DIPLOMA IN
DIGITAL & PRECISION ENGINEERING

The modern gadgets, mobile and computing devices in our daily lives require precision in their design and manufacture, and this is what you will learn in this course. You will gain the skills necessary to manufacture specific tools and components through precision engineering, as well as train in digital manufacturing, automation and systems integration.

You will also gain knowledge in the full process of product design from development to realisation, including the application of IT and digital enabling technologies for new and exciting developments in micro-systems.

Upon graduation, your skills and expertise in precision engineering will offer you a range of career choices, as there is increasing demand in multiple industries for the production of biomedical, mould design, automation, and aerospace products and tools.
WHY THIS DIPLOMA?
• Learn about and apply the latest IT- and digital-enabling technologies.
• There are opportunities for overseas attachments of up to six months in Germany, Switzerland, the US, the UK or Japan.
• Full sponsorship of course and monthly allowance for successful scholarship recipients.

IT WILL ENABLE YOU TO...
• Develop a strong foundation in precision engineering fundamentals, digital design and manufacturing.
• Possess knowledge and skills for digital design and engineering applications, engineering processes and process control.
• Gain industry exposure during six months of industrial attachment at a local or overseas company.

DURATION
Three academic years on a full-time basis.

FURTHER EDUCATION
You can pursue further studies with up to two years’ exemption for related undergraduate programmes at reputable universities in Singapore, Australia, the UK and the US.

CAREER PROSPECTS
You will be highly sought-after in the manufacturing and precision engineering industries, and can expect a dynamic and rewarding career with industry leaders in the following areas:
• Aerospace manufacturing
• Automation and special equipment building
• Biomedical manufacturing
• Mould design and simulation
• Precision tool and component manufacturing

ENTRY REQUIREMENTS^ 
You must have obtained the following minimum GCE ‘O’ Level results:
• English Language (EL1) Grade 1–7
• Elementary/Additional Mathematics Grade 1–6
• A relevant Science subject Grade 1–6

^ Please refer to the section on entry requirements for diploma courses for more details.
COURSE STRUCTURE

YEAR 1 – SEMESTERS 1 & 2
Core Modules
EGD101 Engineering Mathematics 1A
EGD102 Engineering Mechanics 1
EGD103 Aerospace Manufacturing Technology
EGD104 Engineering Drawing/CADD
EGD105 Materials Technology
EGD106 Semestral Project 1
EGD107 Engineering Mathematics 1B
EGD108 Electronics & Electrical Principles
EGD109 Metrology & Quality Control
EGD110 Communication Skills
EGD111 Computer Programming
EGD112 Semestral Project 2
General Studies*

YEAR 2 – SEMESTERS 1 & 2
Core Modules
EGD201 Engineering Mathematics 2A
EGD202 Automation Systems
EGD203 Engineering Mechanics 2
EGD204 Manufacturing Information System
EGD205 3D Mould Design & Plastic Processes
EGD206 Semestral Project 3
EGD207 Engineering Mathematics 2B
EGD208 Mechanical & Fixture Design
EGD209 Thermofluids
EGD210 Semestral Project 4
EGD211 Quality Process Control & Management
EGD214 Manufacturing Systems & Simulation
General Studies*

YEAR 3 – SEMESTERS 1 & 2
Core Modules
EGD302 Advanced Metrology & TQM
EGD303 Semestral Project 5
EGD304 Professional & Interpersonal Communication Skills
EGD309 Advanced CAD Modelling & Simulation
EGD324 Full-Time Semestral Project**
General Studies*
Internship#
Elective Programmes (Select one)
Precision Tool & Component Manufacturing
EGD305 Integrated CAM & CNC Technology
EGD306 Product Innovation & Additive Manufacturing

Mould & Tool Design Analysis
EGD307 Advanced Plastics Processing Technology
EGD308 Advanced Mould & Tool Design

Equipment Design & Building
EGD310 Machine Elements & Mechanisms
EGD311 Automated Equipment Design

* To complete 60 hours for General Studies Modules with the aim of promoting a holistic education and learning experience. Choose modules from clusters that include foreign languages, communication and interpersonal skills, leadership and teamwork, values and society, general knowledge and interests, and healthy and active lifestyle.
**Students taking EGD325 or EGD326 would not need to do EGD324.
# Internship (Choose one)
EGD323 Internship Programme (12 weeks)
EGD325 Internship Programme (24 weeks)
EGD326 Overseas Internship Programme

For detailed module synopses, please refer to the online Prospectus at www.nyp.edu.sg/prospectus
EGD101
Engineering Mathematics 1A  [60 hours]
This module covers mathematical concepts relevant to solving engineering problems. Topics covered include engineering functions, trigonometry, complex numbers, determinants, matrices and vectors.

EGD102
Engineering Mechanics 1  [60 hours]
This module provides students with the fundamentals of engineering mechanics to enable them to analyse and solve problems related to engineering design applications. Topics covered include concepts and principles of mechanics, Newton’s three fundamental laws, statics of rigid bodies in 2D, stress and strain, moment of inertia of areas and masses, beams, bending moments and shear forces, torsion of circular sectioned shafts, friction, dynamics, work, energy and power.

EGD103
Aerospace Manufacturing Technology  [60 hours]
This module provides students with basic knowledge of manufacturing technology. It focuses on metal-cutting and metal forming processes, non-traditional machining processes, surface finishing processes and common manufacturing processes in the aerospace industry. The operating principles, applications and economical aspects of the industrial manufacturing processes will be described. It aims to give students a clear overview and understanding of manufacturing technology in general.
**EGD104**
**Engineering Drawing/CADD**  [60 hours]
The module covers the knowledge and practical skills of preparing and interpreting engineering drawings. Topics that deal with the drawing standards and conventions of orthographic projection, sectional views, assembly drawing, dimensioning and pictorial drawing, are included to equip students with the necessary skills to communicate ideas and concepts through technical drawings.

**EGD105**
**Materials Technology**  [30 hours]
This module provides students with a practical understanding of the physical and mechanical properties of engineering materials so that they are able to select the most appropriate materials to be used in engineering applications. The various material treatment processes to alter material properties and their industrial applications are also covered.

**EGD106**
**Semestral Project 1**  [60 hours]
This module provides students with knowledge and skills on handling machine tools to perform basic milling processes. With this training, students will understand the methods of holding and machining engineering components according to given specifications.

**EGD107**
**Engineering Mathematics 1B**  [60 hours]
This module provides students with essential knowledge in calculus and analytical skills for solving engineering problems. Topics include functions, differentiation and integration with engineering applications.

**EGD108**
**Electronics & Electrical Principles**  [60 hours]
This module equips students with fundamental knowledge of DC and AC electrical circuits containing resistances (R), inductances (L) and capacitances (C). Students learn to apply the relevant electrical principles pertaining to R, L and C. Other topics covered are electrical safety rules, measurements of basic electrical quantities with the standard analogue/digital measuring instruments, correct usage of laboratory equipment and devices such as the analogue/digital multi-meters, variable and regulated DC/AC power supply units, dualtrace oscilloscope, frequency generator, circuit protection devices, cables, connectors, switches, relays and standard electrical/electronic components.

**EGD109**
**Metrology & Quality Control**  [60 hours]
This module provides students with fundamental concepts and parameters of dimensional measurement. They will learn through hands-on practice with some of the specialised instruments and techniques. By the end of the course, students should have a firm grasp of good measurement practices.

**EGD110**
**Communication Skills**  [30 hours]
This module gives students a broad understanding of the communication process and the interpersonal communication skills to interact effectively with others. Their oral presentation skills will also be honed, allowing them to become effective presenters. In addition, the module covers the various forms of writing skills — technical, proposal and report — required in an engineering environment.

**EGD111**
**Computer Programming**  [60 hours]
This module comprises two parts. The first gives an overview of the computer and its applications, with a focus on personal computers. It includes a section on how to develop algorithms and drawing flowcharts. The second part of the module covers computer programming using C language, with emphasis on mastering basic programming skills. The module has a practical orientation with ample hands-on practice.
EGD112
Semestral Project 2  [60 hours]
This module provides students with the knowledge and skills required for using workshop machine tools to perform basic turning and grinding processes. With this training, students will understand the methods of holding, fixturing and machining engineering components according to given specifications.

EGD201
Engineering Mathematics 2A  [60 hours]
Topics covered include first and second order differential equations and their applications, numerical approximation to solutions of differential equations, Laplace transform and applications.

EGD202
Automation Systems  [30 hours]
This module equips students with the application knowledge of pneumatics and electropneumatic control, basic circuit protection devices and sensors. With this knowledge, students will be able to select the appropriate pneumatic, electro-pneumatic components, protection devices and sensors for specific applications. In addition, the module covers the design of ladder diagram for combinational and sequential logic control.

EGD203
Engineering Mechanics 2  [60 hours]
This module builds on the foundation of Engineering Mechanics 1 and covers more practical and complex mechanical analysis. It also provides students with the various concepts of solid mechanics and dynamic behaviour of the physical body in motion. Students should be able to appreciate, analyse and utilise their knowledge to solve real-life problems related to engineering applications upon completion of this module.

EGD204
Manufacturing Information System  [60 hours]
This module offers students fundamental concepts of the manufacturing information systems in production planning and control. They will also gain knowledge in using various established tools and techniques, and computer-based manufacturing systems to perform production planning and control activities in a manufacturing enterprise. Topics covered include Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP II).

EGD205
3D Mould Design & Plastic Processes  [60 hours]
This module provides students with knowledge and skills that are essential for designing injection moulds. They will be exposed to applications of computer-aided manufacturing and mould flow simulation software. Students will also learn about injection moulding technology. Topics include hydraulic and toggle types of clamping units, modern screw for thermoplastics injection types, as well as moulding defects and their remedies, and machine specification. Students will gain a comprehensive understanding of the various plastics processes and finishing techniques.

EGD206
Semestral Project 3  [60 hours]
This module introduces the use of computer numerical control (CNC) technology and hands-on skills for tool and component manufacturing. It provides students with a working knowledge for integrating process planning, manual and interactive programming as well as operating. Students will examine the capabilities and limitations of computer numerical controlled machining processes, which include CNC milling and CNC turning.

EGD207
Engineering Mathematics 2B  [60 hours]
This is a continuation of Engineering Mathematics 1. Topics covered include Fourier Series, permutation, combination, probability and probability distributions.

EGD208
Mechanical & Fixture Design  [60 hours]
This module introduces students to the fundamental concepts and considerations in mechanical design and the design of machine elements. It equips them with knowledge that is required for basic mechanical system design. Students will be tasked to design simple mechanical systems using suitably designed/selected machine elements and engineering components from commercial catalogues. This module also provides students with a thorough understanding and working knowledge of how and why jigs and fixtures are designed and built. Students will also be taught to apply basic engineering principles to complete jig and fixture design projects.
EGD209
Thermofluids [60 hours]
The module introduces the fundamentals of thermodynamics, heat transfer and fluid mechanics. Topics for thermodynamics and heat transfer include properties of pure substances and ideal gases, laws of thermodynamics and processes of heat transfer. Topics for fluid mechanics include properties of fluids, concepts and basic equations of fluid statics and fluid flow. Laboratory experiments will be used to reinforce the basic concepts.

EGD210
Semestral Project 4 [60 hours]
This module provides students with essential working knowledge and skills on the electro-discharge machining (EDM) and EDM wirecut (EDMWC) technology and machining processes. Students will also learn about electrode materials, electrode design, systems integration and CAD/CAM/CAE application by participating in a series of programming exercises and practical sessions.

EGD211
Quality Process Control & Management [60 hours]
This module provides students with knowledge of descriptive and inferential statistics. Students will learn how statistics is used to control processes when manufacturing a product. Topics include basic statistics, probability distribution, point estimation, interval estimation, sampling theory, control charts, acceptance sampling plans and process capability studies. Students will have hands-on experience and use digital instruments, digital processors and statistical process control software. This module also introduces nanometrology, six-sigma and lean manufacturing.

EGD214
Manufacturing Systems & Simulation [30 hours]
This module provides students with knowledge of various manufacturing systems including group technology, flexible manufacturing systems and computer-integrated manufacturing. The manufacturing system technologies taught are assembly line balancing, material handling system, and automated inspection principles. Students will also learn the simulation tools, which include process simulation, finite scheduling and shop-floor management techniques.

EGD302
Advanced Metrology & TQM [60 hours]
This module provides students with the theory and applications of the latest metrology equipment and total quality management, with focus on understanding the working principles of precision measuring equipment, its methodology and techniques for precision measurement. The precision measurement techniques covered include surface finish measurement, roundness measurement, contact and non-contact coordinate measurement and sub-micron measurement of micro-parts. Topics covered in total quality management include basic concepts of TQM, leadership, role of senior management, quality council, core values and quality statements, strategic planning, customer satisfaction, employee involvement and continuous process improvement.

EGD303
Semestral Project 5 [60 hours]
This module covers advanced machining processes like electro discharge machining (EDM), EDM wire-cut (EDMWC) and CNC machining technology. Students will learn electrode design, systems integration and CAD/CAM/CAE applications.

EGD304
Professional & Interpersonal Communication Skills [30 hours]
This module helps students understand and acquire communication skills for entry into the job market as working professionals. It focuses on job searching skills and includes resume and cover letter writing, as well as interviewing skills. Students will gain insights into change management, organisational structure and corporate culture, enabling them to better fit in at their workplace. They will also learn about business correspondence.

EGD305
Integrated CAM & CNC Technology [60 hours]
This module introduces the application of Computer-Aided Manufacturing (CAM) software on Computer Numerical Control (CNC) machining processes. It provides in-depth working knowledge of CAM and CNC technology through extensive hands-on practice. Students will learn how to generate multi-axis CNC programming with the aid of CAM software package and work on complex CAD models. They will also be exposed to post-processor customisation and its relation to CNC machine configuration.
EGD306
Product Innovation & Additive Manufacturing [60 hours]
This module equips students with knowledge of the product innovation process. Students will apply CAD tools for the design and development of components and products. They will also be introduced to various rapid prototyping and rapid tooling techniques, as well as their applications.

EGD307
Advanced Plastics Processing Technology [60 hours]
This module provides students with an in-depth knowledge of injection moulding machines and moulding processes. It also covers process optimisation and control, process automation and integration in a modern moulding environment. Students will learn about the effects of critical moulding parameters on product quality, and examine other moulding techniques including clean room moulding, micromoulding and multi-component moulding.

EGD308
Advanced Mould & Tool Design [60 hours]
This module explores 3-plate mould design and 3D mould design. It also includes CAM for Tooling Manufacturing and Flow Analysis. Upon completion of this module, students will have in-depth understanding of 2-plate and 3-plate Mould Design and Flow Analysis. Students will also be able to incorporate CAM into tooling design for moulds. With this knowledge, they will be able to comprehend advance mould design and analysis and support tool room operation in CAM.

EGD309
Advanced CAD Modelling & Simulation [60 hours]
This module equips students with knowledge and skills to apply advanced 3D CAD tools for the design of mechanical components. Topics covered include the use of sketch constraints and feature dependencies to express design intent, assembly modelling with the use of constraints, drawing generation and annotation, and visualisation and rendering of 3D CAD models and assemblies.

EGD310
Machine Elements & Mechanisms [60 hours]
This practical-oriented module exposes students to various types of commonly used machine elements and system peripherals for automated assembly systems. Upon completion of the module, students will be able to handle basic tools used in assembling parts and also understand the working principles of the common system peripherals used in automated assembly systems.

EGD311
Automated Equipment Design [60 hours]
This module offers an overview to the design and build of industry automation machines. It aims to synthesise diverse engineering fundamentals in this field and covers a variety of machine subsystems, machine modules, mechanical devices and components used in automated production machines. In addition, basic design methodology and philosophy and essential design considerations, are also discussed. The lectures are complemented with practical design sessions.

EGD323
Internship Programme [12 weeks]
The industrial attachment programme forms an integral part of the coursework and allows students to gain exposure to real-life working environments during attachment to companies. The module aims to help students develop other important work skills such as adopting a positive working attitude, taking initiative, and enhancing interpersonal relationships and communication skills.

EGD324
Full-Time Semester Project [12 weeks]
The full-time semester project enables students to put the knowledge and skills acquired from the course into practice. Students are assigned projects with well-defined objectives that meet industrial standards. They will be organised into project teams to develop team spirit while meeting specific project objectives.
EGD325
Internship Programme [24 weeks]
In this 24-week industrial attachment project, students are assigned to a real-life project conducted in a selected organisation. The purpose is to enhance students' understanding of current industry practices and the work environment. Students will apply knowledge and skills learnt during the course. The extended attachment phase allows companies to plan and conduct a meaningful project to maximise learning opportunities for students.

EGD326
Overseas Internship Programme [24 weeks]
The overseas industrial attachment programme forms an integral part of the coursework and allows students to gain practical working exposure in a real-life work environment during attachment to companies. Apart from providing a platform for students to apply their knowledge, it will also help to develop other important work skills such as adopting a positive working attitude, taking initiative, and enhancing interpersonal relationships and communication skills.