



COURSE OUTLINE

Module	Learning Objective / Outcome	Outline
Floating Structures & Applications	As land reclamation is becoming a non-viable option, this module will illustrate how floating structures can help free up land for land scarce countries. For Singapore, land can then be repurposed for housing and new industries.	<ul style="list-style-type: none"> • Land Usage in Singapore • Brief Review of Space Creation in past 50 years • Space Creation Options - underground, skywards, polders and floating islands - Pros and Cons • How safe are super mega floating islands? Would underwriters insure multi-million assets floating in the sea? • How floating islands help sustain our rich marine bio-diversity? • Moving from 3IR to 4IR to intensify land use with multi-level production systems; how can floating solutions help the process? • What are the industries to relocate offshore in the first wave? • Resolving shipping requirements with land scarcity, a concept master plan of the sea • Mobility of floating islands creates opportunities to tap into the non-governmental capital market
Design Principles & Considerations	This module covers the design principles & considerations for floating structures, incl. practical engineering challenges. Participants will have a reasonable understanding of basic floating concepts, hence this is an overview to facilitate the rest of the course.	<ul style="list-style-type: none"> • Advantages of Floating Structures • Types of Floating Structures • Rigidity, Movements, Stability and Forces on Floating Structures • Environmental Conditions & Design Loads • Design Considerations
Classification Rules for Floating Structures	This module provides an introduction to maritime regimes, major regulations & conventions and roles of Classification with regards to structures, safety and protection of the marine environment.	<ul style="list-style-type: none"> • Need for International Rules & Regulations • Key Maritime Regulations • Classification Notation • Classification Process • Design, Construction and In-operation Requirements
Buoyancy, Weight & Stability	The participants will be familiar with the different terms, understand the phenomena affecting stability of floating bodies and gain practical knowledge of the stability design criteria & measures.	<ul style="list-style-type: none"> • Buoyancy and Hydrostatics • Weight and Weight Control • Intact Stability • Subdivision and Damaged Stability • Stability Regulations and Criteria



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Wave Excitation and Motion Analysis	Upon completion of this module, the participants will understand the stability and dynamic behaviour of floating structures in waves.	<ul style="list-style-type: none"> • Waves • Motion in Calm Water • Forces and Response in Regular Waves • Motion Response in Irregular Waves
Structural Strength & Material	This module introduces the different types of material used in floating structures and the design consideration of structural stiffness, loadings and weight distribution that affects stresses and deformation/motion of the floating structures.	<ul style="list-style-type: none"> • Materials for Floating Structures • Longitudinal Bending Moment • Hogging and Sagging due to Waves • Structure Framing • Effect of Weight and Load Distribution • Hydrostatic and Hydrodynamic Loads • Hydroelasticity
Connection System for Multiple Floating Units	This module introduces the different types of mechanical connectors for floating platforms. Special design considerations and the relevant ship class rules and regulations will be introduced. Design tools, ship class approval procedure, essential document and drawings will be illustrated.	<ul style="list-style-type: none"> • Design Challenges • Types of Connection System • Pros and Cons of Connection System • Design Specifications • Testing Requirements • Design Verifications including Methodology, Procedure and Computer Simulations • Case Study for Connector Applications
Mooring System	This module introduces the different types of mooring systems that can be implemented for floating structures. Site specific requirements and introduction to mooring system design will also be made.	<ul style="list-style-type: none"> • Types of Mooring System • Advantages and Disadvantages • Mooring Requirements • Mooring System Design Considerations • Mooring system design methods
Construction and Installation	The module explains the general information on construction and installation and provides a history overview of floating ferroconcrete hull, present and its future.	<ul style="list-style-type: none"> • History overview of floating ferroconcrete hull • Sequence of construction & installation • Future & new era of ferrocconcrete floating constructions
Project Case Studies	This module will take the participants through learning points using real-world case studies of floating solutions.	<p>Case 1: Floating Oil Storage</p> <p>Case 2: Floating Bridges</p> <p>Case 3: Float@Marina Bay</p>