Introduction to Naval Architecture

Delivery Method: eLearning || **Duration:** 18 hours || **Course Fee:** 900 €

Category: Naval Architecture & Marine Engineering

Available languages: English

Certificate

On completion of the training program, the student will be awarded:

- A Certificate of **Introduction to Naval Architecture**, issued by Bureau Veritas Solutions Marine & Offshore.

The Certificate of **Introduction to Naval Architecture** is obtained after completing the course and passing the online test.

Presentation

This training course provides a general introduction to Naval Architecture, the art and science of building ships.

Who the course is for

The course **Introduction to Naval Architecture** is aimed at anyone interested in understanding the general principles of Naval Architecture. This may include Ship Managers, Technical Superintendents, Ship Masters, Officers and Seafarers; Shipyards Technical Staff; Surveyors; P&I and/or Insurance Inspectors; Marine Engineers; Etc..

Objectives

On completion of the training, students will be able to:

- Understand the ship design process and the main terms and definitions used, including the lines plan, the form coefficients used in ship design, and the area and volume properties.
- Know the basic concepts of intact and damage stability.
- Get familiar with the main aspects of marine hydrodynamics acting on ship resistance, propulsion and seakeeping.
- Understand the basic principles of ship structures, structural design, scantling determination and typical structural arrangements of different ship types.
- Know the most common failure modes and structural defects.
- Get familiar with shipbuilding technology processes, materials used and shipyard layout

Program

Module 1 – Ship Geometry

- Ship types
- Ship design process
- Terms and definitions
- The lines plan
- Form coefficients
- Area and volume properties: centre of gravity and centre of buoyancy, displacement, curves of sectional area, Bonjean curves, curves of form
- Principles of numerical integration and its application

Module 2 – Ship Stability and Trim

- Definitions and main principles
- Centre of gravity (G), a centre of buoyancy (B) and metacentre (M)
- Characteristics of GM
- Metacentric diagram and metacentric radius
- Intact stability: the external couple, the internal couple, the righting moment
- Characteristics of GZ, intact stability curve, angle of loll
- Cross curves of stability
- Inclining experiment
- Longitudinal stability
- Free surface effect
- Docking
- Dynamic stability
- Intact stability criteria

Module 3 – Damage Stability

- Damage stability calculation methods
- Watertight subdivision
- Effects of flooding
- Deterministic methods: added mass method, lost buoyancy method, floodable length method, permeability
- Damage stability criteria
- Probabilistic method: theoretical foundations, main principles, damage statistics, probability of survival, new probabilistic regulations

Module 4 – Load Lines

- History of load lines
- Definitions
- Freeboard calculations, tabular freeboard
- Load line marks
- Conditions of assignment: strength and stability requirements; the position of hatchways, doorways and ventilators; doorways, hatchways and miscellaneous openings

Module 5 – Ship Resistance, Propulsion and Seakeeping

- Ship resistance: Froude number, coefficient of resistance, fouling, evaluation methods and model tests
- Ship propulsion: propulsion efficiency, propeller characteristics and design
- Seakeeping: ship motions, hydro-structure interactions, slamming, green water effect, sloshing, parametric rolling, ice loads, seakeeping tests, passive and active systems

Module 6 – Introduction to Ship Structures

- Definitions
- Structural units and structural members: bottom structure, side shell, decks, bulkheads, superstructure, primary and secondary structural members,
- Structural connections: brackets, collar plates, pillars
- Scantling calculation parameters
- Framing systems

Module 7 – Structural Arrangement of Different Ship Types

- Dry cargo ships: general cargo ships, bulk carriers, container ships
- Tankers: oil tankers, chemical tankers, gas carriers
- Specialized ships: passenger ships, ro-ro cargo ships, high-speed crafts, dredgers, heavy lifters, supply vessels and tugs

Module 8 – Structural Design, Analysis and Classification Rules

- Structural design: safety factor, structural reliability
- Loads and load effects: sea pressure, static and dynamic contribution, global bending moment and shear force, global torsion moment, bow impact and bottom slamming pressure, local bending moment and shear force
- Structural response: hull structure response
- Hierarchy of hull structure: plates, stiffeners, bottom transverse, floors, girders, hull girder
- Strength analysis: simple beam properties, stress levels, stress calculation, primary, secondary and tertiary levels response, finite element analysis
- Classification rules, longitudinal strength criteria

Module 9 – Failure Modes and Structural Defects

- Basic types of structural failure: large local plasticity, instability (buckling), fracture
- Structural defects: corrosion, misalignments, structural details, shape, deformations, stress concentration, structural continuity, cracks

Module 10 – Introduction to Shipbuilding

- Shipbuilding materials
- Shipyard layout
- Ship production process
- Shipbuilding technology: treatment, preparation, assembly, outfitting