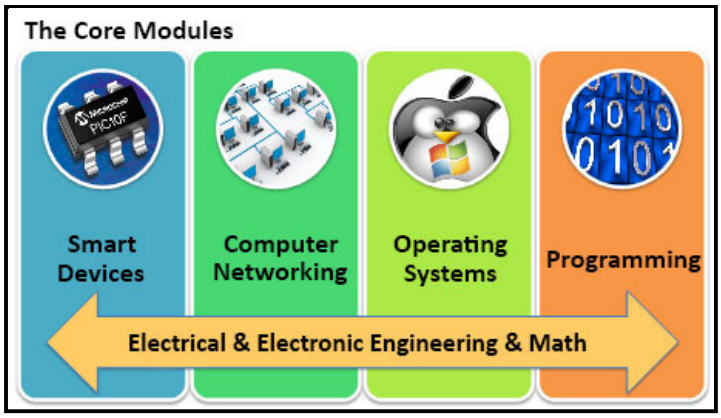
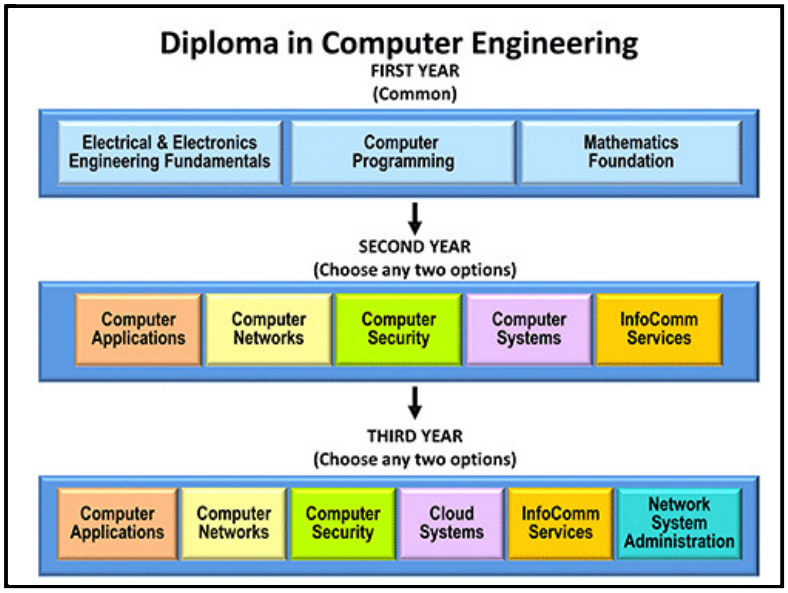
SINGAPORE POLYTECHNIC SP

What You'll Study





First Year

First-year students take part in a competition pitting the best projects as part of the Introduction to Engineering module. More.

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0083	Structured Programming Teaches students to write programs in a structured way. It emphasizes good programming techniques and covers topics on simple data types, input/output, selection control and loop-constructs, functions and basic data structures such as arrays.	60
ET0085	CADD Equips students with the knowledge of drawing office practice, ISO drawing standards and acquiring of drawing skills using latest AutoCAD software. It aims to teach students the ability to read and produce good technical sketches and projection drawings as a form of engineering communication. The module shall cover basic 2D drawings, isometrics and orthogonal projections, and the use of workstation based CAD/CAM software for computer aided drafting.	30
ET0730	Network Fundamentals This module provides a general overview of computer networking. It provides a general introduction to networking terminology, concepts, devices, functionality, applications and standards required for computer networking. Students will learn to build simple LANs, perform basic network and service configurations, and implement IP addressing schemes.	30
ET1003	Digital Electronics I Introduces students to the knowledge, understanding and design techniques necessary, to enable them to design simple combinational circuits using commercial SSI and MSI integrated circuits. Additional topics covered include introduction to simple sequential logic circuits such as flip-flops and mono-stables.	60
ET1004	Digital Electronics II Builds on basic material covered earlier with advanced topics such as adders, multiplexers/de-multiplexers, decoders/encoders, counters and shift registers and some application examples of these circuits.	60

ET1005	Principles of Electrical and Electronic Engineering I Covers the fundamental concepts of electricity. Basic laws and theorems which govern the operation of electrical circuitry are explained with illustrations. Understanding and application of electrical phenomena are further enhanced using circuit simulation on worked examples and tutorial problems and via hands-on sessions. Topics covered include scientific notation, engineering notation, metric prefixes, basic elements of an electrical circuit, definitions of energy and power, power sources, measuring instruments, DC and AC concepts, simple series and parallel networks, electromagnetism, inductor, inductance, transformers, Kirchhoff Voltage and Current Laws, Current and Voltage Divider Rules.	60
ET1006	Principles of Electrical and Electronic Engineering II Extends the basic concepts onto other electrical and electronic devices. Topics covered include: Capacitor, capacitance, Superposition theorem, semiconductor physics, semiconductor devices such as diodes, special diodes and bipolar transistors, transducers such as thermistors, and application of operational amplifiers. Students will participate in PBIL activity to exhibit team learning. Upon completion, this module consolidates students foundation of the electrical and electronic engineering.	90
ET1011	Introduction to Engineering I In this module, students will learn and apply the Design Thinking process to create new and innovative products or services. In addition, this module also provides a platform where students can integrate theoretical knowledge from different modules, and put into practice what they learn in first year technical modules. They will design, test and build practical and interesting projects and in the process learn essential skills like circuit simulation, strip-board fabrication, soldering, circuit assembly and troubleshooting. Teamwork, creative & critical thinking and presentation skills are emphasised.	60
ET1012	Introduction to Engineering II Provides a platform where students can put into practice what they learn in first year technical modules. Students design, test and build several practical and interesting projects and in the process learn essential skills like circuit simulation, PCB layout planning & fabrication, strip-board fabrication, soldering, circuit assembly and troubleshooting. Projects are designed to integrate theory learnt from different modules. To support the CDIO initiative, teamwork, creative & critical thinking and presentation skills are emphasised in this module.	30
LC0354	Communicating for Personal and Team Effectiveness Aims to equip students with the necessary skills to develop self-confidence in their spoken and written interactions with intended audiences for specific purposes, in informal contexts.	30
LC8001	General Education 1 Aims to equip students with critical reasoning skills and provide them with opportunities to practise critical thinking through the exploration of contemporary social issues. It also provides a platform for students to learn the basics of arguments through the formal argumentation structure.	30
LC8002	General Education 2 Aims to equip students with the skills to critically analyse the elements of persuasion in narratives used in a variety of contexts to appreciate the power of storytelling in our daily life. Students will also explore the history of discrimination in societies and craft their responses through their own narrative.	30
MS4120	Basic Mathematics Equip students with the necessary mathematical knowledge and skills to handle problems encountered in their course of study. Topics include algebra, exponential, logarithmic, trigonometric functions. Binomial theorem, complex numbers, differentiation of algebraic and trigonometric functions and integration of algebraic function are included. It also serves as a foundation for further work in mathematics in subsequent modules.	60
MS4121	Engineering Mathematics I Equip students with the necessary mathematical knowledge and skills to solve problems encountered in their course of studies. It also serves as a foundation for more advanced mathematics in the second year. Topics include trigonometry, determinants, matrices , complex numbers and calculus.	60
SP101A	Education and Career Guidance 1 A compulsory module for all first year students, ECG 1 aims to develop an understanding of personal interests, strengths, values and life goals. With greater knowledge and understanding of self, planning and decision making in choosing a future career can be better developed. Some topics covered in ECG 1 include 'Defining My SP Life', 'Personal Branding', 'Discovering My Interests', 'Planning for Success – My Personal Action Plan' and more.	15

Second Year

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0717	Network Systems Design Teaches the student how to design, implement and troubleshoot a Local Area Network. The student will learn how to perform basic routing and switching, implement network services and perform basic network security tasks required for connecting the LAN on the internet. Students develop a network solution comprising of Routers, Switches, Servers and other computer network equipment. This project will also serve to supplement the practical knowledge for the core networking/security modules using a CDIO approach.	90
ET1010	Microcontroller Applications Introduces the use of microcontrollers in a range of system applications. Students are taught how a microcontroller works, how to program it, and the use of microcontroller. In addition, the student will learn basic analogue and digital support circuitry, sensors and actuators/displays required for a	90

	microcontroller based application. This module allows students to develop a project conceived around a microcontroller system with sensors and output devices.	
LC0356	Communicating for Project Effectiveness Aims to equip students with skills in effective communication, teamwork and interpersonal communication, and report writing.	30
LC0357	Communicating for Professional Effectiveness Aims to equip students with the essential communication and interpersonal skills necessary for work and the pursuit of further studies.	30
LC8003 or LC8006	Social Innovation Project or Overseas Social Innovation Project Aims to equip students with the Design Thinking mindset, methods and tools to conceptualise innovative solutions for real life problems. Students will explore a social cause, go through the practical rigour of the Design Thinking process and apply suitable tools to fulfil the objectives of the project. Students will also be exposed to trends and issues related to themes, such as Healthcare, Active Ageing, Environment, and Social Integration. In the process, they will develop a better understanding of themselves and the world, as well as the positive impact they can make.	30
LC8004	General Education 3 Aims to enhance students' knowledge and appreciation of a broad range of social, political and economic issues. Students will learn about the importance and relevance of information literacy skills as well as develop their ability to assess the validity and reliability of information from different sources, consider diverse perspectives, and put forward a convincing point of view.	30
MS4205	Engineering Mathematics II (A) This module is designed to provide students with further knowledge in mathematics and analytical skills to solve engineering problems encountered in their studies. Among the topics covered are Laplace transforms and statistics.	60
MS4206	Engineering Mathematics II (B) Provides students with further knowledge in mathematics and analytical skills to solve engineering problems encountered in their studies. Among the topics covered are methods of integration, infinite series, Fourier series, differential equations and vector algebra.	60
SP201A	Education and Career Guidance 2 ECG 2 is taken by all second year students. This module aims to develop professional skills necessary to seek and secure work. It also guides the students on how to discover and develop skills, knowledge and attitudes needed for work effectiveness and changes related to work. Topics covered in this module include 'Job Search and Market Trends', 'Discovering Your Unique Selling Point', 'Resilience', 'Work Place Values' and more.	30
	Option 1 - Modules 1 and 2	
	Option 2 - Modules 1 and 2	

Second Year Options (Choose 2 options)

Second Year Computer Applications option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0011	Computer interfacing Demonstrates how a personal computer can be used in interfacing applications using its internal ports (i.e. Centronics and RS-232) as well as external ports using interface cards. Students are introduced to parallel and serial data transfer and taught how to control electronic devices and gather information from the real world.	75
ET0702	Data Structures and Algorithms Provides a basic theoretic understanding and hands-on in data structures and algorithms commonly encountered in computer programming. Student will receive further understanding in basic data types, introduction to the construction and operations of more complex data types and structures beyond their first programming module. Basic principles and reasoning of algorithms and methods commonly encountered will be introduced. Constructions and associated operations of linked lists, stacks, queues, and binary trees will be covered. Simple applications will be introduced through the use of some STL classes associated with common data structures and algorithms.	75

Second Year Computer Networks option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0010	Computer Networking Provides an understanding of network fundamental and computer network routing principles. Students will learn the difference between routing and routed protocols and to configure routers for LAN communications. Students will also be equipped with network troubleshooting skills and able to discuss LAN design issues involving multiple routers at the completion of the module.	75
ET0716	LAN Switching and Wireless Provides students a complete foundation in Wireless Networking and LAN Switching. Wireless Networking covers basic RF theory, hardware installation, configuration and management, troubleshooting, security, and site surveying. LAN Switching covers basic switch concepts and configuration, virtual LANs, VLAN protocols and Inter-VLAN Routing.	75

Second Year Computer Security option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0521	Network Vulnerabilities & Security Tools Provides students with the basic ethical hacking skills in identifying the major types of system and network vulnerabilities. Students will also be taught about the countermeasures against these threats through the use of security tools, and best practices used to mitigate the effect of attacks and malicious codes	75
ET0522	Network Security Systems Teaches students the security protocols and techniques in securing data transmission, such as Symmetric and Asymmetric Cryptography, PKI system, PGP, S/MIME and user authentication systems. The students also learn about security in network devices and server systems. Topics covered include Secure Socket Layer (SSL)/Transport Layer Security (TLS), HTTPS protocol, Secure File Transfer Protocol, and security baseline practices for server systems. Students will gain hands-on experience in securing web servers, setting up RADIUS server for authentication, and securing wireless network using techniques like WEP, WPA and PEAP.	75

Second Year Computer Systems option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0015	Server Management Introduces students to the principles, concepts and techniques in managing servers. Upon successful completion of this module, students should be able to understand how to install servers, manage users over a network, how to avoid problems through fault tolerance, and how to recover from problems through disaster recovery and how to troubleshoot network/server problems. Students should be able to evaluate and select the appropriate tools to manage the network with emphasis on server management and administration.	75
ET0911	Data Storage Technology Provides students with basic understanding of data storage technology such as hard disk drives, CD/DVD, mass storage systems and other emerging storage technologies. Principle of magnetic recording, hard disk drives structure, optical data storage technology, I/O interfaces commonly found in mass data storage will also be taught. Students will be introduced to various data storage systems configurations including Direct Attached Storage (DAS), Network Attached Storage (NAS) and Storage Area Network (SAN). Backup systems, best practices and data disaster recovery centre.	60

Second Year Infocomm Services option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0525	Mobile Applications Development With the improvement in wireless mobile devices technology (such as mobile phones and PDAs), users are now able to write programs (e.g. commercial transaction application, games etc.) for their own devices. This module is about writing such software. Students will learn to develop and test software applications for wireless mobile devices. Topics include User interface development, persistent storage and networking of mobile applications.	75
ET0721	Client-Server Applications Development This module aims to teach students the basic features of the client and server side programming. Students will also learn practical skills in database programming skills using Structured Query Language (SQL). Students will develop a professional client/server application over the Web and or mobile devices for Internet applications.	75

Third Year

See also a selection of projects by third-year students.

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0023	Operating Systems Introduces the student to the inner workings of Operating Systems for computers. It provides a clear description of the concepts that underlie operation systems. At the end of this module, students will have a good understanding of the OS's management system such as processes, memory, storage, I/O devices and security issues.	75
ET0706	Object Oriented Programming Equips students with knowledge of basic object-oriented programming concepts. Students will be able to develop software with modularity, reusability using object-oriented approach. Students will be able to develop event-driven programming with GUI. Students will be able to design more robust application program using exception handling.	75
ET102Y/Z	Final Year Project Provides students with the opportunity and responsibility to be innovative / creative, find or select, formulate, plan, carry out and report on a challenging	150

	piece of work that could provide a solution to the engineering problem. The module also aims to provide students with the opportunity to apply and integrate their knowledge and skills acquired during their polytechnic study and industrial attachment.	
	Option 1 - Modules 1 to 3	
	Option 2 - Modules 1 to 3	

Third Year Options (Choose 2 options)

Third Year Computer Applications option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0104	Embedded Computer Systems Provides an understanding of low-cost and small-sized, but powerful embedded processors, used commonly in industrial and home devices. Students will learn to develop smart devices with remote control and monitoring functions. Topics covered include parallel input/output, serial communications, timing functions, communication protocol/HTTP and troubleshooting equipment.	60
ET0707	Advanced Microcontroller Technology Students are taught how to write and develop programs in Assembly Language. Concepts include assembly and linking, development of modular programs, passing of parameters, system timing, interrupt service routines and systems programming. Students are also taught how to interface assembly language programs with high level language programs and how to develop program libraries.	60
ET0708	Microprocessor Systems Provides students with knowledge of how microprocessors work and operate. Topics include the computer architecture, memory interfacing, device interfacing, peripheral support and development of microprocessor systems.	75

Third Year Computer Networks option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0026	Network Management Teaches students the essentials of network management including network management functions, protocol and standards. It explains how network management functions are achieved through a practical approach. It gives student an overview of network management tools currently available so that students can relate to them as they are deployed in an organisation. This module also covers ways to optimise network performance through traffic distribution and introduces student to concept of quality of service and network storage solutions.	75
ET0030	TCP/IP Provides students with an understanding of the underlying concepts essential to the protocols of the Transmission Control Protocol/Internet Protocol (TCP/IP) suite, which is the engine for the Internet and networks worldwide. It also covers popular TCP/IP application protocols (such as HTTP, FTP, SMTP, DNS, etc.) and introduces students to the latest IP addressing standards used in networking.	60
ET0718	Wide Area Networks Discusses the WAN technologies and network services required in enterprise networks. It explains how to select appropriate devices and technologies to connect small- to medium-sized business networks. Students also learn how to implement and configure common data link protocols and how to apply WAN security concepts, principles of traffic access control and addressing services. Finally, students learn how to detect, troubleshoot, and correct common enterprise network failure issues.	60

Third Year Computer Security option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0531	Firewall Technologies Covers secure network design and the technologies for securing the perimeter of a network. Security features of perimeter devices (routers and firewalls) including various filtering techniques (e.g. packet filtering, Proxy filtering and Stateful filtering) are covered. Other topics include Virtual private network, Intrusion detection and prevention, disaster recovery and business continuity. In laboratory, students will learn to configure Cisco routers and ASA (Adaptive Security Appliance) for De-Militarised Zone, Virtual Private Network, and authorization.	75
ET0709	Network Analysis & Forensics Teaches the use of Network Analysis and Packet Capture tools to analyse data flowing through a network. Students will learn how to use analysis tools to perform forensic tests to determine the nature of any security breaches and exploits. The module will also use case studies to determine the nature of different exploits used by hackers on the Internet.	60
ET0715	Internet Security Provides students with the fundamental concepts on the need for IT Security. The world is beginning to awaken to the fact that even though network and	60

	OS-level security might be tightly configured, the application layer still provides a potential avenue of entry for intruders. Students will be able to identify the vulnerabilities of web applications and recommend appropriate actions to be taken to counter-act and improve web application security.

Third Year Cloud Systems option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0714	Data Centre Management This module looks at the use, planning and configuration of resources and devices that make up a Data Centre. Students are taught how to manage, monitor and conserve energy using green IT methodologies.	75
ET0719	System Virtualization Introduces the concepts and techniques of implementing CPU and data storage virtualisation in an effort to maximize the resource utilization and to conserve energy. Practical implementation is used to illustrate concepts taught.	60
ET0722	Cloud Computing Services This module teaches students to understand the basic principles of Cloud Computing - differentiating the use of cloud systems, identification of potential benefits and risks as well as the ability to evaluate the basic offerings of cloud systems. The student will learn about the technologies and framework that support cloud computing and how to examine and recommend applications for the cloud.	60

Third Year Infocomm Services option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0141	Broadband Communications Provides students a fundamental understanding of various broadband networks and services. Topics include MPLS, ATM, Gigabit Ethernet, SONET, Broadband access technologies (xDSL, Cable Modem),WiMAX, FTTH and other emerging broadband technologies. Students will learn to configure networking devices like switches, routers, and DSLAM to study the behaviour and application of broadband network.	60
ET0532	IP Multimedia Services This module provides students with the fundamental concepts of Voice over IP and Video over IP applications. IP Telephony and IPTV architectures and components used will be covered. Students will learn to install, configure and maintain Enterprise IP Telephony network. Service provider VoIP solutions will also be covered. For IPTV, students will learn to configure video streaming server and multicast transmission.	60
ET0723	Wireless Communications Provides in-depth understanding of various commonly used wireless technologies such as Wi-Fi, Wi-MAX, Bluetooth, RFID and other emerging wireless technologies. Application of the various wireless technologies will also be covered in this module.	75

Third Year Network System Administration option

MODULE CODE	MODULE NAME	TOTAL HOURS
ET0727	CCNA Studies The CCNA is recognized in the industry as a technical professional working with traditional Cisco-based networks that predominantly include LAN and WAN routers and LAN switches. The module is designed to help students acquire the knowledge to install, configure and operate Local Area Network (LAN), Wide Area Network (WAN) as well as routing and switching implementations and management as proposed by the CCNA certification. Students who complete this module will have the expertise needed to pass the industrial certification test CCNA, by Cisco Systems.	75
ET0728	Linux Essentials This module covers the use of essential tools for administering and managing Linux systems, this includes command-line structures and programming, the configuration of running systems, file systems, disk storage and software installation.	60
ET0729	Linux System Administration This module covers the tools and tasks required to manage and configure a Linux sever, including user management, services management, deployment of virtual machines, and security management. The focus of this module is on Red Hat Linux Enterprise Servers. This module in conjunction with ET0728 Linux Essentials will prepare the student to take the Red Hat Certified Systems Administrator (RHCSA) certification for Red Hat Linux Enterprise.	60

Advanced Modules

Capable students will be given the option of doing up to four Advanced Modules in the second and third year. These modules are designed to add greater depth of knowledge in key areas, useful for those who seek to go on to university studies.

MODULE CODE	MODULE NAME	TOTAL HOURS

MS801M	Advanced Mathematics 1 Provides students with a sound foundation in calculus essential for studies in engineering courses at the university level. Topics include mathematical induction, functions and their graphs, limits and continuity of functions, differentiation, integration and its geometrical applications, polar coordinates and parametric equations, indeterminate forms, improper integrals and complex numbers.	60
MS802M	Advanced Mathematics 2 Provides students with further knowledge in calculus and linear algebra essential for studies in engineering courses at the university level. Topics in the module include multiple integrals, partial derivatives and their geometric significance and applications, sequences, infinite series and power series, matrices, determinants, systems of linear equations, eigenvalues and eigenvectors.	60
MS803M	Advanced Mathematics 3 Equips students with a basic knowledge of vectors and differential equations considered essential for studies in engineering courses at the university level. Topics include operations on vectors, lines and planes in space and vector-valued functions, ordinary differential equations (1st order & 2nd order), Laplace transforms & its applications in initial value problems and Fourier Series.	60
MS837M	Further Mathematics This module aims to provide students with essential mathematical knowledge for further studies in universities. Topics covered include mathematical induction, functions, quadratic and cubic equations, inequalities, sequences and series, complex numbers, methods of integration, parametric equations and the applications of differentiation and integration.	60
MS864M	Physics This module provides the students with a good foundation in physics which is essential for pursuing degree courses in the universities. Topics covered include physical quantities and units, kinematics, dynamics, oscillations, waves, electricity, magnetism and electromagnetism. The extensive use of vectors and calculus in developing concepts allows the students to see how mathematics is used as a concise language of Physics.	60

Please note: Course structure is subject to change.