

## **SUSTAINABLE URBAN DESIGN & ENGINEERING COURSE MODULES**

With a global shift towards more eco-friendly cities, you could be the next architect or civil engineer to help shape Singapore's future landscape, while improving the quality of urban living. Get a step closer to turning dreams into reality with the Diploma in Sustainable Urban Design & Engineering [SDE]!

In the foundation year, you will be immersed in studio-based learning, picking up conceptual thinking, drawing and modelling skills. You will also develop an appreciation of urban planning, building systems, structures and sustainable design to allow an integrated approach in architecture and civil engineering.

You will cultivate an understanding of the intersection of architecture and civil engineering with a view to specialise in either field in the second year.

### **Architecture Specialisation**

Investigate, experiment and explore with different aspects of the architectural design considerations from the conceptual to contextual, physical, social and cultural perspectives through a series of small to large scale design projects. You will be committed to architectural design studio classes to steer your acumen towards creative thinking, to enhance your knowledge on spatial and experiential planning, architectural formation and sustainable design.

You will develop critical design solutions with compliance to statutory requirements for architecture and urban interventions.

### **Civil Engineering Specialisation**

Learn about current Code of Practice for the analysis and design of structural elements in reinforced concrete structures, steel structures and detailed design of various structural elements. Embark on local and overseas study trips to deepen your structural and civil engineering design capabilities as well as the design of eco-friendly buildings. Develop comprehensive awareness of industry trends shared by guest speakers from the industry.

You will explore the latest technologies in Building Information Modelling to produce sustainable architectural and engineering solutions. You will also get a chance to attend off-campus learning as well as to explore through study trips to world renowned architectural festivals, sustainable cities and heritage sites.

Finally, you will round off your third year with a six-month internship, or a three-month internship with final year project to apply what you have learnt in the real world.

## **ARCHITECTURE SPECIALISATION**

### **LEVEL 2.1**

#### **Building Mechanical & Electrical Systems**

This module provides fundamental knowledge on principles of operation and layouts of mechanical and electrical systems for buildings as well as plant room and duct riser space required to accommodate equipment and distribution networks. Systems covered include building water supply, mechanical ventilation, air-conditioning, sanitary plumbing & drainage, fire protection, town gas supply, electrical power distribution, lighting and lifts & escalators. In addition, the module will also cover energy efficiency, water efficiency and indoor environmental quality requirements of the Green Mark New Buildings scheme.

#### **Career & Professional Preparation II**

This second-year module helps to equip students with skills necessary to seek and secure work. They will also be equipped to communicate their personal brand in a positive way. As students sharpen their communication skills, they will also learn how to market themselves effectively.

#### **Design Studio 1**

The studio enhances the Year 1 foundation of conceptual methodologies, technique and critical thinking with the inclusion of the user, spatial planning, narrative, circulation flow and tectonics. Students are to investigate, experiment and explore conceptual designs through a series of small scale design projects. Through conceptual and analytical thinking, students develop their architectural translations into spatial articulations.

### **Digital Architecture Modelling**

Students will be introduced to advanced skills in 3D modelling, visualization, analysis, documentation and fabrication for Architecture. Using industry standard software for parametric design modelling, students learn to harness the techniques of 3D modelling. Through creative design process, the students will generate computation design seamlessly to integrate these outputs into compelling presentations and to interface the digital fabrication to their design project.

### **History & Theory of Western Architecture**

This module provides an introduction to a general overview of the developments in Western architecture, both historically and theoretically. It covers major movements, ideas, principles and traditions in architecture, and their influence on the global production of architecture. Exploring key works, architects and texts ranging from the classical era through the twenty-first century, students will appreciate the development of architectural ideas and built works, and their relationship with the prevailing society and culture. Intellectual discourse and critique of architectural design are expected as learning outcomes.

## **LEVEL 2.2**

### **Architectural Materials & Technology 1**

This module expands on students' understanding of basic construction and building technologies, and introduces basic building materials, timber and reinforced-concrete structural systems as well as creative-driven detailing applicable to small and medium scale projects. Students are required to apply their understanding of construction methodologies and architectural detailing into their design projects.

### **Architectural Visualisation & Presentation**

As a follow-on module from Digital Architectural Modelling, this module introduces students to advance digital representational skills in both architectural renderings and presentation. Utilising the latest software in the industry, students will harness the skills and techniques learned to create compelling hybrid 2D and 3D drawings, visualisations, diagrams and presentation boards in order to visually communicate their design ideas and strategies. They also learn how to compile all their works in a digital portfolio.

### **Design Studio 2**

Design Studio 2 focuses on connecting the user's and community's needs to a design solution. This further exploration heightens students' sensitivity to the different aspects of the user/community, which shapes the design process, decision and crafting of the design project. Through the studio project, students will learn to articulate architectural spaces and to translate programmatic investigations into spatial design proposals. Students will expand design strategies to engage with the interfacing of design exploration and fabrication.

### **Fundamentals of Landscape Architecture**

This module provides students an overview of the field of landscape architecture. Students will learn about the history, theory and design processes of landscape architecture. Students will develop an understanding of design principles, appreciation towards human physical and mental responses to the softscape, hardscape and natural environment. Students will explore the design ideology and application of theory in the practice of landscape architecture.

### **Workplace Safety & Health**

The module covers the relevant legislation and standards pertaining to workplace safety & health. Students will be taught to identify the various types of industry hazards and the means of protection against these hazards. The topics will include risk management and control, safety management system, accident reporting and investigation, safe use of hand and power tools, safe handling of materials and machinery, and electrical safety.

## **CIVIL ENGINEERING SPECIALISATION**

### **LEVEL 2.1**

### **Building Mechanical & Electrical Systems**

This module provides fundamental knowledge on principles of operation and layouts of mechanical and electrical systems for buildings as well as plantroom and duct riser space required to accommodate equipment and distribution

networks. Systems covered include building water supply, mechanical ventilation, air-conditioning, sanitary plumbing & drainage, fire protection, town gas supply, electrical power distribution, lighting and lifts & escalators. In addition, the module will also cover energy efficiency, water efficiency and indoor environmental quality requirements of the Green Mark New Buildings scheme.

### **Career & Professional Preparation II**

This second-year module helps to equip students with skills necessary to seek and secure work. They will also be equipped to communicate their personal brand in a positive way. As students sharpen their communication skills, they will also learn how to market themselves effectively.

### **Computer Aided Modelling**

This module introduces students to BIM processes and applications. The students will be equipped with the practical 3D BIM structural modelling skills and technical knowledge to initiate projects using BIM. It also enables students to learn how to apply the e-submission guidelines and to understand the mandatory format for regulatory approval.

### **Engineering Mathematics 3**

This module is a continuation of Engineering Mathematics 2. Topics include Integration Techniques & Applications, First Order Differential Equation, Laplace Transform, Probability and Statistics.

### **Infrastructure & Building Works**

This module introduces students to the various methods of construction involved in complex structures, multi-storey buildings and infrastructure engineering works as part of urban development. It covers reinforced concrete construction, precast and pre-stressed construction, and structural steelwork. Excavation works, excavation supports, ground water control, road works and pipeline construction are also included.

## **LEVEL 2.2**

### **Structural Design 1**

This module trains students to use the current Code of Practice for the analysis and design of structural elements in reinforced concrete construction. Students will also learn to read structural drawings for construction purposes.

### **Land Surveying**

This is the science and technology of gathering, analysing, distributing and using geographic data. Students learn to use instruments (Level and Total Station) to gather data with basic surveying techniques. They also learn to interpret, distribute and use this collected data for urban development projects. Students will carry out integrated assignments where the data collected will be transferred to AutoCAD software, to allow them to appreciate how the data are used in real projects.

### **Quantity Surveying**

This module covers the principles of taking-off and measurement of quantities from construction drawings for urban development works. It is used for preparing cost estimates and budgeting. Topics covered include the measurement of quantities for earthworks, brickworks, concrete works, reinforcements, road pavements, pipelines, sewer lines and drainage. Students will also have practical sessions on the use of software for taking-off and costing.

### **Water Resources Technology**

This module introduces students to the basic behaviour of water as a liquid and the fundamental concepts that are essential for the study of water related technologies. It provides students the fundamental principles and design of water collection systems, water treatment processes, and water transmission and distribution systems.

### **Workplace Safety & Health**

The module covers the relevant legislation and standards pertaining to workplace safety & health. Students will be taught to identify the various types of industry hazards and the means of protection against these hazards. Topics include risk management and control, safety management system, accident reporting and investigation, safe use of hand and power tools, safe handling of materials and machinery, and electrical safety.

## COURSE CURRICULUM

Module Name	Credit Units
<b>YEAR 2</b>	
<b>ARCHITECTURE SPECIALISATION</b>	
<b>Level 2.1 (24 hours per week)</b>	
Building Mechanical & Electrical Systems	5
Career & Professional Preparation II	2
Design Studio 1	8
Digital Architecture Modelling	4
History & Theory of Western Architecture	3
Interdisciplinary Studies (IS) elective ^	2
<b>Level 2.2 (25 hours per week)</b>	
Architectural Materials & Technology 1	3
Architectural Visualisation & Presentation	4
Design Studio 2	8
Fundamentals of Landscape Architecture	4
Workplace Safety & Health	4
Interdisciplinary Studies (IS) elective ^	2
<b>CIVIL ENGINEERING SPECIALISATION</b>	
<b>Level 2.1 (21 hours per week)</b>	
Building Mechanical & Electrical Systems	5
Career & Professional Preparation II	2
Computer Aided Modelling	4
Engineering Mathematics 3	4
Infrastructure & Building Works	4
Interdisciplinary Studies (IS) elective ^	2
<b>Level 2.2 (27 hours per week)</b>	
Land Surveying	5
Quantity Surveying	4
Structural Design 1	7
Water Resources Technology	5
Workplace Safety & Health	4
Interdisciplinary Studies (IS) elective ^	2

### Notes:

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