



The largest academic school in Ngee Ann Polytechnic, the **School of Engineering (SoE)** brings together four clusters:

- Built Environment
- Electrical & Electronic
- Mechanical & Manufacturing
- Engineering Applications

Each cluster offers diploma courses in its respective area of discipline with specialised learning facilities and teaching expertise. Our diplomas are infused with multidisciplinary elements to create well-rounded engineers and professionals who are highly valued by the industry for their analytical and problem-solving skills.

#### ENGINEERING COMMON PROGRAMME (ECP)

With so many courses to choose from, it is important that our students end up with the diploma course that best matches their interests.

Ngee Ann's School of Engineering offers an exclusive *Engineering Common Programme* that will give students the flexibility to make their choice only at the end of the first semester.

There are nine core engineering courses:

- Aerospace Electronics (AE)
- Aerospace Technology (AT)
- Audio-visual Technology (AVT)
- Biomedical Engineering (BME)
- Electrical Engineering (EE)
- Electronic & Computer Engineering (ECE)
- Marine & Offshore Technology (MOT)
- Mechanical Engineering (ME)
- Mechatronic Engineering (MTE)

All first-year students taking the above engineering courses will share a common curriculum, including those who opt for the ECP. However, ECP students have the added advantage of being able to choose the course that they wish to continue with at the end of their first semester. This enables them to find the best fit and to make a more informed decision regarding their careers. During the first semester, all ECP students will be taken care of by the Multidiscipline Engineering Division to help them settle in campus life. They will also have the opportunity to bond with all of their peers, regardless of their future area of study and they will be able to attend a wide range of student development programmes such as Image Enhancement Workshops, Music & Arts Appreciation, and Adventure Camp.

## COURSES OFFERED IN THE SCHOOL OF ENGINEERING

The School of Engineering offers a total of **19 full-time Diploma courses**. In addition, the School offers Advanced Diploma courses, Specialist Diploma courses, part-time Diploma courses, as well as short courses for the public.

One important aspect of Ngee Ann's Engineering courses is the six-month **Industrial Attachment Programme (IAP)** and the alternative in-house **Project Design & Development (PDD)** programme for graduating students.

The IAP and PDD provide our students with experiential training, and facilitate their passage into working life. Under the two programmes, students work to solve real-life industrial issues encountered by our industrial partners. Greater emphasis has also been placed on research-oriented collaborative projects.

In addition to core modules, students can choose from a plethora of elective modules under the enhanced **Ngee Ann Learning Model (NLM)**; these modules fall under the categories of Communication, Media & the Arts, Life Skills, Entrepreneurship, and Science & Technology. The NLM aims to nurture graduates and give them confidence to face the challenges of the New Economy.

The full-time diploma courses offered by SoE are:

### Built Environment

- Diploma in Civil & Environmental Engineering (CEE)
- Diploma in Environmental & Water Technology (EWT)
- Diploma in Facilities Management for Business (FMB)
- Diploma in Real Estate Business (REB)

### Electrical & Electronic

- Diploma in Aerospace Electronics (AE)
- Diploma in Audio-visual Technology (AVT)
- Diploma in Biomedical Engineering (BME)
- Diploma in Electrical Engineering (EE)
- Diploma in Electronic & Computer Engineering (ECE)
- Diploma in Network Systems & Security (NSS)

### Mechanical & Manufacturing

- Diploma in Aerospace Technology (AT)
- Diploma in Marine & Offshore Technology (MOT)
- Diploma in Mechanical Engineering (ME)
- Diploma in Mechatronic Engineering (MTE)
- Diploma in Product Design & Innovation (PDI)

### Engineering Applications

- Diploma in Business Process & Quality Engineering (BPQE)
- Diploma in Engineering Informatics (EI)
- Diploma in International Supply Chain Management (ISCM) **NEW!**
- Diploma in Logistics Management (LMGT)

## ELECTIVE MODULES AND DIPLOMA PLUS PROGRAMME

SoE recently reviewed its course structure and curricula to: (i) provide greater flexibility and breadth to cater to students' learning abilities and interests in engineering and non-engineering areas; (ii) strengthen the foundational knowledge of engineering students; and (iii) cater to students with diverse aspirations to pursue further study or join the industry.

Under the revised course structure, SoE students can select elective modules from a wide range of clusters available under both engineering and non-engineering categories. Students have to select two elective modules to complete their diploma. Moreover, all SoE students qualify for a Diploma Plus Certificate when they complete two additional elective modules; that is, a total of four elective modules during their entire course of study, and satisfy the Diploma Plus Programme requirement that three of the four completed elective modules must be from the same cluster. The Diploma Plus Certificate will better prepare students who wish to pursue a university degree, or increase their employability in discipline-specific areas. If a student takes additional elective modules beyond the Diploma Plus Programme requirements, he will also be awarded with enhancement certificates for each additional completed module. The full range of elective module clusters offered by SoE is listed below.

### Engineering Category

- Advanced Engineering Mathematics Cluster
- Aerospace Design Cluster
- Aerospace Electronics Cluster
- Applied Physics Cluster
- Applied Technology Cluster
- Biomedical Engineering Cluster
- Computer & Communication Systems Cluster
- Decision Management for Quality Cluster
- Electrical Control & Measurement Cluster
- Industrial Control Cluster
- Industrial Electronics Cluster
- Information Technology Cluster
- International Freight Forwarding & e-Logistics Cluster
- Mechanical Technology Cluster
- Microelectronics Cluster
- Network Systems & Security Cluster
- Stage Management & Technology Cluster
- Telecommunication Distribution Technology Cluster
- Workplace Safety & Health Cluster

### Non-Engineering Category

- Economics & Financial Applications Cluster
- Green Development Cluster
- Leisure & Retail Management Cluster

For the description of individual elective modules within each cluster, please refer to page 182. For details on the specific clusters available to different diplomas, please refer to the course module section of each diploma under the heading Across-Level Modules.

Engineering students can also pursue Diploma Plus Programmes in Business, Innovation Management, and Languages, which are run by Ngee Ann's other academic schools.

## MAJOR ACHIEVEMENTS

Over the years, SoE has consistently made its mark in many ways, both locally and abroad. Some of the School's major achievements are highlighted below:

SoE brought glory to Singapore by making a clean sweep in the Sumo category of RoboGames 2006, which was held in the United States. Ngee Ann's Sumo robots won the Gold Award in all three events of the Sumo Robot category, namely:

- 3kg (Autonomous) Sumo Robot Competition
- 3kg (Remote-Control) Sumo Robot Competition
- 500g Mini-Sumo Robot Competition

SoE students have produced ingenious ideas to help protect the environment. Two Electrical Engineering graduates emerged victorious at the 2006 Green Wave Environmental Care Project for Schools Competition. Their Water Management System clinched top prize in the tertiary category, marking the first time the top prize has been awarded for this category since the Competition's inception.

In the Mayor's Innobiz Award Competition organised by the North East Community Development Council in 2005, SoE's Clipper and Emergency Traffic Light projects clinched the first and second prizes respectively in the Innovative Product Award Open Category. Another SoE project, Touch-n-Drive Wheelchair, won the first prize in the Innovation for Physically Challenged Award Category.

SoE clinched several prizes at the Tan Kah Kee Young Inventors' Award 2006 with its creative and cost-effective inventions. The winning inventions included an Ankle Foot Orthosis that helps cerebral palsy patients to work normally and an Eyebrow Control System, which helps improve the lives of paralysed or stroke patients. The Eyebrow Control System helps these patients operate electronic devices, such as televisions and lights, and also sounds an alarm to attract the attention of their caregivers.

Five Facilities Management for Business students won approval from the Land Transport Authority of Singapore (LTA) for their Hazard Identification System. The WiFi-enabled system tracks and monitors the physically handicapped as they move about a Mass Rapid Transit station, and sounds a warning if they are too close to potential hazards or obstacles. The LTA has earmarked this project for wider adoption and commercialisation.

At the 26th All Japan Micromouse Competition in November 2005, NP continued its winning tradition. Not only did ECE students Tan Zhi Ping and Liu Qi top the microclipper category, their robot also set a new record by flipping 26 out of 32 cans.

## FACILITIES & STAFF

At Ngee Ann Polytechnic, students can look forward to a conducive learning environment. New equipment and software programmes are introduced periodically in tandem with the latest technological developments and industry trends.

SoE boasts some of the latest technology centres, laboratories and computing facilities. These include:

- Alpha Centre
- Assistive Technology Centre
- Automation & Integrated System Centre
- Biomedical Engineering Centre
- Bluetooth Laboratory
- Design and Rapid Prototyping Centre
- Digital Signal Processing Centre
- Energy & Environment Centre
- Facility Management Centre
- Frontline I AeroScout – Enterprise Visibility Solution Centre
- High Voltage Training Centre
- Instrumentation & Control Centre
- Internetworking Technology Laboratory
- Marine Technology Laboratory
- Microelectronics Design and Application Laboratory
- Photonics Laboratory
- Power Quality Centre
- Quality Control Calibration Laboratory
- Radio Frequency Laboratory
- Solar Technology Centre

The School also has a pool of dedicated and highly qualified professionals with relevant post-graduate degrees and working experience in the respective engineering fields.

SoE lecturers attend seminars regularly and engage in industrial consultancy projects to keep up with the latest developments, tools and techniques used in the business and engineering industries. Such activities ensure that the curricula remain up-to-date and relevant to the industry.

## COLLABORATIONS

SoE has forged numerous collaborations with various industrial and educational partners. These partnerships provide opportunities for joint research and consultancy projects, skills and technology transfer, staff training, as well as attachments and placements for final-year students.

### Centres of Innovation

In September 2005, Ngee Ann Polytechnic and AEM-Evertech Holdings Ltd (AEM), a Singapore public-listed company and a major player in the semiconductor manufacturing industry, signed a Memorandum of Understanding (MOU) to establish the NP-AEM Centre of Innovation (NACOI). NACOI links the technical capabilities in Ngee Ann with the industrial and production expertise and resources of AEM and their customers and suppliers, to develop breakthrough technologies in photonics, imaging systems and microcircuit design and packaging. SoE staff and students, together with researchers from other tertiary institutions, work alongside their AEM counterparts to facilitate technology transfer between academia and industry. The MOU also facilitates attachments for SoE staff and students with AEM-Evertech. The organisations will also actively exchange professional expertise and jointly organise seminars, conferences and workshops.

In November 2006, SoE collaborated with SPRING Singapore to set up new Centres of Innovation (COIs) in environmental and water technology (EWT) and marine and offshore technology (MOT). Worth a total of \$13 million, the two COIs will leverage on a formidable combination of strong industry ties, rich expertise in engineering, cutting-edge facilities, and multidisciplinary project teams. Apart from functioning as one-stop technology centres in developing commercially-viable technologies and products, the COIs will also improve the efficiency, productivity and safety operations in the MOT and EWT sectors. They will also develop designs and engineering solutions that meet the specific requirements of companies.

### Exploit Technologies and A\*Star

SoE is collaborating with Exploit Technologies Pte Ltd and A\*Star research institutes (RIs) to research, develop and commercialise A\*Star technologies. At a Master Collaboration Agreement Signing Ceremony in August 2006, the polytechnic and Exploit Technologies inked agreements to work on new products and applications based on the technological innovations in three areas – a “lab-on-a-chip” water testing mechanism, a personal health status monitoring system and a mini-fuel cell.

### National Instruments

In July 2006, SoE and National Instruments signed a \$2-million Memorandum of Understanding that grants the polytechnic the use of up to 200 licences of the global virtual instrumentation company’s LabVIEW version 8. Engineering students will benefit from hands-on training with this leading programming language, which is widely used in various sectors such as energy, manufacturing, pharmaceuticals and aviation.

### Smart Bed

The Smart Bed, the product of a collaboration between SoE, Alexandra Hospital and Plenitum Care (S) Pte Ltd, was developed by a group of SoE students and staff based on input and feedback from the hospital’s doctors, nurses and operations staff. It is designed for weak elderly patients and those who require complete bed rest. The Smart Bed’s sensor system can be enabled for patients classified under “fall-precaution” and disabled for complete-rest-in-bed patients. Fall-precaution patients getting off their bed will trigger a threefold alert system – a buzzer at the nurses’ station, a light along the corridor, and an SMS to the duty nurse’s mobile phone. This ingenious sensor system allows staff to monitor patients’ movements and quickly attend to them, thus preventing any falls.

### Frontline | AeroScout – Enterprise Visibility Solution Centre

In September 2007, SoE and Frontline Technologies Pte Ltd signed a Memorandum of Understanding to jointly set up an Enterprise Visibility Solution Centre for the development of real-time location system (RTLS) utilising radio frequency identification (RFID) technology in Asia. The Centre will be one of the pioneer research and application laboratories in Singapore to test and develop Active RFID solutions. It will also serve as a demonstration laboratory for customers to test if the proposed RFID solution works in a simulated working environment. Additionally, the Centre will serve as a test-bed for third-party product and application solutions and integrate these for commercial uses. The Centre will provide NP’s final-year engineering students practical experience in developing and testing RFID solutions, which may eventually be implemented in the commercial market.