

Introduction to Port Engineering

July 20-August 28, 2020

**GUIDED ONLINE
COURSE**



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Certificate in Port
Engineering Task
Committee*

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**Earn
CEU: 2.4
PDH: 24**

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Introduction to Port Engineering

EARLY BIRD RATE (UNTIL JULY 6):
Member \$1395 | Nonmember \$1695

REGULAR RATE (AFTER JULY 6):
Member \$1695 | Nonmember \$1995

Credits: **CEU: 2.4 | PDH: 24**

12-Week Courses
ACCELERATED TO
6 WEEKS!

ASCE announces accelerated courses!

You asked, we listened—this is one of our most popular 12-week courses offered at an accelerated pace this summer, 6-weeks! All the same great content, released at a faster rate.

About this course

This course will provide a general background in port engineering. Various types of terminals will be presented, including container, liquid bulk, dry bulk, cruise ships, small craft marinas, and USN/ military terminals. The course will give the specific requirements of each of these various types of facilities and prepare you for the engineering tasks required for port facilities. Reference materials will be the most current and provide a knowledge base and toolbox for attendees.

You will gain the insights and skills to advance your leadership capabilities while making a positive difference in the world.

After you complete this Introduction course, consider taking the next step by completing four additional Guided Online Courses to earn your **Port Engineering Certificate**. First, complete the core course requirements:

- **Introduction to Port Facilities**
- **Design of Port Facilities**
- **Construction of Port Facilities**

Then, select two electives for a total of (5) courses completed:

- **Geotechnical Design of Port Facilities**
- **Port Operations & Maintenance**
- **Seismic Design of Piers and Wharves**
- **Marine Container Terminal Planning**

ASCE's Port Engineering Certificate Program is a series of career-focused courses taught by practicing engineers and university professors to provide professional engineers in-demand skills used in the field of port engineering. You will learn the fundamental concepts of port engineering, the design, construction, and management of port facilities. Then, depending on your electives you could also learn: geotechnical data; port operations & maintenance and how containerized commerce drives container terminal operations, and how those operations drive infrastructure.

Certificate program enrollment saves you up to 35% compared to purchasing courses individually.

YOUR INSTRUCTORS



Martin L. Eskijian, P.E.,
D.P.E. (Ret.), M. ASCE



Edward J. Schmeltz, P.E.,
D.CE, D.OE, D.PE, D.NE, FASCE

In this course, you will learn how to:

- Recall the characteristics of maritime vessels.
- Describe the relationship of maritime vessel characteristics to engineering analyses of port and harbor facilities.
- Identify types of vessels and the key factors each brings to the design of maritime facilities.
- Describe the factors affecting the design and operation of marine facilities including wind, waves, ice, tides, and currents.
- List the design and operational criteria for types of port facilities.
- Convert criteria into operational limits and downtime estimates at various facility types.

Upon completion of the course, you will be able to:

- Develop a general background in port engineering.
- Be familiar with distinct types of terminals including container, liquid bulk, dry bulk, cruise ships, small craft marinas, and USN/ military terminals.
- Understand the specific requirements of each of these types of facilities.
- Prepare for the engineering tasks required for port facilities.

Who Should Attend?

- Entry level engineers working for port authorities or consulting firms.
- Engineers seeking to move into the field of port engineering from other disciplines.
- Senior level management that may be placed into a position of authority over port facilities.



WEEK 1:

DESIGN CONDITIONS I AND II

Learning Outcomes

- Describe vessel characteristics and movements as they are applied to port design.
- Evaluate and compute vessel impacts on berth structures.
- Identify vessel mass for various uses.
- Estimate vessel motions at berth.
- Define navigation channel dimensions and other characteristics depending on vessels transiting.
- List basic meteorological and oceanographic conditions impacting port facilities.
- Evaluate risk concepts and recurrence intervals and their impact on the selection of design criteria.
- Describe basic development of environmental loads on port facilities/structures.

TOPICS

- General Vessel Characteristics – length, beam, draft, LBP, and naval architecture aspects
- Displacement, DWT, and Gross Tonnage definitions
- Vessel Motions – heave, pitch, roll, surge, sway, and yaw
- Vessel Transit – squat, windage, channel characteristics, and Broad-brush design
- Vessel Impact on Berths – methods of calculation, varying angles of incidence by size, and fender loads on hull plating
- Meteorological and Oceanographic Conditions – wind, waves, currents, tides, tsunamis, fog, and rainfall
- Extreme Conditions for Design – the concepts of recurrence interval and risk
- Environmental Loads
- Use of Breakwaters/Jetties

WEEK 2:

CONTAINER TERMINAL DEVELOPMENT I AND II

Learning Outcomes

- Identify and describe the development of container vessels over time and their impact on upland and port facilities.
- Describe alternative methods of handling containers from the pier face to the stacks.
- Evaluate and describe the issues related to mooring and berthing container vessels.
- Compute berth operating limits.
- Describe the basic layout of container yards.
- Identify key types of container handling equipment and their impact on terminal layout and design.
- Evaluate the unique requirements of pavements in container facilities.
- Evaluate the unique utility requirements in container terminals.

TOPICS

- Unique Container Vessel Characteristics – sizes and shapes
- Container Types
- Upland Configurations – container stacking and container handling
- Upland Handling Equipment Types
- Intermodal Connectivity – rail, truck, and gates
- Mooring and Berthing Considerations/Configurations
- Mooring Equipment
- Container Handling Equipment – STS cranes, top loaders, transtainers, and RMGs
- Pavements
- Modelling
- Operational Issues
- Shore Power

WEEK 3:

LIQUID BULK TERMINALS I & II

Learning Outcomes

- Describe the functional requirements of liquid bulk terminals.
- Define the parameters of a risk and hazard analysis for petroleum terminals.
- Evaluate the general scope and layout of the terminals and define functional requirements.
- Identify commonly used design standards related to petroleum/liquid bulk terminals.
- Define the loading combinations applicable to bulk terminal design.
- Identify the components of berthing and mooring systems and typical design codes for petroleum facilities.
- Evaluate alternative structural materials for berth construction.
- Identify typical mechanical equipment required on terminals.

TOPICS

- What can go wrong?
- Functional Requirements
- Risk and Hazardous Area Requirements
- General Design Layout and Configurations – wharves, piers, islands and offshore multi-point
- Mooring and Berthing Requirements/Analysis
- Quick Release Hooks and Mooring Lines
- Loads and Loading Combinations
- Seismic Criteria and Associated Structural Displacements
- Structural Materials and Construction
- Mechanical Equipment and Pipeline Systems
- Fire Detection and Suppression
- Instrumentation and Operational Issues
- Existing Terminals and Rehabilitation

WEEK 4:

DRY BULK TERMINALS AND CRUISE TERMINALS

Learning Outcomes

- Identify types of dry cargo and the implications on vessel loading.
- Describe the characteristics of dry bulk terminals for various cargos.
- Differentiate between types of loading/unloading operations.
- Define unique characteristics of cruise vessels and the impact of those characteristics on berths/terminals.
- Describe general requirements of terminal buildings and ancillary facilities.
- Define unique operational aspects of cruise vessels/terminals.
- Describe types of cruise facilities with respect to Port of Call, Homeport.

TOPICS

- Definitions
- Cargo Types
- Berth Configurations
- Handling Equipment – conveyor systems, ship loaders/unloaders, truck dumps, and more
- Lightering Operations
- Unique Vessel Characteristics
- Operating Limitations – wind, waves, and currents
- Operating Limitations – support services
- Special Considerations – customs, immigration, passenger handling, baggage, and stores

WEEK 5:

MARINAS AND SMALL BOAT HARBORS AND BREAKWATERS & JETTIES

Learning Outcomes

- Describe general design and layout of floating, small craft marinas.
- Explain design criteria, with consideration of tsunami and storm surge loads.
- Describe offshore, single point moorings analysis/design.
- Define the purpose of breakwater and jetty structures as they apply to ports and harbors.
- Identify types of breakwater and jetty structures and the relative merits of each.
- Determine the criteria used in the design of these protective structures.
- Execute a two-dimensional design of a protective breakwater.

TOPICS

- What can go wrong?
- General Design Considerations and Layout
- Example Design Codes
- Maintenance and Inspection of Floating Small Craft Marinas
- Single Point, Offshore Moorings
- Purpose of Structures
- Types of Structures – rubble mound, caissons, and shoreside revetments
- Determining Layouts
- Design Methodologies – criteria, waves, and formulas
- Typical Designs
- Examples

WEEK 6:

MILITARY FACILITIES I & II

Learning Outcomes

- Define special requirements for berthing at naval facilities.
- Define navigation requirements unique to naval vessels.
- Evaluate the requirements for weapons handling at military facilities.
- Define the needs for naval facilities related to shore utilities.
- Describe the differences between graving and floating drydocks and their operations.
- Identify the special considerations related to “museum” vessels.

TOPICS

- Vessel Characteristics and Special Considerations
 - carriers and subs
- Mooring Issues
- Cold Ironing
- Weapons Handling
- Supporting Utilities
- Shoreside Utilities
- Special Support Facilities – pure water, steam and machine shops
- Drydocking – floating and graving docks
- “Museum” Vessels – special considerations

This course outline is subject to change



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We also offer **Certificate Programs**, which are made up of multiple Guided Online Courses, enabling you to go broader and deeper into specific technical areas.

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- ASCE Week
- Guided Online Courses and Certificate Programs
- Live training sessions streamed over the Internet
- On-demand recorded webinars and seminars
- In-person seminars

These are the perfect platforms to exchange ideas, meet a diverse group of colleagues, participate in discussions, learn about the latest innovations in your field, and earn CEUs and PDHs.

ASCE Week

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