

DIPLOMA IN

# ENGINEERING WITH BUSINESS

**L**earn about the business side of engineering by taking advantage of this multidisciplinary course that integrates the principles and technologies of engineering with the concepts of business. Give yourself a competitive edge over your peers by having options in both the engineering and business sectors for your future career, academic development or entrepreneurial ventures.

For an integrated project spanning Year 1 to Year 3, you will design engineering solutions applicable to real-life business

situations. It may even inspire you to initiate social entrepreneurship projects. In Year 3, you can choose to specialise in either Business Servitization or Product Engineering.

There will be many opportunities for you to go overseas – from internships at world-class R&D centres and companies to immersion trips to countries like South Korea, Japan and the UK – and you can also graduate with professional certifications.

*Номинальный уровень масла*



## WHY THIS DIPLOMA?

- It is the only course with a specialisation in Business Servitization, which is the bundling of services and solutions as a value-add for the product.
- You can go on overseas exchange programmes at institutes of higher learning.
- There are opportunities for internships at world-class companies or R&D centres locally or overseas through SEG's strong partnerships with industry players.
- You can earn industry professional certifications and our Diploma Plus Programme certificate, as well as enjoy the flexibility to pursue a degree in engineering or business.

## IT WILL ENABLE YOU TO...

- Design, develop, implement and market solutions for engineering and/or business application.
- Choose a career in engineering, business or related fields, and/or gain entry into related undergraduate and/or professional training programmes.
- Become a leader who can collaborate and communicate effectively with multidisciplinary teams.
- Contribute to innovative and enterprising endeavours.

## DURATION

Three academic years on a full-time basis.

## FURTHER EDUCATION

You will enjoy opportunities to pursue further studies with good advanced standing in relevant degree courses at reputable universities in Singapore, the UK, Australia, the US, Canada, New Zealand and other countries.

## CAREER PROSPECTS

You will be able to support current and emerging needs of engineering industries in areas such as:

- Business planning and development
- Project planning and management
- Product design and development
- Logistics and supply chain management
- Operations management
- Research and development
- Business analytics

## ENTRY REQUIREMENTS<sup>^</sup>

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

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<sup>^</sup> Please refer to the section on entry requirements for diploma courses for more details.

## COURSE STRUCTURE

### YEAR 1 – SEMESTERS 1 & 2

#### Core Modules

- EGM101** Mathematics 1A
- EGM102** Applied Mechanics 1
- EGM104** CAD/CAM/CAE Fundamentals
- EGM105** Materials Science
- EGM107** Mathematics 1B
- EGM108** Electrical Principles & Circuits
- EGM110** Communication Skills
- EGM111** Programming Essentials
- EGM181** Team & People Management
- EGM182** Enterprise Resource Planning
- EGM183** Engineering Economics
- EGM191** Integrated Project 1
- EGM192** Integrated Project 2

#### General Studies\*

### YEAR 2 – SEMESTERS 1 & 2

#### Core Modules

- EGM201** Mathematics 2A
- EGM203** Applied Mechanics 2
- EGM207** Mathematics 2B
- EGM208** Mechanical Design & Mechanisms
- EGM209** Thermofluids
- EGM213** Analogues & Digital Electronics
- EGM281** Marketing & Customer Relationship Management
- EGM282** Operations Management
- EGM283** Business Management
- EGM284** Financial & Management Accounting
- EGM291** Integrated Project 3
- EGM292** Integrated Project 4

#### General Studies\*

### YEAR 3 – SEMESTERS 1 & 2

#### Core Modules

- EGM304** Professional & Interpersonal Communication Skills
- EGM305** Engineering Systems & Simulation
- EGM381** Project Engineering & Management
- EGM382** Entrepreneurship
- EGM391** Integrated Project 5
- EGM392** Full-Time Semestral Project\*\*

#### General Studies\*

#### Internship<sup>#</sup>

#### Elective Programmes (Select one)

#### Business Servitization

- EGM383** Business Process Optimization & Analytics
- EGM384** Global Supply Chain Management

#### Product Engineering

- EGM385** Product Lifecycle Management
- EGM386** Product Design & Evaluation

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\* 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 EGM393 or EGM394 would not need to do EGM392.

<sup>#</sup> Internship (Choose one)

EGM395 Internship Programme (12 weeks)

EGM393 Internship Programme (24 weeks)

EGM394 Overseas Internship Programme

**EGM101****Mathematics 1A****[60 hours]**

This module provides students with basic mathematical principles and tools necessary to underpin their education in the engineering discipline. It will enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems. Topics covered include engineering functions, trigonometry, complex numbers, determinants, matrices and vectors. At the end of this module, students will be able to demonstrate an understanding of, and competence in, the basic mathematics of engineering, such as vectors, matrices, exponential and logarithmic functions, and complex numbers.

**EGM102****Applied Mechanics 1****[60 hours]**

This module is designed to provide first-year students with the fundamentals of engineering mechanics and to enable them to analyse and solve problems related to engineering design applications. The topics covered include 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.

**EGM104****CAD/CAM/CAE Fundamentals****[60 hours]**

This module provides students with knowledge and skills in the modelling of engineering parts and in interpreting of drawings derived from the 3D models. Topics also include orthographic projection, sectional views, assembly drawing and dimensioning. Together, they provide the students with the necessary skills in communicating ideas and concepts through engineering drawings. The module will also involve the applications of CAD/CAM/CAE technology to produce manufacturing prototypes through participating in a series of lab practical sessions.

**EGM105****Material Science****[60 hours]**

This module provides students with an essential understanding of the structure and properties of materials so that they are able to select the most appropriate materials to be used in engineering applications. The topics covered include atomic structure, types of bonds, basic crystallography, non-crystalline and crystalline materials, as well as processing-structure-property relationships. By the end of the module, students will have a firm grasp on the fundamental knowledge of materials science. Skills acquired serve as a foundation for advanced modules in integrated projects and product engineering.

**EGM107****Mathematics 1B****[60 hours]**

This module provides students with essential knowledge in calculus and analytical skills for solving engineering problems encountered in their course of study. It also serves as a foundation for advanced topics in the second year. Topics include concept of limits; derivatives of polynomial, trigonometric, inverse trigonometric, exponential and logarithmic functions; indefinite and definite integrals of common engineering functions; and differentiation and integration with engineering applications.

**EGM108****Electrical Principles and Circuits****[60 hours]**

This module acquaints students with the fundamentals of Direct Current (DC) electrical circuits, Alternating Current (AC) electrical circuits and Electro-magnetic circuits. At the end of the module, students will be able to demonstrate an understanding of, and competency in, electrical safety rules, measurements of basic electrical quantities, correct usage of laboratory equipment and devices.

**EGM110****Communication Skills****[30 hours]**

This module aims to sharpen the communication skills of students in a corporate and academic environment. It covers methods of technical writing and oral presentation. The students will learn conflict management, negotiation skills and team dynamics. Students will also learn about self-esteem and professional image and will learn to write proposals, technical reports and business letters.

**EGM111****Programming Essentials****[60 hours]**

The module teaches students the methodology of good program development. Students will be able to develop algorithms, draw flow charts and write structured programs. The module has a practical orientation with ample hands-on practice.

**EGM181****Team and People Management****[30 hours]**

This module equips students with necessary teamwork and people management skills relevant for the efficient and successful completion of projects. Students will practise and demonstrate the skills of team building and management of teams, and understand appropriate communication strategy to work successfully in teams.

**EGM182****Enterprise Resource Planning****[30 hours]**

This module teaches the role of IT systems in logistics functions. It covers the various logistics order fulfilment processes performed by Enterprise Resource Planning (ERP) systems. These systems integrate information and work flow across a company's various business functions. Industry-leading software will be used to enable the students to be exposed to industry practices. At the end of this module, students will be able to demonstrate understanding of, and competency in, planning critical resources like materials, machines and manpower in a company to obtain realistic and actionable outcomes for execution at the production operations.

**EGM183****Engineering Economics****[60 hours]**

This module aims to foster an understanding of fundamental economic principles, theories and concepts that allows students to appreciate how such knowledge can be useful in the engineering context. Coverage of this module includes the price mechanism and its role in resource allocation in the product and factor markets, objectives of firms and how they operate and make price and output decisions, as well as comparison of firms' behaviour in different market structures on the basis of efficiency, equity and innovation. Students will also be introduced to key indicators of economic performance and various macroeconomic policies. Students will develop the ability to use the tools of economic reasoning to explain, analyse and evaluate the project costing decisions based on various economic situations and issues.

**EGM191****Integrated Project 1****[60 hours]**

This module aims to promote students' interest in engineering by providing a platform for them to have their first hands-on experience in building practical projects in various engineering disciplines, applying and integrating the knowledge from different modules in the semester. Through this platform, students will be able to hone their creative thinking and problem-solving skills, build synergistic teams and enhance their communication skills.

**EGM192****Integrated Project 2****[30 hours]**

In this module, students will ideate an innovative product. They will then conceptualise the design, making prototype to test the design and engineering concept. At the end of this module, students, as a team, will be able to demonstrate an understanding of engineering design processes and competency in the skills of concept and engineering design and project management. This module forms part of the integrated project where students will participate in the development of a product.

**EGM201****Mathematics 2A****[60 hours]**

This module provides students with the basic theory of ordinary differential equations and Laplace transform. The module focuses on differential equations that arise in practice and emphasis will be on solving these equations and understanding the possible behaviours of solutions. Topics covered include partial derivatives, first and second order differential equation and their applications, numerical approximation to solutions of differential equations, Laplace transform and applications. At the end of the module, students will be able to demonstrate a sound knowledge of a range of techniques for solving linear ordinary differential equations and apply it to solve real-life problems in engineering.

**EGM203****Applied Mechanics 2****[60 hours]**

This module builds on the foundation of Engineering Mechanics 1/ Applied Mechanics 1 and covers more practical and complex mechanical analysis. It aims to provide students with the various concepts of the dynamics of particles and physical bodies. Students will be able to appreciate, analyse and utilise their knowledge to solve real-life problems related to engineering dynamics upon completion of this module.

**EGM207****Mathematics 2B****[60 hours]**

This module provides students with the necessary mathematical training that will assist and expand their experiences within their discipline of study. The module consists of two parts. The first part focuses on Fourier analysis and discusses how periodic signals in the time domain can be represented in the frequency domain. The aim of the second part is to give students a working knowledge of statistical concepts so that statistical reasoning can be correctly applied to experimental results and their statistical significance discussed. Topics include Fourier series, probability concepts, probability distribution (Binomial, Poisson and Normal), sampling distributions, estimation and linear regression. At the end of the module, students will be able to demonstrate a sound knowledge of the mathematical training and apply it to solve real-life problems in engineering.

**EGM208****Mechanical Design and Mechanisms****[60 hours]**

This module introduces students to the fundamental concepts of mechanical design and analysis and the design of machine elements. Students will gain the necessary knowledge for a basic mechanical system design.

**EGM209****Thermofluids****[60 hours]**

This module introduces the fundamentals of thermodynamics, heat transfer and fluid mechanics. In the topics of thermodynamics and heat transfer, the properties of pure substances and ideal gases, laws of thermodynamics and processes of heat transfer are introduced. In the topics of fluid mechanics, the properties of fluids, the concepts and basic equations of fluid statics and fluid flow are covered. At the end of the module, students will be able to appreciate and utilise their knowledge to analyse and solve problems relating to fluid statics, fluids in motion, heat transfer and laws of thermodynamics and properties of pure substances and ideal gases.

**EGM213****Analogues & Digital Electronics****[60 hours]**

This module provides essential knowledge of the characteristics of electronics devices and their applications such as PN junction, Zener diodes, transistors and operational amplifiers. The module will also cover functions of basic logic devices and their applications. Design and analysis of analogue and digital circuits will be taught with emphasis on both theory and practical. This module provides the foundation for students to apply the basic knowledge of analogue and digital electronics for product design and integrated projects.

### **EGM281**

#### **Marketing & Customer Relationship Management [60 hours]**

This module provides students with an understanding of the fundamental principles and concepts of marketing. Students will learn about customer behaviour and principles and practices in customer relationship management. At the end of this module, students will be able to demonstrate understanding of, and competence in, applying the principles of planning the marketing mix elements of product, place, promotion and price in a given marketing situation.

### **EGM282**

#### **Operations Management [60 hours]**

This module provides students with knowledge in the functional area of business that is concerned with the production of goods and services. In conjunction with other functional areas, it also deals with the management of resources (inputs) and the distribution of finished goods and services to customers (outputs). At the end of this module, students will be able to demonstrate understanding of, and competence in, operations strategy, designing the product and process, planning and scheduling resources and managing the supply chain that are required to manage day-to-day operations, and make vital decisions in an organisation.

### **EGM283**

#### **Business Management [60 hours]**

This module covers the basic knowledge of management principles, skills and business management processes. This module will train students to apply the management knowledge in the areas of planning, organising, leading and controlling an organisation.

### **EGM284**

#### **Financial and Management Accounting [60 hours]**

This module will introduce students to financial and management accounting concepts and principles. Students will be exposed to basic costing concepts and financial techniques used to analyse and evaluate capital investment projects. At the end of this module, students will be able to demonstrate understanding of, and competence in, the preparation of management reports and accounts to provide financial and statistical information required by managers within the organisation to make day-to-day and short-term decisions.

### **EGM291**

#### **Integrated Project 3 [30 hours]**

In this module, students will apply engineering design to transform a conceptual design into a workable product. At the end of the module, students will be able to calculate product cost and material usage with consideration to industrial needs. This module forms part of an integrated project that students will participate in to develop a product.

### **EGM292**

#### **Integrated Project 4 [30 hours]**

In this module, students will actualise their product by designing and implementing electronics and software into the product. At the end of the module, students will be able to test, evaluate, modify and refine the product, to ready it for production. This module forms part of an integrated project that students will participate in to develop a product.

**EGM304****Professional & Interpersonal Communication Skills [30 hours]**

This module aims to help students understand and acquire communication skills for entry into the job market as working professionals. It focuses on job search skills and includes resume and cover letter writing, as well as interview skills. Students will gain insight into change management, organisational structure and corporate culture. They will also learn about business correspondence. In all, students will gain competency in job searching skills and adapting to the work environment of their relevant industry.

**EGM305****Engineering Systems and Simulation [60 hours]**

This module provides students with an extensive coverage of the various engineering systems and technologies. Workstation design concepts are covered under assembly line balancing and automated inspection principles. At the end of this module, students will be able to demonstrate understanding of PCB automation assembly process, material handling system and simulation tools.

**EGM381****Project Engineering and Management [60 hours]**

This module will cover a variety of project management methods throughout the life cycle of projects. At the end of the module, students will have the ability to plan and monitor projects, generate revenue models, as well as identify and manage project risks, teams and conflict.

**EGM382****Entrepreneurship [30 hours]**

This module allows students to integrate and apply knowledge and tools acquired from various modules during the course, during the preparation and presentation of a business plan. At the end of this module, students will be able to conduct environmental research and analysis, and translate entrepreneurial ideas into a business plan.

**EGM383****Business Process Optimisation & Analytics [60 hours]**

This module covers business process optimisation, business analytics and their importance to the overall business performance and strategy. Topics include process modelling techniques, business process optimisation concepts and the analysis of business data using intelligent tools. At the end of the module, students will demonstrate an understanding of process modelling, analysing and streamlining of business data and processes.

**EGM384****Global Supply Chain Management [60 hours]**

This module provides students key concepts in supply chain management (SCM) and how SCM is enabled through IT to be an integral part of strategy and operations management in the logistics, retail, services and manufacturing industries. At the end of the module, students will demonstrate understanding of global supply chain strategies for the integration of supply chain components into a coordinated system to enhance service level and reduce system-wide cost.

**EGM385****Product Lifecycle Management [60 hours]**

This module provides a management approach to new products development, product life cycle management and the impact on the supply chain. At the end of the module, students will demonstrate an understanding of PLM information and digital flow, and make information-driven decisions at every stage of the product lifecycle.

**EGM386****Product Design and Evaluation [60 hours]**

In this module, students will be taught sustainable design principles, conceptual problems, and the importance of design for manufacturability and environment. At the end of the module, students will demonstrate an understanding of testing and evaluating the system or components by comparing against requirements, specifications and ease of manufacturing.

**EGM391****Integrated Project 5 [30 hours]**

In this module, students will be involved in activities that help them bring their product to market. At the end of the module, students will develop business models for their product and implement strategies to help them realise the business model together with supporting services. This module forms part of an integrated project that students will participate in to develop a product.

**EGM392****Full-Time Semestral Project [12 weeks]**

This module enables students to put into practice the knowledge and skills they have acquired from the course to develop solutions for real-life applications. Projects will be assigned to students who will work under staff supervision to develop and produce the desired project deliverables. In addition to equipping students with technical and soft skills for project development, this module will enable them to develop problem-solving skills and instil the habit of lifelong learning, to prepare them for entry into the workforce.

**EGM393****Internship Programme [12 weeks]**

This module enables students to put into practice the knowledge and skills they have acquired from the course, in real-life work environments. They will be assigned work tasks or projects, with clear learning outcomes that are relevant to their courses and intended job roles, during the internship. Students will be guided by mentors from the industry and NYP who help them perform on the job and achieve learning outcomes. This will allow students to gain work-centred knowledge and skills, and work-related experiences. In addition, they will acquire important work values and ethics which include being responsible and positive, as well as taking initiative and exercising integrity. Through this work-based experiential programme, students will be better prepared for work and life.

**EGM394****Overseas Internship Programme [24 weeks]**

This module enables students to put the knowledge and skills that they have acquired from the course into practice in real-life work applications. The students will be assigned work tasks or projects that are relevant to their courses and intended job roles, during the overseas internship. The students will be guided by mentors from the industry, company or institution to help them perform the projects or tasks. This will allow students to gain project or task-related knowledge, skills, and experiences. In addition, they will acquire important work values and ethics which include being responsible and positive, as well as taking initiative and exercising integrity. This module will also enable students to develop problem-solving skills, instil the habit of lifelong learning and develop a global mindset to prepare them for entry into the workforce.

**EGM395****Internship Programme [24 weeks]**

This module enables students to enhance their learning by relating and applying their knowledge and skills to practice in real-life work environments. This will allow students to gain work-centred knowledge and skills, and work-related experiences. In addition, they will acquire important work values which include being responsible and positive, exercising integrity, work ethics and interpersonal communication skills. Through this work-based experiential program, students will be better prepared for entry into the workforce.