

PRODUCT DESIGN & INNOVATION COURSE MODULES

How do you define good design? We see it as innovations that are equal parts attractive, practical and functional, and are able to differentiate themselves from their competitors. Through our Diploma in Product Design & Innovation [POI], you will get to design your very own smart innovation and learn about why some products become successful in the market.

The course integrates three important disciplines of product design - Arts, Engineering and Business. You will get to explore design processes at every stage, from idea conceptualisation to realisation, and graduate with quality design folios, including working prototypes. With our studio-based learning approach, you will work in modern design studios and develop prototypes using state-of-the-art model making equipment and facilities.

In your first year, learn about fundamental design principles as well as engineering concepts that are applied to the design process. You will be taught how to use computer-aided design software in your second year, and apply what you have learnt to actual product design projects. You will then progress to more advanced product innovation and development projects in your final year when you learn about the business management aspects of product development. You will also go on a three-month internship at leading companies.

Under our partnership with Motorola Solutions, top designs in the students' final-year projects are given awards by Motorola.

To top it off, we've got local and overseas field trips to design centres and museums in countries such as Australia, so your learning journey is nothing short of fulfilling.

LEVEL 1.1

Engineering Sciences for Design 1

This module pertains to the study of fundamentals of mechanics and applications in product design. The syllabus covers external forces in two dimensions and their effects on particles and rigid bodies at rest. Students will learn to analyse forces acting on rigid bodies by drawing free-body diagrams and applying the conditions of static equilibrium. Topics include forces and resultants, moments and couples, equilibrium, plane friction, kinematics, and kinetics of linear motions. Applications of mechanics in product design are learnt through case studies and assignments.

History & Principles of Design

The module provides students with a historical perspective of design against the backdrop of developments in culture, art and technology. Students will learn about design movements and iconic design works. The module also covers elements and principles of design such as points, lines, planes, textures and space and the concepts of balance, proportion, symmetry and contrast. The basic product form and aesthetics are then learnt through assignments and discussions.

Manufacturing Processes

The module provides students with an understanding of common manufacturing processes. Through hands-on practice and integrated projects, students acquire knowledge of turning, milling, grinding, assembly, dimensional tolerances, joining processes, surface texture and so on. Students will take on projects involving producing parts according to design drawings and specifications given, as well as designing and producing simple products with suitable manufacturing processes. Shop floor safety is emphasised.

Model Making

In this module, students will learn about the various processes, techniques and materials used in model making. Students will apply their knowledge and improve their hands-on skills by making 3D models using materials such as foam, acrylic, paper board and wood in the workshop. Students will also pick up techniques in model finishing.

Visual Thinking & Design Sketching

The module equips students with important skills in visual thinking, design visualisation, freehand design sketching and rendering for product design. The emphasis on hands-on practice enhances students' creative thinking abilities from basic lines and two-dimensional (2D) sketches to thumbnails and three-dimensional (3D) perspective sketches. The module also provides students with an understanding of the generic product design process as well as the related

tasks and attributes involved. The module also sets the context of the course by providing an overview of the curriculum.

LEVEL 1.2

Career & Professional Preparation I

This module gives students a foundational introduction to their three-year diploma course curriculum and how it prepares them for industry. It will help them to embark on their three-year course with the end in mind, through guided reflection of their personal characteristics, and producing an overall game plan for their future education and career goals. The module aims to deepen students' commitment to the sector that the course prepares them for.

Computer Aided Design 1

The module equips students with the knowledge and skills in using a computer-aided design (CAD) tool to produce 3D solid and surface models as well as 2D detail and assembly drawings. Students will also learn the fundamentals, conventions and practices of engineering drawing based on the International Standards Organisation (ISO) and Singapore Standards (SS) guidelines. Topics include 3D CAD modelling, 2D CAD drawings, orthographic projection, sectioning, dimensioning, conventional representations, assembly drawing, bill of materials and blueprint reading.

Conceptual Design

In this module, students will apply their creativity to the first two phases of the design cycle — writing design briefs and design specifications as well as generating design concepts. They will learn to identify target user groups, define user needs, identify product markets, conduct basic market studies, generate creative design concepts, as well as evaluate and refine design concepts. They will then hone their design sketching skills and generate ideas in accordance to the design specification.

Design Presentation & Methods

This module focuses on the presentation of design concepts and relevant details in digital media. It includes an introduction to visual communication design. Students will learn, in a practice-oriented manner, the commonly-used software programmes for visual communication design. These include image editing as well as text and graphic creation functions for logo, packaging, poster and product design presentation via digital means. Students will also deepen their understanding of the design presentation methods, principles and techniques through project work.

Materials & Design Applications 1

The module covers the characteristics and properties of commonly used materials for products, including metals, plastics, rubber, ceramic, wood and composites. The module also includes the applications and criteria for selection and design considerations for common materials. Students acquire the knowledge and skills through lectures, discussions, case studies and projects.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 1	
Level 1.1 (28 hours per week)	
Engineering Sciences for Design 1	3
History & Principles of Design	4
Manufacturing Processes	5
Model Making	4
Visual Thinking & Design Sketching	6
Innovation Toolkit ^	4
Sports & Wellness ^	2
Level 1.2 (25.5 hours per week)	
Career & Professional Preparation I	1.5
Computer Aided Design 1	5

Conceptual Design	5
Design Presentation & Methods	6
Materials & Design Applications 1	4
Communication & Contemporary Issues ^	4

Notes:

^ For more details on Interdisciplinary Studies (IS) electives, please log on to www.np.edu.sg/is/

IS Modules

The School of Interdisciplinary Studies (IS) delivers a broad-based curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge economy. IS offers both prescribed modules and electives to challenge boundaries. Prescribed modules

develop students' competencies in core areas such as Communication, Innovation and Enterprise, Culture and Communication, and Personal Mastery and Development, while elective modules provide insights into Arts and Humanities, Business, Design, and Science and Technology.