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COURSE BROCHURE

Coastal Engineering and Shore Protection Structures Training Course

17 – 21 January 2027
Muscat

Coastal Engineering and Shore Protection Structures Training Course

Ref: 927_35104 **Date:** 17 – 21 January 2027 **Location:** Muscat **Fees:** 6500 GBP

Coastal Engineering and Shore Protection Structures is a 1-week training course for coastal, port and harbour engineers and marine contractors, built around a shore protection options appraisal that compares hard and soft defences for one named frontage. Rising sea levels, heavier storms and expanding waterfront assets are pushing erosion and overtopping onto board agendas. Jupiter Prime Training delivers this course for engineers turning wave data into durable coastal structures.

Why Coastal Engineering and Shore Protection Matters Now

Three forces shape coastal engineering today: climate-driven change in sea level and storm intensity, growing investment in ports, resorts and industrial waterfronts, and public scrutiny of how defences alter beaches next door. An owner who sizes a breakwater or seawall well protects assets for decades and limits maintenance; one who misreads wave climate or sediment pathways can trigger downdrift erosion, armour failure and costly emergency repairs. The course rests on established coastal design practice for wave transformation, armour stability, overtopping and littoral drift.

Who Gains Most from Coastal Engineering and Shore Protection

- Engineers responsible for sizing breakwaters, revetments and seawalls on new frontages
- Port and harbour specialists accountable for basin tranquillity and quay protection
- Contractor staff who plan rock placement, armour unit supply and marine plant
- Asset owners' technical leads who commission surveys and condition monitoring of defences
- Environmental and planning advisers who weigh the shoreline effects of coastal schemes

Mixed groups from one waterfront project, where designers, contractors and asset owners attend together, gain most because they leave sharing one design basis and one monitoring regime.

Coastal Engineering and Shore Protection Capabilities

Participants move from wave and water-level statistics to armour sizes, crest levels and sediment budgets that can be defended in design reviews.

- Calculate design wave heights and extreme water levels from offshore records — scheme design basis
- Assess longshore sediment transport and shoreline response — choice between groynes, nourishment or revetments
- Specify rock and concrete armour sizes for stable slopes — contractor procurement
- Weigh overtopping limits against crest level and setback — asset owners and insurers
- Design inspection and survey regimes for existing defences — maintenance budgeting
- Communicate scheme trade-offs and residual risk — planners and community stakeholders

Key Coastal Engineering and Shore Protection Terms

- Significant wave height — the average height of the highest third of waves in a record, the basic input for structural design.
- Wave run-up — the vertical reach of a broken wave up a slope above still water level.
- Overtopping discharge — the volume of water passing over a structure crest per metre length per second.
- Littoral drift — the movement of beach sediment along the shore driven by waves arriving at an angle.
- Armour layer — the outer layer of rock or concrete units that resists wave attack on a breakwater or revetment.
- Beach nourishment — placing imported sand or shingle on a beach to widen it and absorb wave energy.

Coastal Engineering and Shore Protection Day by Day

Day 1: Coastal Processes and Wave Climate

- Wave Generation, Refraction and Shoaling — Nearshore Design Conditions
- Tides, Surges and Sea Level Allowances — Crest Level Setting
- Extreme Value Analysis of Wave Records — Return Period Selection
- Wave Breaking and Depth-Limited Conditions — Structure Toe Loading
- Bathymetric and Topographic Surveys — Reliability of the Design Basis

Day 2: Sediment Transport and Shoreline Change

- Longshore and Cross-Shore Transport Estimates — Sediment Budget Decisions
- Shoreline Evolution Modelling — Downdrift Erosion Risk
- Groyne Fields and Their Spacing — Beach Retention Choices
- Beach Nourishment and Recharge Cycles — Soft Defence Viability
- Coastal Cells and Sediment Pathways — Scheme Boundary Definition

Day 3: Breakwaters, Seawalls and Revetments

- Rubble Mound Breakwater Cross-Sections — Harbour Tranquillity Targets
- Armour Stability Formulae for Rock and Units — Armour Sizing
- Vertical and Recurved Seawalls — Wave Force and Overtopping Control
- Revetment Filters, Underlayers and Toe Protection — Scour Resistance
- Overtopping Assessment and Crest Freeboard — Public Safety Limits

Day 4: Materials, Construction and Monitoring

- Quarry Rock Grading and Durability Testing — Material Acceptance
- Concrete Armour Unit Selection — Supply and Placement Logistics
- Marine Plant and Placement Tolerances — Construction Sequencing
- Condition Surveys and Profile Monitoring — Maintenance Triggers
- Physical and Numerical Model Testing — Design Verification

Day 5: Practising the Shore Protection Options Appraisal

- Frontage Characterisation From Wave and Sediment Data — Problem Statement
- Hard Versus Soft Defence Comparison — Lifecycle Cost and Impact
- Preliminary Armour and Crest Design — Option Feasibility
- Monitoring and Maintenance Plan Outline — Long-Term Asset Care
- Shore Protection Options Appraisal — Preferred Scheme Recommendation

Applying Coastal Engineering and Shore Protection After the Course

- Lead a review of the design wave and water-level basis for a current coastal scheme using the extreme value methods covered.
- Set up a beach profile and armour condition survey for one existing defence, with triggers for maintenance.

Coastal Engineering and Shore Protection Questions FAQ

What is coastal engineering and shore protection and why does it matter now?

Coastal engineering and shore protection is the design of structures and beach works that resist waves and erosion. It matters now because rising seas, stronger storms and new waterfront assets raise the cost of getting defences wrong.

Which roles gain most from coastal engineering and shore protection training?

Coastal and harbour engineers, marine contractors and asset owners' technical leads gain most. You apply the methods directly to the defences you design, build or maintain.

How does coastal engineering and shore protection differ from a coastal zone planning course?

This subject is engineering design: wave loads, armour sizes, sediment budgets and monitoring. A coastal zone planning course looks at land use, habitats and stakeholder policy across a whole coastline rather than sizing individual structures.

What do you bring back from coastal engineering and shore protection training?

You bring back a shore protection options appraisal for a real frontage, plus worked methods for design waves, armour sizing, overtopping checks and defence monitoring that your colleagues can reuse.

Coastal Engineering and Shore Protection: The Way Forward

The shore protection options appraisal sets out wave climate, sediment behaviour and the hard and soft defences considered for one frontage. Its first use is choosing a preferred scheme to take into detailed design, and it serves designers, contractors and asset owners alike. After the first storm season, revisit its monitoring results to test whether the assumed wave climate and drift rates still hold.