

DIPLOMA IN
ENGINEERING
(CONTROL AND AUTOMATION)



COURSE OBJECTIVE

The course aims to train participants in the area of instrumentation, automation and control. The trainees can be from various fields of disciplines. The training will allow these trainees to obtain the basic knowledge and practical experience in instrumentation, automation and control area and to work more effectively in manufacturing, process and automation industries.

On completion of the course, trainees would be able to understand and use common instrumentation automation systems and devices like transmitters, controllers, control valves, signal conditions and data acquisition systems, single loop and multiloop control system analysis and design, digital control systems, fieldbus technology, PLC programming, safety and industrial practices.

This Diploma does not lead to any professional accreditation/licensing for the vocations in the industries outlined.

COURSE DETAILS

Course Commencement:

April Intake

October Intake

Class Schedule:

2 - 3 evenings a week

6:30pm - 10:30pm

Duration:

900 hours (2.5 years)

SUITABLE FOR

Engineers, technicians, technical supervisors and other personnel whose work scope is involved with or related to the design, operation, installation and maintenance of systems such as automation, control, measurement and instrumentation, monitoring, industrial network and communication and PLCs. The course is also suitable for people who intend to make a conversion to these technical areas in their career pursuit.

MINIMUM ENTRY REQUIREMENTS

Applicants must not suffer from serious colour appreciation deficiency.

Applicants with any of the following qualifications are invited to apply for the Part-Time diploma:

- a) **The following GCE 'O' Level grades and with at least 3 years of relevant working experience:**

Subjects	Grades
English	1 - 7
Mathematics (Elementary/Additional)	1 - 6
<u>One of the following subjects:</u>	
Biology	
Chemistry	
Combined Science	
Design & Technology	
Electricity & Electronics	
Fundamentals of Electronics	1 - 6
Integrated Science	
/Additional Combined Science	
Physical Science	
Physics/Engineering Science	
Science (Chemistry, Biology)	
Science (Physics, Biology)	
Science (Physics, Chemistry)	
Science (Biology, Chemistry, Physics)	

- b) Nitec with GPA ≥ 3.5 in an engineering or information technology discipline and with at least 2 years of relevant working experience

OR

- c) Higher Nitec in an engineering or information technology discipline with at least 1 year of relevant working experience.

OR

- d) Nitec in Technology in an engineering or information technology discipline with GPA ≥ 3.5 with at least 2 years of relevant working experience and successful completion of bridging programme conducted by ITE.

OR

- e) Higher Nitec in Technology in an engineering or information technology discipline with at least 1 year of relevant working experience and successful completion of bridging programme conducted by ITE.

OR

- f) Relevant WSQ Diploma qualification or equivalent with at least 3 years of relevant working experience and WPLN at Level ≥ 6 for English and Mathematics.

For applicants who have the qualifications stated above but do not meet the minimum entry requirements may at the discretion of the polytechnic be invited to sit for entrance tests.

COURSE OUTLINE

This course consists of 5 modular certificates (MC). Each MC will consist of a few modules and the details are as follows:

MC 1 - Certificate in Electrical and Digital Circuit Fundamentals

Module 1 - Electrical Principles

Module 2 - Digital Principles

MC 2 - Certificate in Electronics

Module 1 - Analog Electronics

Module 2 - Digital Electronics

MC 3 - Certificate in PLC and Control System

Module 1 - PLC Applications

Module 2 - Control System 1

MC 4 - Certificate in Network and Control

Module 1 - Network and Control Applications

Module 2 - Control System 2

MC 5 - Certificate in Sensors and Fieldbus

Module 1 - Sensors and Instrumentation

Module 2 - Fieldbus Technology

MODULE SYNOPSES

MC 1 - Certificate in Electrical and Digital Circuit Fundamentals

Module 1 - Electrical Principles

Covers the basic laws and theorems that govern the operation of electrical circuits. Topics covered include scientific notation, engineering notation, metric prefixes, definitions of energy and power, power sources, measuring instruments, DC and AC concepts, simple series and parallel networks, electromagnetism, inductor, inductance, transformers, Kirchhoff's Voltage and Current Laws, Current and Voltage Divider Rules.

Module 2 - Digital Principles

Covers the principles and design techniques to enable students to design simple combinational circuits using commercial SSI and MSI integrated circuits. Simple sequential logic circuits such as flip-flops and mono-stables are also introduced.

MC 2 Certificate in Electronics

Module 1 - Analog Electronics

Builds upon and extends the fundamentals covered in Electrical Principles. 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.

Module 2 - Digital Electronics

Builds upon and extends the fundamentals covered in Digital Principles. More complex circuits such as adders, multiplexers/de-multiplexers, decoders/encoders, counters and shift registers are covered.



MC 3 Certificate in PLC and Control System

Module 1 - PLC Applications

Topics covered include PLC architecture, input and output connection, device selection, programming, testing and troubleshooting. PLC programming language will cover standard languages including ladder logic, function blocks and structured texts.

Module 2 - Control System 1

This module aims to provide foundational knowledge and techniques of basic control systems. Topics covered include control system representation using block diagram, system performance analysis, basic controller concepts and controller tuning techniques. Single-loop feedback control is the central theme of the module.

MC 4 - Certificate in Network and Control

Module 1 - Network and Control Applications

Topics covered are networking fundamentals, ISO 7-layer communication model, TCP/IP, IP addressing, router and switch configuration, industrial networks, fieldbus technology, DeviceNet and SCADA systems. Emphasis will be given to the integration of the different networks.

Module 2 - Control System 2

This module covers advanced topics in Control System. Build on the understanding of single-loop control systems, multi-loop strategies including cascade, ratio, feedforward and selective control are discussed. The applications of different types of controllers are covered. Concepts related to digital control are introduced. Control system documentation techniques are provided.

MC 5 Certificate in Sensors and Fieldbus

Module 1 - Sensors and Instrumentation

Topics covered are basic measuring concepts & instrumentation, temperature sensors, pressure sensors, flowmeters, strain gauges, signal conditioning for instrumentation, calibration and Advanced Instrumentation.

Module 2 - Fieldbus Technology

The module aims to equip students with the knowledge to apply fieldbus technology to link instruments and field devices in a manufacturing plant to control system. Fieldbus is an industrial network system for real-time distributed control. The technologies covered are HART, Foundation Fieldbus and PROFIBUS. Strong emphasis will be given to the application of these technologies in the area of process and discrete manufacturing industries.

AWARD / CERTIFICATION / ACCREDITATION

Upon completion of five Certificates within a five-year validity period, the participant will be conferred a Diploma qualification from Singapore Polytechnic.

CET Qualification Award (CQA)

All subsidised part-time Singaporean students who graduate from their first full diploma qualification from 1 March 2011 will receive a CQA of S\$1,000 upon graduation, as long as it is a higher qualification than other full qualifications that the students had attained previously.

FEES PAYABLE

1. Course Fee:

For Singapore Citizens (SCs) who are taking first part-time diploma qualification, MOE will provide subsidy of 70%.

For Permanent Residents (PRs) who are taking first part-time diploma qualification, MOE will provide subsidy of 60%.

For Foreigners, fees payable will be the full course fee.

The fees (inclusive of 7% GST) reflected in our course fee table are indicative as they are based on prevailing funding policies and subject to review. Module Certificate fee is payable on a semester basis.

FUNDING INCENTIVES

1. MOE Subsidy

Type of Academic CET Programme Enrolled	Prevailing Subsidy Rate		
	Singapore Citizen	Permanent Resident	Enhanced Training Support Scheme for SMEs-Sponsored
First Part-Time Diploma Qualification	70%	60%	90%

Note:

- i. Singapore Citizens will be subsidised for their first part-time diploma programme offered at the polytechnics, regardless of government subsidies previously received from participating in full-time diploma or full-time and part-time degree programmes
- ii. For Singapore Permanent Residents, this is subject to the applicants not having previously attained a qualification at the diploma or higher level subsidised by the government
- iii. Students who transfer or re-admit from a part-time diploma within the same or across polytechnics are eligible for the subsidy covering the Funding period, less the number of semesters of subsidy received for the previous courses
- iv. Students repeating any modules are required to pay full module fees

Under the Enhanced Training Support Scheme, Small and medium enterprises (SMEs)* will enjoy subsidies of 90% of the course fees when they fully sponsor their Singapore Citizen employees for the academic CET programmes.

*SMEs are defined as companies with at least 30% local shareholding and Group employment size of not more than 200 employees or Group annual sales turnover of not more than \$100 million.

2. Enhanced Workfare Training Support (WTS) Scheme

With effect from 1 July 2013, if you are a Singapore citizen aged 35 years or over, have a monthly income of not more than \$1,900, you can enjoy 95% subsidy of your course fee for a wider range of courses covering all Singapore Workforce Skills Qualifications (WSQ) courses, Academic Continuing Education and Training (CET) courses approved by the Ministry of Education (MOE), as well as Certifiable Skills Training courses accredited or supported by the Singapore Workforce Development Agency (WDA). You may also be eligible for a training allowance* if you sign up for any WTS qualifying courses on your own without the support of your employer and successfully complete it. In addition, you may receive cash awards* for completing training. For more information, please visit www.wda.gov.sg or www.workfare.sg or contact the WTS Hotline at **1800-5368-333**.



* Terms and conditions apply.

3. Absentee Payroll Funding

Companies can claim absentee payroll funding when they sponsor their employees for the academic CET programmes.

For more information, please visit www.skillsconnect.gov.sg



APPLICATION PROCEDURES

1. All applications must be made via Online Registration. There is a non-refundable application fee of \$7.00 (inclusive GST) payable. The application will not be processed until the application fee is paid.

The Application Fee of \$7.00 can be paid by the following payment modes:

- a) For e-payment using Visa/Master cards, please click on the 'Make ePayment' button on the acknowledgement page to proceed.

- b) For NETS payment, you can pay at:

Singapore Polytechnic
PACE Academy
Blk T1A, Level 1
Mon-Fri: 8:30am to 8:00pm
Sat: 8:30am to 12:00pm

- c) Cheques should be made payable to Singapore Polytechnic. Please cross the cheque and write the Registration Reference ID, Applicant Name and NRIC/FIN number on the back of the cheque. Mail the cheque to:

Manager (CET Programmes)
Singapore Polytechnic
PACE Academy
500 Dover Road
Blk T1A, Level 1
Singapore 139651

Please note that an administrative charge of \$15 will be imposed for any returned cheques from the bank or financial institution.

2. The applicant is required to upload the following supporting documents in separate attachments. The application will be rejected if the applicant does not submit the required documents. Non-English documents must be translated to English by a public notary.
 - ▶ Certificates of Educational Qualifications (e.g. GCE 'O' Levels, NITEC, WSQ Diploma, etc.)
 - ▶ Academic Transcripts
 - ▶ Identification Documents*
 - NRIC (front & back) for Singapore Citizen and Permanent Resident
 - Identity Card for Malaysian who is not residing in Singapore
 - FIN (front & back) Card such as Employment Pass/Work Permit/Dependent Pass **and** Passport for non-Singaporeans
 - ▶ Birth Certificate, if you are below 21
 - ▶ Documentary proof (e.g. Deed Poll, Marriage Cert) if your name in the NRIC/Passport is different from the educational documents.
 - ▶ Documentary proof of relevant work experience (e.g. Employer(s)' Letters/Testimonials stating the job title, job scope and duration of employment, Certificate of Service, etc.)

Applicant can upload documents to a maximum of 10 attachments. Each attachment must not be more than 3 MB in size. Formats can only be in Word, PDF, BMP or JPEG. Images of documents scanned or taken must be clear; else the application will be rejected.

*Identification documents are mandatory. Otherwise the applicant will not be able to proceed with the online registration. If the applicant uploads FIN card, he will also have to upload Passport in order to proceed with the online registration.

Non-Singaporeans must possess a valid Employment Pass / Work Permit / Dependant Pass throughout the course duration. They would need to bear the full risk of non-completion should their pass expire and subsequently lapse within the duration of the course.

3. The applicant will be notified by email on the application outcome 6 weeks after the closing date of application.
4. The data provided to Singapore Polytechnic will be kept strictly confidential and will be used for the purpose of course administration. The data may be passed on to the relevant organisations that require the information related to the course.





GENERAL ENQUIRIES

Email: ptenquiry@sp.edu.sg

Hotline: 6772 1288

Website: www.pace.sp.edu.sg