



Co-funded by the Erasmus+ Programme of the European Union

Course Name: PORT AND MARINE CONSTRUCTIONS

Number of credits: 3ECTs

Period: Fall/spring semester

Coordinator	Vietnam Maritime University
Credits	3 ECTs
Lecturers	Tran Duc Phu
Level	BSc.
Host institution	Ho Chi Minh City University of Natural Resources and Environment
Course duration	1 semester (the classes will be scheduled in accordance with the university timetable)
New/revised	New course

Summary

The course provides basic knowledge of port and marine constructions; the basic factors to consider in the design of port planning; port master plan; environmental conditions to consider when designing and planning ports and marine structures; planning and design of port's waters; port design and marine structures.

Target student audiences

BSc. students majoring in Marine Resources Management

Prerequisites

Required courses (or equivalent): NO

Aims and objectives

Students understand an overview of ports and structures, know the role of ports and marine structures in economic development; identify factors related to port planning; understand the port master planning and environmental conditions to consider when designing or planning ports and marine structures; understand the port water zones planning and design; understand the principles of port and marine engineering. From studying the factors that govern port planning, students can understand a particular port or marine facility planning design.

The Authentic Tasks:

The course provides basic knowledge of planning and designing of ports and marine structures.

General learning outcomes:

By the end of the course, successful students will:

Knowledge	<ul style="list-style-type: none"> • Have an overview of ports and marine structures; • Find out key factors to consider in the port planning and designing; • List environmental conditions to consider when designing and planning ports and marine structures.
Comprehensive	<ul style="list-style-type: none"> • Presenting the general knowledge about ports and structures, the role of ports and structures in economic development;



	<ul style="list-style-type: none"> • Presenting the basic factors to consider in port planning design; port master plan; • Students understand the principles of port design and marine structures
Application	<ul style="list-style-type: none"> • Basic plan and design port water areas; • Basic design Port and marine structures.
Analysis	<ul style="list-style-type: none"> • Analyzing elements relating to port planning
Synthesis	<ul style="list-style-type: none"> • Planning a basic port and estimating basic environmental loads for designing ports and marine structures; • Planning and designing port's waters.

Overview of sessions and teaching methods

The course will make most of interactive and self-reflective methods of teaching and learning and, where possible, avoid standing lectures and presentations

- Learning methods**
- Video presentations
 - Project Based Learning
 - Literature review
 - Brainstorming
 - Puzzles
 - Query
 - Mind map
 - Problem-based learning
 - Team work

Course outline

Week	Topics
Week 1&2	Overview of ports and the role of ports in economic development
Week 3&4	Basic factors to consider in port planning & design
Week 5&6	Environmental conditions
Week 7 & 8	Planning and designing port's land
Week 9 & 10	Port's waters planning and design
Week 11 & 12	Mechanization of cargo handling in ports
Week 13 & 14	Port warehouse design and plan
Week 15	Marine constructions and auxiliary equipments

Course Schedule

Topic 1. Port overview and its role in economic development	
Learning objectives	<ul style="list-style-type: none"> • Understand general knowledge about ports and marine structures • Know the role of ports and structures in economic development
Learning outcomes	<ul style="list-style-type: none"> • Summarize some basics of transport and port • Present the mission, role and structure of the port



	<ul style="list-style-type: none">• Categorize common port types.
Student deliverables	Exercise: <ul style="list-style-type: none">• Summarize some basics of transport and port• Present the mission, role and structure of the port
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	1.1 Some Basic Issues of Transport and Port; 1.2 Mission, Role, and Structure of Port; 1.3 Port classification 1.4 Characteristics and classification of marine structures
Topic 2. Basic factors to consider in port planning & design	
Learning objectives	<ul style="list-style-type: none">• Have knowledge of the basic factors to consider in port design and master plan.
Learning outcomes	<ul style="list-style-type: none">• Summarize the basic factors to consider in port plan and design including: cargo, ships, loading and unloading facilities, natural conditions.
Student deliverables	Exercise: 1. Summarize the basic factors to consider in port plan and design?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	2.1 Cargo; 2.2 Vessel; 2.3 Loading and unloading facilities; 2.4 Natural conditions.
Topic 3. Environmental conditions	
Learning objectives	<ul style="list-style-type: none">• Have knowledge of environmental conditions to be considered in planning and designing port and marine constructions
Learning outcomes	<ul style="list-style-type: none">• Summarize environmental conditions to be considered in planning and designing port and marine constructions
Student deliverables	Exercise: 1. Summarize environmental conditions to be considered in planning and designing port and marine constructions?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	3.1 Wind; 3.2 Current; 3.3 Wave; 3.4 Others.
Topic 4. Planning and designing port's land	
Learning	<ul style="list-style-type: none">• Understand how to plan port's land.



objectives	
Learning outcomes	<ul style="list-style-type: none">• Calculate the elevation of the berth and the land area of the port• Present structures and sizes of port's land• Present types of berths' edge and estimate the number of wharfs
Student deliverables	Exercise: <ul style="list-style-type: none">• Calculate the elevation of the berth and the land area of the port?• Present structures and sizes of port's land?• Present types of berths' edge and estimate the number of wharfs?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	4.1 Introduction; 4.2 Calculating the wharf deck elevation and the design water depth of the port; 4.3 Structures and sizes of port's land; 4.4 Types of berths' edge and estimate the number of wharfs.
Topic 5. Planning and Designing Port's waters	
Learning objectives	<ul style="list-style-type: none">• Understanding planning port's waters
Learning outcomes	<ul style="list-style-type: none">• Present the structure, use and requirements of the port's waters• Calculate the depth and bottom elevation of the port's waters• Demonstrate how to determine the size of the water bodies of the port
Student deliverables	Exercise: <ul style="list-style-type: none">• Present the structure, use and requirements of the port's waters?• Calculate the depth and bottom elevation of the port's waters?• Demonstrate how to determine the size of the water bodies of the port?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	3.1 The structure, use and requirements of the port's waters; 3.2 The depth and bottom elevation of the port's waters; 3.3 The size of the water bodies of the port.
Topic 6. Mechanization of cargo handling in ports	
Learning objectives	<ul style="list-style-type: none">• Have knowledge of mechanization of cargo handling in ports
Learning outcomes	<ul style="list-style-type: none">• Summarize the mechanization of cargo handling in ports
Student deliverables	Exercise: 1. Summarize the mechanization of cargo handling in ports?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	6.1 Categorizing cargo handling methods in ports



	6.2 Cargo handling processes 6.3 Mechanization models 6.4 Factors affecting the selection of mechanization models 6.5 Technical and economic indicators for comparison and selection of mechanization models 6.6 Loading and unloading order
Topic 7. Port warehouse design and plan	
Learning objectives	<ul style="list-style-type: none">• Have knowledge of port warehouse design and plan
Learning outcomes	<ul style="list-style-type: none">• Present process of port warehouse design and plan
Student deliverables	Exercise: 1. Presenting process of port warehouse design and plan? 2. Stating how to calculate the port warehouse for serving container, dry and liquid cargo?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	7.1 Introduction 7.2 Warehouse categorize 7.3 Port's warehouse capacity 7.4 Size of warehouse 7.5 Calculating warehouse for serving container 7.6 Calculating warehouse for serving dry cargo 7.7. Calculating warehouse for serving liquid cargo
Topic 8. Marine constructions and auxiliary equipments	
Learning objectives	<ul style="list-style-type: none">• Have knowledge about marine constructions and auxiliary equipments
Learning outcomes	<ul style="list-style-type: none">• Summarize structure of marine constructions and auxiliary equipments
Student deliverables	Exercise: 1. Present the structure of marine constructions? 2. Presenting mooring equipments? 3. Presenting fender systems?
Topic materials	<ul style="list-style-type: none">• Lecture notes of Port and Marine Structures• Video
Outline	7.1 The structure of marine constructions 7.2 Mooring systems 7.3 Fender systems

Literature

Compulsory

[1] Lecture notes of Port and Marine Structures



Recommended:

[1] Pham Van Giap. *Harbour Planning*. Vietnam National Civil Engineering University Publishing, 2019

[2] Nguyen Van Ngoc. *Berth Constructions*. Vietnam Maritime Publishing, 2016

[3] H.Lightringen, *Planning and functional design*, The Netherlands, 2010.

Course workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities (30 hours)			
Lectures	Understanding theories, concepts, methodology and tools	Class participation	15
Moderated in-class discussions	Understanding basic knowledge of planning and designing of ports and marine structures.	Class participation and preparedness for discussions	5
In-class assignments, homework assignment	Understanding basic knowledge of planning and designing of ports and marine structures.	Class participation and preparedness for assignments	5
Reading and discussion of assigned papers for preparation for lectures	Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature.	Class participation, creative and active contribution to discussion	5
Independent work (60 hours)			
Home work and Exercise	Ability to interpret data, analyze objects and use concepts, tools, and methods, and equations to solve problems.	Quality of individual assignments	60
Total			90

Course Assignments

Course assignments will constitute a multi-part project:

- Assignment #1 - (in-class, online)
- Assignment #2 - (home work)
- Assignment #3 - (home work)
- Assignment #4 - (mostly in-class)



Assignment #1: port and harbour quiz will help students have general knowledge about ports and marine structures, the role of ports and structures in economic development, common port types and the basic factors to consider in port design and master plan, the basic factors to consider in port design and master plan.

Assignment #2: Environmental conditions give rise to loads imposed on the structure by natural phenomena including wind, current, waves, etc. Environmental loads shall be anticipated from any direction unless knowledge of specific conditions makes a different assumption more reasonable. In this assignment, the wind speeds and wind forces should be computed using appropriate formulas and coefficients.

Assignment #3, cargo handling and port warehouse quiz will help students have knowledge of mechanization of cargo handling in ports and port warehouse.

Assignment #4: deals with a very important issue of plan and design port structures. The students will estimate wharf deck elevation, design water depth.

Grading

The students' performance will be based on the following:

- Assessment**
- Progress assessment (30%):
 - Exercise (15%):
 - Homework (15%):
 - Final assessment (60%):
 - Final examination (45%)
 - Semi- Final examination (15%)

- Evaluation**
- A (8,5 – 10)
 - B (7,0 – 8,4)
 - C (5,5 - 6,9)
 - D (4,0 – 5,4)