security Analytics, SecOps and ECAT. RSA imparts knowledge and best practices on developing and managing an intelligence driven SOC operations to staff and students.

- **TP Green Data Centre**
  Designed for maximum energy efficiency and minimum environmental impact, the Green Data Centre enables IT applications and services, as well as computing resources to be centrally stored, managed and disseminated, without compromising energy consumption. The first Cisco Unified Computing System (UCS) deployed in South East Asia, it also hosts virtual desktop infrastructure technologies from partners such as VMware, EMC, Cisco and Fujitsu.

Big Data Management & Governance

Do you know that big data plays a major role in our lives? For instance, big data assists soccer clubs in how they use data to gain a strategic competitive advantage. Digital cameras placed in stadiums track every player on the pitch for game insights, while soccer players wear state-of-the-art equipment like GPS trackers, acceleration sensors and heart rate monitors so that their game preparation can be analysed and optimised.

Big data also extends itself to everyday activities such as online shopping with websites leveraging big data to provide a better shopping experience for their customers. For instance, online shopping giants like Amazon use big data to cut delivery times by predicting what online shoppers are going to buy and start delivering the product even before the customer clicks 'buy'!

Indeed, with big data gaining popularity in today's landscape, it is an exciting time for big data professionals. Recognising this, the Singapore Government has come up with initiatives to create a vibrant Data and Analytics ecosystem and position the country strategically as an international Data and Analytics Hub. The first and only polytechnic to offer a full-time Big Data course, you will have opportunities to work with data at your fingertips. You will also attain highly sought-after professional certifications in Data

Engineering, which ascertains your technical competency that you've built through the curriculum. When you graduate, your skillsets will be in great demand by organisations. There are many opportunities and great potential for you to excel in this area.

Upon graduating, our students can pursue further studies through the Earn & Learn Programme which enables them to work and deepen their skills, or they can also undertake courses at local or overseas universities.

There is a clear demand for graduates who have skills and knowledge in the area of Big Data Management & Governance. Your graduates will fill a known need in the big data value chain with the skills they acquired from this course.

Mr Eric Goh
Managing Director
Dell EMC Computer Systems
(South Asia) Pte Ltd

Career Opportunities

Graduates can expect good career prospects across many industries with local and multinational businesses, government agencies, financial and banking institutions and consulting firms as Data Engineers, Data Specialists, Big Data Operations Specialists, Big Data Technical Support Specialists, Data Analysts, Database Administrators and Data Warehousing Specialists.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
TP Fundamentals Subjects	: 40 credit units
Diploma Subjects	
Core Subjects	: 72 credit units
Elective Subjects	: min 8 credit units
Total Credit Units Completed	: min 120 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.

Minimum Entry Requirements

English Language (EL1) *	Grades 1 - 7
Mathematics (E or A)	Grades 1 - 6
Any two other subjects	Grades 1 - 6

To be eligible for selection, applicants must also have sat for one of the following subjects: Additional Combined Science, Additional Science, Biology, Biotechnology, Chemistry, Combined Science, Computer Studies, Creative 3-D Animation, Design & Technology, Engineering Science, Food & Nutrition, Fundamentals of Electronics, General Science, Human & Social Biology, Integrated Science, Physics, Physical Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry), Science (Physics, Chemistry, Biology).

Sijil Pelajaran Malaysia (SPM)/ Unified Examination Chinese (UEC) holders must have a minimum of grade 6 for the relevant English Language subject (e.g. Bahasa Inggeris).

Note: Applicants with complete colour vision deficiency are not eligible to apply for this course.

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS			
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CCS1006	Communication & Information Literacy	1	2
CCS1007	Workplace Communication	1	2
CCS1008	Persuasive Communication	1	2
GCC1001	Current Issues & Critical Thinking	1	2
IED1001	Innovation & Entrepreneurship	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
TFS1002	Global Studies	1	3
TFS1003	Managing Diversity at Work*	1	3
TFS1004	Global Citizenship & Community Development*	1	3
TFS1005	Expressions of Culture*	1	3
TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CCF1C02	IT Systems Security Essentials	1	4
CIA1C06	Database Application Development	1	4
CIA1C07	Logic & Mathematics	1	3
CIA1C10	Data Analytics	1	4
CIT1C14	Data Structures & Algorithms	1	4
CIT1C18	Computational Thinking	1	4
CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CIA2C01	Data Warehouse Modelling	2	4
CIA2C13	Data Visualisation	2	4
CIA2C14	Data Science Essentials	2	4
CIG2C01	Big Data Architecture & Systems	2	4
CIG2C02	Programming for Big Data	2	4
CIG2C04	Data Marshalling & Transformation	2	4
CIG2C06	Data Security & Governance	2	4
CMP3202	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CIA2E01	Text & Social Media Analytics	2	4
CIA3E01	Applied Data Science in a Business Domain	3	4
CIT3C15	Machine Learning for Developers	3	4

Business Intelligence & Analytics

To run a successful business, you must understand customer needs, preferences and purchasing trends. You need to know what's available in the market, what's selling well, and what your competitors are up to. Yes, that's right – you need to gather intelligence and analyse it to propose smart business strategies. In essence, you will be the thinker behind successful businesses.

Analytics professionals have an exciting career in store, for the Singapore Government is positioning the country strategically as an international Data and Analytics Hub as well as a Smart Nation. If you want to help businesses do better and compete more effectively, then take up this course which will position you for an exciting and rewarding career.

You will undertake projects that equip you with working experience and business domain knowledge that you require as a professional in this field. Exciting internship opportunities with local or overseas organisations provide you with valuable skills and experience as you will be working with diverse people in a dynamic work environment. You can achieve highly sought-after professional certifications, such as SAS Certified Base Programmer and SAS Certified Predictive Modeler Using SAS Enterprise Miner, to ascertain technical competency

built through the curriculum. Upon graduating, our students can pursue further studies through the Earn & Learn Programme which enables them to work and deepen their skills, or they can also undertake courses at local or overseas universities.

❝

Meeting the challenges of the new millennium is quintessential. At SAS, we refer to education as the engine of economic growth. In Singapore, SAS has been in partnership with Temasek Polytechnic since 2002. We believe that quality public education is a critical imperative for our children and for the country in this competitive, global economy. We are actively engaged in ensuring that all students have the support necessary to reach their full potential and become productive citizens. The Temasek Polytechnic BIA Diploma course ensures the next generation of technology and analytics innovators has the knowledge and skills to succeed, and to contribute to Singapore's vision of a Smart Nation.

Randy Goh
Deputy Managing Director
SAS Singapore

Career Opportunities

Graduates can expect good career prospects across many industries such as local and multinational businesses, government agencies, financial and banking institutions and consulting firms as Data Analysts, Business Intelligence Analysts, Business Analysts, Business Analytics Specialists, Data Mining Specialists, Data Warehousing Specialists and Systems Analysts.

Graduation Requirements

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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
TFS1002	Global Studies	1	3
TFS1003	Managing Diversity at Work*	1	3
TFS1004	Global Citizenship & Community Development*	1	3
TFS1005	Expressions of Culture*	1	3
TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

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CIA1C07	Logic & Mathematics	1	3
CIA1C10	Data Analytics	1	4
CIT1C14	Data Structures & Algorithms	1	4
CIT1C18	Computational Thinking	1	4
CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CIA2C01	Data Warehouse Modelling	2	4
CIA2C05	Data Mining Concepts & Techniques	2	4
CIA2C06	Business Intelligence Applications	2	4
CIA2C11	Predictive & Prescriptive Analytics	2	4
CIA2C12	Quantitative Analysis	2	4
CIA2C13	Data Visualisation	2	4
CIA2C14	Data Science Essentials	2	4
CMP3103	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CIA2E01	Text & Social Media Analytics	2	4
CIA3E01	Applied Data Science in a Business Domain	3	4
CIT3C15	Machine Learning for Developers	3	4

Cybersecurity & Digital Forensics

Advanced persistent threat, ransomware and distributed denial of service attacks – you will learn to understand their workings and potential damage they can cause. Learn how to defend against them and acquire the professional skills to detect them when (and not if) defences fail. In addition, learn the techniques to uncover hidden digital traces, analyse digital evidence, reconstruct the digital trail of events and unravel the mystery behind a cybercrime one byte at a time. The cyber world today needs many highly trained professionals with a strong sense of righteousness and tenacity like you to give companies and organs of state a fighting chance against lurking hackers and criminals.

To hone your skills, you will experience working in 'live' learning enterprises such as the TP-IBM Security Operations Centre and Temasek Advanced Learning, Nurturing and Testing Laboratory set up in collaboration with the Ministry of Home Affairs.

In the first year, you will master IT fundamentals that equip you with skills in areas such as software development, networking and data analytics. In your second year, you will acquire industry-specific competencies in cyber security and forensics such as network security, forensics in digital security and ethical hacking. Receiving hands-on training in state-of-the art facilities, you will learn how to conduct vulnerability assessments of computer and application systems, use ethical hacking tools and implement intrusion prevention solutions.

In your final year, you will have opportunities to be attached to local and overseas cyber security or forensics companies.

You will attain sought-after professional certifications, such as the RedHat Certified System Administrator/Engineer (RHCSA/ RHCE), Forensic Toolkit ACE and Cellebrite Mobile Forensics Fundamentals. Upon graduating, our students can pursue further studies through the Earn & Learn Programme which enables them to work and deepen their skills, or they can also undertake courses at local or overseas universities.

Career Opportunities

Graduates from the Diploma in Cybersecurity & Digital Forensics will have good employment opportunities with local and multinational businesses, governments, financial and banking institutions, and consulting firms as security penetration testers, security operations analysts, incident/forensic/threat investigators and IT security auditors.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
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Sijil Pelajaran Malaysia (SPM)/ Unified Examination Chinese (UEC) holders must have a minimum of grade 6 for the relevant English Language subject (e.g. Bahasa Inggeris).

Note: Applicants with complete colour vision deficiency are not eligible to apply for this course.

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TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

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CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CCD2C03	Ethical Hacking & Intrusion Prevention	2	4
CCD2C04	Forensics in Digital Security	2	4
CCD2C05	IT Security Management & Audit	2	4
CCD2C06	Servers Administration & Security	2	4
CCD2C08	Secure Web Applications	2	4
CCF2C01	Network Security	2	4
CDF3C01	Incident Response & Management	3	4
CMP3602	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
Digital Forensics			
CDF2C02	Digital Media Forensics	2	4
CDF2C04	Investigation Methodology & Techniques	2	4
CDF2C05	Application Forensics	2	4
CIG2C06	Data Security & Governance	2	4
Enterprise Security			
CCD2C09	Enterprise System Security & Assurance	2	4
CFI2C03	IT Project Management	2	4
CMC2P52	IoT Security & Privacy	2	4
CCD3C01	Security Technology & Innovation	3	4

Financial Business Informatics

In the local and global banking and financial services industry, there is demand for professionals who possess information technology skills and a sound understanding of financial business processes. Such techno-strategists, with their dual skills, are sought after because they can contribute significantly to the organisations they join.

This course equips you with the knowledge and skills to be technically and financially savvy. You will learn how banks and financial institutions are structured to operate in the global financial markets. Your knowledge of IT and financial services will give you a distinct advantage in seeking employment in financial organisations or when you create a financial technology (FinTech) startup venture.

In your first year of studies, you will acquire strong foundation IT skills in areas such as software development, networking and data analytics. In your second year, you build sound industry-relevant competencies in financial technologies. In your final year, you will get hands-on experience through internship attachments to banks, financial institutions and fintech startups. This will also provide you with the opportunity to apply the knowledge you have acquired in your first two years and pick up important people skills so that you develop sensitivity to the needs of clients and organisations.

Upon graduating, our students can pursue further studies through the Earn & Learn Programme which enables them to work and deepen their skills, or they can also undertake courses at local or overseas universities.

> With dual skills in IT banking processes and a keen knowledge of key financial systems, students from this course will be able to support investment operations as well as contribute as business analysts skilled in the banking domain. The training these students receive in Thomson Reuters products, enables them to help customers become more efficient and equips them to lead in the evolution of the global financial market.

Mr Alfred Lee
Managing Director
ASEAN
Thomson Reuters

Career Opportunities

With unique dual skills in finance and IT, you are well-positioned for careers in financial institutions, and business/IT consulting firms. You can look forward to jobs such as financial systems consultants, IT/business analysts or financial products settlements specialists. You could also look forward to joining the exciting financial technology (fintech) industry or developing your own start-up company.

Graduation Requirements

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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
TFS1002	Global Studies	1	3
TFS1003	Managing Diversity at Work*	1	3
TFS1004	Global Citizenship & Community Development*	1	3
TFS1005	Expressions of Culture*	1	3
TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
BAF1007	Basic Business Finance	1	4
CCF1C02	IT Systems Security Essentials	1	4
CIA1C06	Database Application Development	1	4
CIA1C07	Logic & Mathematics	1	3
CIA1C10	Data Analytics	1	4
CIT1C14	Data Structures & Algorithms	1	4
CIT1C18	Computational Thinking	1	4
CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CFI2C11	Banking Processes & Automation	2	3
CFI2C12	FinTech Innovations	2	4
CFI2C13	Open Banking App Development	2	4
CIT2C18	Mobile App Development	2	4
CFI3C01	Risk & Governance	3	4
CFI3C04	Wealth & Portfolio Management	3	4
CMP3801	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE CLUSTERS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
Digital Payment			
CFI2E06	Digital Payment & Lending	2	4
CFI2E07	Distributed Ledgers & Blockchain	2	4
Business Analytics			
CBA2C02	Data Mining & Business Analytics	2	4
CIA2C13	Data Visualisation	2	4

Game Design & Development

Today, games have evolved beyond those like the World of Warcraft and Halo. Games are no longer confined to gaming machines. Immersive media and AR/VR are making games come alive in ways no one ever imagined before and they can reach many more people. At TP, we focus on developing students' skills in Serious Games. Serious Games are those that go beyond entertainment. The demand for them is increasing, with many being developed in the form of simulations and training for different sectors such as healthcare and the military. With Singapore hosting a large gaming industry, there is a need for highly skilled game developers and designers who can use the latest immersive technologies to work on both the entertainment and serious games.

Any person can play a serious or video game; but to successfully develop a game that excites, engages, and educates an audience requires skill. These include skills in concepts – such as digital storyboarding, production – including 2D/3D animation, immersive technologies (AR/VR) and publication.

We prepare you to be industry relevant with certifications from our industry partners such as Autodesk and Unity.

Our subjects allow you to have a strong understanding of and experience in the immersive technologies behind serious and video games, giving you a firm grasp of the end-to-end process to develop a successful game.

Our lecturers, several of whom have worked on some of the world's best-selling video game titles, specialise in various areas of game production. They will help you acquire the skills to create your games from the initial stages of concept development and design, through to programming and the final stages of publishing a game.

To give you a head start in the industry, you will work in the Select-Start Studios taking on real-world projects. Some of our students' projects include commercially available iPhone and Android games, as well as serious games related to training and simulation for different industry sectors. You will also have the chance to be attached to leading game developers, overseas companies and universities for your internship.

Upon graduating, you can pursue further studies through the Earn & Learn Programme which enables you to work and deepen your skills, or you can also undertake courses at local or overseas universities.

Career Opportunities

You will graduate with the skills to fill the following types of positions: applications developer, game developer/programmer, level designer/game designer, and AR/VR developer.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
TP Fundamentals Subjects	: 40 credit units
Diploma Subjects	
Core Subjects	: 72 credit units
Elective Subjects	: min 8 credit units
Total Credit Units Completed	: min 120 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.

Minimum Entry Requirements

English Language (EL1) *	Grades 1 - 7
Mathematics (E or A)	Grades 1 - 6
Any two other subjects	Grades 1 - 6

To be eligible for selection, applicants must also have sat for one of the following subjects: Additional Combined Science, Additional Science, Biology, Biotechnology, Chemistry, Combined Science, Computer Studies, Creative 3-D Animation, Design & Technology, Engineering Science, Food & Nutrition, Fundamentals of Electronics, General Science, Human & Social Biology, Integrated Science, Physics, Physical Science, Science (Chemistry, Biology), Science (Physics, Biology), Science (Physics, Chemistry), Science (Physics, Chemistry, Biology).

Sijil Pelajaran Malaysia (SPM)/ Unified Examination Chinese (UEC) holders must have a minimum of grade 6 for the relevant English Language subject (e.g. Bahasa Inggeris).

Note: Applicants with complete colour vision deficiency are not eligible to apply for this course.

Course Structure

TP FUNDAMENTALS (TPFun) SUBJECTS			
SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CCS1006	Communication & Information Literacy	1	2
CCS1007	Workplace Communication	1	2
CCS1008	Persuasive Communication	1	2
GCC1001	Current Issues & Critical Thinking	1	2
IED1001	Innovation & Entrepreneurship	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
TFS1002	Global Studies	1	3
TFS1003	Managing Diversity at Work*	1	3
TFS1004	Global Citizenship & Community Development*	1	3
TFS1005	Expressions of Culture*	1	3
TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CCF1C02	IT Systems Security Essentials	1	4
CGE1C10	Game UiUx	1	4
CIA1C06	Database Application Development	1	4
CIA1C07	Logic & Mathematics	1	3
CIA1C10	Data Analytics	1	4
CIT1C14	Data Structures & Algorithms	1	4
CIT1C18	Computational Thinking	1	4
CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CGE2C12	Game Modelling	2	4
CGE2C15	Game Math & Physics	2	4
CGE2C16	Game Development	2	4
CGE2C17	Game Development Project	2	4
CGE2C19	Programming with Game Engines	2	4
CGE2C20	Game Design	2	4
CMP3702	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE CLUSTERS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
Advanced Game Design			
CGE2P21	Advanced Game Modelling	2	4
CGE3E02	Advanced Game Design	3	4
Advanced Game Programming			
CGE2E05	Programming for Procedural Game Content	2	4
CGE3E01	Game AI	3	4

Information Technology

How does my mobile app locate the nearest Uber? How does my home know to turn on the lights 5 minutes before I get there? How do self-driving cars learn to drive on their own? How does a robot recognize my speech and reply? The answers to all these questions and much more share one common thing: they are all created through and driven by information technology.

In today's world artificial intelligence-based applications, mobile applications, data analytics and the Internet of Things (IoT) are driving innovation and disrupting everything around us. Graduates from this course are able to develop innovative software solutions through coding that will transform and disrupt society in a meaningful way. If you are passionate about transforming the culture and environment around you through IT, then consider this course in Information Technology.

You have two clusters of elective subjects to choose in this course:

• Business Analytics Cluster which focuses on analysing and interpreting data and developing visualisations using dashboards.
• Game Development Cluster which focuses on the knowledge and skills needed to design and develop games.

In your final year, you will integrate the knowledge that you have acquired to complete a major project. You will also be attached to either a local or overseas company as an intern and this will provide you an opportunity to apply your skills in a real work environment and also prepare you to contribute as an IT professional when you graduate.

This course has an established track record of producing highly successful students who have won top positions in national and international IT software applications and development competitions as well as create their own start-up companies. Upon graduating, our students can pursue further studies through the Earn & Learn Programme which enables them to work and deepen their skills, or they can also undertake courses at local or overseas universities.

The challenges facing businesses today require solutions that are grounded on innovation in technology. We are also seeing several disruptive trends such as artificial intelligence, block chain, data analytics, DevOps and the Internet of Things (IoT), which requires the workforce of the future to adapt to the ever changing landscape. This future workforce needs to be agile and flexible in delivering innovative technology solutions. The Diploma in Information Technology course at Temasek Polytechnic helps provide a solid foundation for developing IT professionals for the industry.

Sam Liew
Managing Director
Accenture Singapore

Career Opportunities

With a broad-based education in IT, your employment prospects are excellent. You will be able to fill positions such as applications developers, systems analysts, IT consulting analysts and platform engineers in government organisations, software houses, large multinational corporations and financial institutions.

Graduation Requirements

Cumulative Grade Point Average	: min 1.0
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LEA1012	Leadership: Essential Attributes & Practice 2	1	1
LEA1013	Leadership: Essential Attributes & Practice 3	1	1
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MCR1002	Career Readiness 2	1	1
MCR1003	Career Readiness 3	1	1
TFS1002	Global Studies	1	3
TFS1003	Managing Diversity at Work*	1	3
TFS1004	Global Citizenship & Community Development*	1	3
TFS1005	Expressions of Culture*	1	3
TFS1006	Guided Learning	1	3
CSI3004	Student Internship Programme	3	16

Students must choose to take either one of these three subjects or TFS1006 Guided Learning.

DIPLOMA SUBJECTS – CORE SUBJECTS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
CCF1C02	IT Systems Security Essentials	1	4
CIA1C06	Database Application Development	1	4
CIA1C07	Logic & Mathematics	1	3
CIA1C10	Data Analytics	1	4
CIT1C14	Data Structures & Algorithms	1	4
CIT1C18	Computational Thinking	1	4
CIT1C19	User Experience & Interface Design	1	3
CIT1C20	Coding & Development Project	1	4
CMC1C08	Network Technology	1	4
CGE2C11	Object-Oriented Analysis & Design	2	4
CIT2C18	Mobile App Development	2	4
CIT2C19	Software Quality Assurance	2	4
CIT2C20	Full Stack Web Development	2	4
CIT2C21	Microservices	2	4
CMC2C16	IoT Application Development	2	4
CIT3C15	Machine Learning for Developers	3	4
CMP3102	Major Project	3	10

DIPLOMA SUBJECTS – ELECTIVE CLUSTERS

SUBJECT CODE	SUBJECT	LEVEL	CREDIT UNITS
Business Analytics			
CBA2C02	Data Mining & Business Analytics	2	4
CIA2C13	Data Visualisation	2	4
Game Development			
CGE2C16	Game Development	2	4
CGE2C20	Game Design	2	4

Subject Synopses

BAF1007 Basic Business Finance

This subject provides a general overview of the balance sheet and profit and loss statement of the company. It also provides a basic understanding of the sources and allocation of funds within a business enterprise, and an appreciation of some of the financial tools and techniques used by the financial manager in the management of funds and other financial resources.

CCD2C03 Ethical Hacking & Intrusion Prevention

This subject discusses threats on the Internet and provides an understanding of how a cyber-attacker will penetrate a network. It equips you with the principles and practices of preventing such attacks, discussing threats such as malicious codes, website defacing and hacking, illegal access to unauthorised information, privacy violations, distributed denial of services and cyber terrorism. You will acquire knowledge of potential threats, various penetration strategies and methods, and the respective counter measures. You will also learn the principles of creating a secure network design.

CCD2C04 Forensics in Digital Security

This subject covers the concept and techniques required to discover and investigate evidence from various digital storage devices. Topics include using common tools and commercial toolsets for extraction and analysis of digital evidence. Network traffic capture and analysis will also be discussed and investigated for the tracing of specific information and source of attacks.

CCD2C05 IT Security Management & Audit

This subject aims to familiarise you with the various IT security policies processes and procedures, as well as best practices in industry and government. You will learn about the associated standards for risk management and the management of IT security. You will also learn how to plan, execute, report and follow up on an information security management system audit.

CCD2C06 Servers Administration & Security

This subject covers the concept and techniques required to configure and administer a typical networked server using common operating systems in the industry. Topics include installation of a server system, configuration of devices, disks and file systems with security configuration of Local Area Network (LAN) and Wide Area Network (WAN) environments. Administering of key server services, using various tools and system scripting to monitor and analyse its performance and security will be discussed and applied. The subject also covers the concepts of encryption methodology, Public Key Infrastructure, key distribution and authentication.

CCD2C08 Secure Web Applications

This subject focuses on secure web application design and development. It discusses the inherent threats and vulnerabilities of web applications and the corresponding countermeasures. In addition, it includes industry best practices such as OWASP (Open Web Application Security Project) Top Ten Web Application Vulnerabilities.

CCD2C09 Enterprise System Security & Assurance

The subject covers the security risks associated with the deployment and use of enterprise level server operating systems as well as services such as email, database, secure wired and wireless access and web. The subject teaches assessment of security risks when these systems are integrated and conducting penetration testing and incident response to ensure the integrity and security of the enterprise systems.

CCD3C01 Security Technology & Innovation

This subject covers topics such as security trends and technologies in the industry, the types of innovation, key elements of innovation and innovation skills required to move progressively from idea to impact. It discusses topics on security innovation relating to the methods, ideas, production, market needs, effective processes, impact and needs of customers.

CCF1C02 IT Systems Security Essentials

This subject introduces statutes and ethical issues pertaining to IT. Topics covered include the Computer Misuse and Cybersecurity Act, Personal Data Protection Act and Intellectual Property Rights. The subject also introduces key principles of Information security namely confidentiality, integrity and availability and their application in various security scenarios. Topics covered also include international standards, security policies, procedures, and processes to protect IT systems against cyber-attacks and information breaches.

CCF2C01 Network Security

This subject introduces internetworking security technologies, including configuring network-based access control lists, managing network firewalls, configuring logging and remote management. The subject also covers the configuration of authentication, authorisation and accounting on network devices, customising privilege levels and views.

CCS1006 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.

CCS1007 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.

CCS1008 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.

CDA2C02 Data Mining and Business Analytics

This subject introduces the fundamental concepts of machine learning. Topics covered include supervised and unsupervised learning and classification.

CDF2C02 Digital Media Forensics

This subject covers three main areas: Mobile Device Forensics, Image & Video Forensics, and Correlation & Artificial Intelligence. You will be using different tools to extract and analyse digital media data from various mobile devices. Fundamental elements of digital photos and digital videos will also be taught. Different image and video enhancement techniques to process evidence for investigation will be covered. Matching and correlation techniques, including the use of artificial intelligence, will be covered as well.

CDF2C04 Investigation Methodology & Techniques

This subject introduces you to the methodology and techniques of analysing multiple sources of digital evidence to determine the cause and effect of an incident. The topics in the subject include the application of best practices and techniques to relate digital evidence to cybercrimes. You will review various case facts to determine how they are related to a crime, reconstruct an incident as well as produce and present findings in a manner that is acceptable to a court of law. You will also go through case examples on best practices and how cause and effect were derived during an investigation.

CDF2C05 Application Forensics

This subject covers the investigation of applications such as web browsers, word processors and standalone executables, as well as Internet applications such as emails and social networking websites, in the context of digital forensics. These applications may be used for illegitimate means or to introduce malicious software into a computer system. In these cases, digital forensic analysis would be carried out to determine the source and extent of the damage.

CDF3C01 Incident Response & Management

This subject covers the policies, plans and procedures for computer security incident response of events such as denial of service, malicious code and authorisation access. It establishes proper processes for assessing the impact of incident on business and implements effective methods of collection, analysis and reporting of data.

CFI2C03 IT Project Management

This subject covers the key processes from project initiation to project closure such as project planning, project monitoring and control, resource management, project implementation and closure.

CFI2C11 Banking Processes and Automation

This subject covers retail banking processes, design thinking model and analysis techniques. It will also cover VBA programming and use advance Excel macros creation to streamline retail operational processes as well as implement data processes automation.

CFI2C12 FinTech Innovations

This subject introduces you to core financial services, banking and FinTech business models. You will also learn and compare the current financial processes to new Fintech business models. Disruptive trends like digital payments, blockchain and tokenisations, crowdfunding, Online lending, insurtech etc will also be covered.

CFI2C13 Open Banking App Development

This subject introduces you to the different types of financial banking instruments available in the financial system. It will also cover banking concepts and Open Banking API infrastructure, enabling you to build customer-centric platforms.

CFI2E06 Digital Payment and Lending

This subject introduces you to the concepts, instruments and technologies used in lending & payment services in the financial market. It also covers the use of FinTech and disruptive ideas that are changing the landscape of lending & payment services.

CFI2E07 Distributed Ledgers and Blockchain

This subject introduces you to the concept of distributed ledgers and the technical principles and implementation of Blockchain. You will also develop an understanding of the concept of ledgers decentralisation, its impact and relationship with blockchain technology.

CFI3C01 Risk and Governance

This subject introduces the Monetary Authority of Singapore (MAS) regulations and risk management guidelines for financial institutions. Topics covered include the MAS Act, internal controls for risk management, credit risk management, market risk management, operational risk management, technology risk management, and audit considerations.

CFI3C04 Wealth & Portfolio Management

This subject introduces the financial planning concepts and techniques used in designing a portfolio for high net worth clients and organisations. This subject will also cover various models of portfolio management. Topics covered include overview of the wealth management advisory process, investment and portfolio management, client relationship management, investment fund products and industry-company analysis using current tools and techniques.

CGE1C10 Game UiUx

This subject focuses on user interfaces and the user experiences of interaction within the game. You will learn the basics of how to create effective game interfaces using the appropriate tools and techniques, as well as understand the user perspectives and experiences of users interacting with game interfaces.

CGE2C11 Object-Oriented Analysis & Design

This subject introduces object-oriented analysis and design (OOAD) techniques using a suitable tool. The topics covered include use case model, use case specifications, domain model, sequence diagrams, view of participating classes (VOPC), database design and mapping class diagram to code.

CGE2C12 Game Modelling

This subject will introduce you to the 3D model creation workflow specifically for the game production pipeline used within the context of game development. You will learn to use Polygon Mesh construction methods and texturing concepts for 3D game production. This subject also introduces Digital Content Creation (DCC) tools that you will apply to 3D modelling techniques such as low-poly meshing and digital texturing practices such as using coordinate mapping function, and photographic texture creation for crafting 3D in-game art assets.

CGE2C15 Game Math & Physics

This subject will teach you the mathematics and physics concepts, principles and formulas that are crucial to developing games that look realistic, and how to apply these concepts into game situations such as simulating rigid-body collisions using momentum and energy. The subject includes geometry, trigonometry, vectors and matrices, and physics concepts, such as Newton's Laws of Motion and Forces and Energy, which will enable you to simulate realistic motion in games.

CGE2C16 Game Development

This subject provides you with the knowledge and skills to develop graphical interactive games through the use of existing game libraries and to create the component parts of a game, both assets and programming code, and then bring them together to produce a complete game. The subject covers game development techniques such as sprite creation, rendering and animation; collision detection; the main game loop; event handling and control of the frame rate. The in-game usage of sound effects will also be taught, as well as key programming concepts required in game development such as memory management, programming standards and debugging.

CGE2C17 Game Development Project

This subject introduces you to the key processes in the pre-game production, game production and post-game production stages. Topics on game industry roles and responsibilities, game development methodology, programming, design techniques and game-testing and quality assurance will also be covered.

CGE2C19 Programming with Game Engines

This subject introduces programming of games using Game Engine. The subject will cover different game programming techniques and design pattern. You will be able to employ the techniques and used in conjunction with game engines.

CGE2C20 Game Design

This subject emphasises the use of game design to improve ideas before and during implementation. It covers various aspects of game design, from initial target audience, player behaviour and attitude to aspects affecting implementation within the actual video game. By examining various successful video games within different genres, you will learn to include a variety of attributes in your video games such as motivation for the player and being able to generate re-playability.

CGE2E05 Programming for Procedural Game Content

This subject focuses on programming specifically for procedurally generated content within a game. You will explore the techniques and approaches using a game engine to build procedural generated content for optimised performance.

CGE2P21 Advanced Game Modelling

This subject teaches you key techniques used in today's game industry for game character creation. You will learn to produce Object Space Normal Map and 3D game characters with complete texture maps and optimisation. This subject also covers the game character production workflow such as character-based modelling method, UV mapping, character mesh detailing and texture painting with digital sculpting tool, and techniques such as texture map baking approach and game model optimisation technique such as Level of Detail (LOD).

CGE3E01 Game AI

The subject introduces the concept of AI within a game engine. You will learn the basic theories behind AI and explore techniques to apply AI using a game engine for various game types.

CGE3E02 Advanced Game Design

The subject emphasises the use of advanced game and level design concepts to improve ideas before and during implementation. You will be analysing specific aspects of games, their appearance historically and their impact to the player. Arranging and producing a level will give you hands-on experience with factors like spawn point placement and level objectives construction.

CIA1C06 Database Application Development

This subject will introduce the fundamental concepts of relational database systems, the design methods specific to relational database, database manipulation using a database query language, and the techniques of implementing relational databases. It will also cover implementation of simple application to access relational database.

CIA1C07 Logic & Mathematics

The subject covers logic, sets, functions, recursion and graphs. It covers mathematical processes for developing algorithms in computing and other real-life applications. Topics covered also include the fundamental mathematical concepts needed for computing.

CIA1C10 Data Analytics

This subject introduces the concepts and techniques of data analytics and its importance at work and in society. You will cover the data analytics lifecycle, the formulation of business analytics goals, performance of exploratory data analysis, preparation of data for analysis, application of basic analytics techniques and presentation of insights derived.

CIA2C01 Data Warehousing Modelling

This subject equips you with the knowledge and skills on data modelling techniques for data warehousing. On completion of this subject, you would be able to design and implement a data warehouse model. The subject introduces the fundamental concepts of data warehouse modelling and covers concepts and principles of data warehouse, introduction to data warehouse model design, data warehouse model implementation and data warehouse applications and tools.

CIA2C05 Data Mining Concepts & Techniques

This subject aims to equip you with the knowledge and skills to use data mining tools to analyse and segment data to explore and discover previously unknown patterns and relationships to generate useful information. This subject covers concepts, methodology, techniques and application of data mining. Several popular data mining techniques, such as cluster analysis, association analysis and decision tree will also be introduced. You will use software tools to perform these analyses and make decisions based on the analysis results.

CIA2C06 Business Intelligence Applications

This subject equips you with the knowledge and skills to develop Business Intelligence applications for an organisation so that its business performance is aligned to identified goals. The subject covers the concepts, techniques and emerging technologies of Business Intelligence applications development. You will also learn the ethical and legal issues in developing Business Intelligence applications.

CIA2C11 Predictive & Prescriptive Analytics

This subject provides you with the knowledge and skills to create a predictive model based on historical data to predict future trends and behaviours. In addition, you will be taught techniques to propose better decision to take advantage of a future opportunity or mitigate a future risk.

CIA2C12 Quantitative Analysis

The subject covers linear regression, correlation between a dependent variable and independent variable, analysis of variance, chi-squared tests, two-way analysis of variance (ANOVA) and multivariate analysis.

CIA2C13 Data Visualisation

This subject covers graphing fundamentals, graphing properties and building dashboard for reporting purposes using relevant statistical modelling and analysis techniques. Topics covered include the preparation of reports on data analysis to support managerial decision-making.

CIA2C14 Data Science Essentials

This subject equips you with the knowledge and skills in the emerging field of data science. You will cover the data science life-cycle, history and context, as well as its landscape. Topics covered include data exploration and analysis techniques to discover new knowledge from data to aid data-driven decisions in an intelligent and informed way.

CIA2E01 Text & Social Media Analytics

This subject equips you with the knowledge and skills to process textual data and social media for analytical insight. It covers topics such as social media analytics concepts and techniques, text analytics process and techniques such as information extraction, text categorisation, cluster analysis and sentiment analysis.

CIA3E01 Applied Data Science in a Business Domain

This subject introduces how data science is used in the various industries (e.g. Financial Services / Retail / Logistics) to develop actionable insights for better decision making to improve businesses. It provides opportunities for you to integrate and apply their skills acquired through the various modules for this end-to-end implementation in specific business domain. Project management and agile methodologies will also be introduced in this subject.

CIG2C01 Big Data Architecture & Systems

This subject equips you with the knowledge and skills to design a big data system in an organisation, as well as to store and apply structured and unstructured data in the context of big data integration. This subject introduces the emerging data architectures driven by "Big Data" adoption and will cover new paradigms of data systems within the realm of "Big Data," which evolved from social media networks. It will also cover the concepts and techniques that have driven Big Data adoption and a comparison of these with traditional data store architectures such as structured databases and data warehouses. Emerging data architectures such as real-time and complex event processing tools will also be covered.

CIG2C02 Programming for Big Data

This subject equips you with the knowledge and skills to program a data management application to manage big data. It covers commonly used scripting languages (such as Python) and how it can be used for big data collection and processing. The use of data analysis, web scraping and data structures in the context of big data will be covered. Other languages for data integration and processing (such as R) will be covered as well.

CIG2C04 Data Marshalling & Transformation

This subject equips you with the knowledge and skills of data mining and to perform data marshalling and transformation. You will be able to gather and transform data into standardised format for network transmission and storage. This subject also covers the fundamental concepts of data mining, data marshalling and data transformation techniques. Conversion of data objects into data streams and standard industry data formats with the use of techniques and tools will be introduced. Implementation of data marshalling and transformation in big data systems will also be covered.

CIG2C06 Data Security & Governance

This subject covers data security and governance as a quality control discipline for assessing, managing, using, improving, monitoring, maintaining, and protecting organisational information. You will learn about concepts such as data security and access, data protection, data policies, business process management, and risk management surrounding the handling of data in an organisation.

CIT1C14 Data Structures & Algorithms

This subject introduces you to the fundamentals of recursion and data structures in solving problems using a programming language. Topics covered include stacks, queues, linked lists and trees. Searching techniques and sorting algorithms.

CIT1C18 Computational Thinking

This subject introduces you to the fundamentals of computational thinking and their application in developing programming solutions to problems. Topics covered include programming concepts, simple data structures and programming techniques.

CIT1C19 User Experience & Interface Design

This subject introduces you to the concept of Human-Centered Design, and its practice to create useful digital products and interfaces that offer great user experience (Ux). Grounded on the lean product development cycle, the topics covered in this subject include Designing Interfaces, Need Findings, Sketching and Prototyping for Interactive Experience, and Testing.

CIT1C20 Coding & Development Project

This subject introduces you to coding principles and practices using an object-oriented approach. The subject also introduces the development of an IT application using the latest technologies. Topics covered include object and classes, composition, simple data structures, application architecture, design and development.

CIT2C18 Mobile App Development

This subject introduces the techniques and practices of programming and implementation of applications on multiple devices and platforms. Topics covered include an overview of how mobile applications are used in various industries, user interface and mobile application development across platforms.

CIT2C19 Software Quality Assurance

This subject introduces the theory and practice of software quality assurance. Topics covered include tools for software testing, testing specifications, black-box and white-box testing, code inspections, metrics, testing documentation, beta testing and test management.

CIT2C20 Full Stack Web Development

This subject introduces the concepts of full-stack web-based applications. Topics covered include designing web pages and implementing the front-end and back-end technologies of a web application. Technological and design issues of web-based application development will also be discussed.

CIT2C21 Microservices

This subject introduces the concepts of microservices in the development of applications. Topics covered include architecture design, development and testing of modular services.

CIT3C15 Machine Learning for Developers

This subject covers the fundamentals of machine learning principles and practices. Supervised and unsupervised learning, neural networks and deep learning will also be covered.

CMC1C08 Network Technology

This subject covers the fundamentals of networking and its related technologies. Topics covered include network protocols and communications, OSI and TCP/IP networking model, IP addressing, virtual local area networks (VLANs), static and dynamic routing, network address translation and wireless networking.

CMC2C16 IoT Application Development

This subject covers the concepts of Distributed System Architecture like Service-Oriented Architecture, Representation State Transfer (REST) and Web Services, identification of technology and design principles for connected devices and prototyping techniques for writing web services.

CMC2P52 IoT Security & Privacy

This subject covers the security and privacy issues involved in the implementation of IoT applications and services. You will learn topics which cover cryptography, capability, access-control mechanisms, authentication models and privacy support through data abstraction, integration and data synchronisation.

CMP3102 Major Project

This subject involves the application of knowledge in a practical learning situation. The subject covers acquiring new knowledge in technology and skills in project management, problem solving and communication.

CMP3103 Major Project

This subject equips you with the skills and knowledge to apply the acquired business intelligence & analytics skills and knowledge from your curriculum to the design and development of a project deliverable. The subject involves the integration of analysis, design, development, implementation, testing, project management, presentation, and interpersonal skills as well as acquiring new skills in a domain-specific area to solving real-life problems.

CMP3202 Major Project

This subject equips you with the skills and knowledge to apply the acquired big data management and governance skills and knowledge from the various subjects in the diploma to the design and development of a project deliverable. This subject involves the integration and application of knowledge and skills developed from the various subjects in the curriculum. It will provide an opportunity to develop a practical understanding of the products, methodologies, processes, systems, project management and presentation skills needed for big data management and governance application projects.

CMP3602 Major Project

Through this subject, you learn to integrate and apply the knowledge and skills learnt from other subjects in the Cybersecurity & Digital Forensics curriculum. The subject provides an opportunity for the practical application of both technical and soft skills such as project management, presentation and problem solving.

CMP3702 Major Project

This subject helps you integrate and apply the knowledge and skills acquired from the various subjects in the Game Design & Development curriculum. It helps you develop a practical understanding of game development methodology, programming and design techniques, quality assurance, project management and presentation skills.

CMP3801 Major Project

This subject involves the integration and application of knowledge to a project in a practical learning situation. The subject will provide an opportunity for the development of a practical understanding of the products, methodologies, processes, systems, project management and presentation skills.

CSI3004 Student Internship Programme

This subject has a structured programme that will help to develop important workplace skills for application in a real work environment. The subject will cover a pre-internship training programme and a mentorship programme with the industry. The subject will also cover the roles and functions of an IT professional in an industry and ability to contribute effectively with a high level of professionalism in the workplace.

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.

IED1001 Innovation & Entrepreneurship

The Innovation & Entrepreneurship subject is designed for learners from all disciplines to embrace innovation in either their specialised field or beyond. You will first be introduced to the Design Thinking framework and learn how to 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. In addition, commercial awareness will be imbued in you through the LEAN Startup framework, idea crystallisation, prototype building, customer testing and validation, refinement of business model canvas, and crowdfunding/crowdsourcing avenues.

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. It aims to cultivate the necessary attitudes, skills and knowledge to conduct yourself professionally, adapt and respond to the changing job market environment.

TFS1002 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.

TFS1003 Managing Diversity at Work

You will examine your own identity, study different forms of diversity and apply strategies to inspire positive collaboration in a diverse workplace. Through a residential stay, you will have the opportunity to experience living and working with peers from different backgrounds.

TFS1004 Global Citizenship & Community Development

This subject highlights the inter-connectedness of the world today, bringing about what it means to be a Global Citizen. You will gain an awareness of the impacts of globalisation and the concepts of social responsibility and sustainable community development. This subject also challenges you to be actively engaged in a social or environmental project.

TFS1005 Expressions of Culture

Whether telling stories, building monuments or celebrating rites of passage, expressions of culture are at the core of cultural diversity. In this subject, everyday objects, artistic creations and popular culture are explored as ways of understanding the values and beliefs of a society. You will explain the role of cultural heritage stakeholders and learn to conduct cultural story-telling. By taking this subject, you will benefit by acquiring a greater understanding and appreciation of the complexities surrounding our cultural assets.

TFS1006 Guided Learning

This is a subject where you will be free to pursue an area of interest through a self-directed approach, guided by staff. You will be expected to demonstrate a sense of curiosity for learning, initiate an opportunity to acquire knowledge and skills, and reflect on your learning journey throughout the subject.