Coastal and Harbor Engineering, and Lab (Spring, 2015)

Instructor - **Professor Yong-Sik Cho**
Office -
E-mail -
Telephone -

URL - http://coast.hanyang.ac.kr/
Teaching Assistant - Byung-Ho Kim (Graduate Student,)

교과목개요

In this course, the basic concept of wave mechanics based on fluid mechanics and hydraulics will be instructed. Main contents include small amplitude waves theory, wave maker theory, wave refraction, diffraction and reflection, tsunami and tide, and coastal structures. The video tapes and other materials will also be used to help students to understand basics of wave mechanics. Students may visit the Coastal and Harbor Laboratory of the Korea Institute of Construction Technology.

수업목표 및 안내

학생들에게 해안 및 항만공학에 필요한 기본적인 유체역학 원리와 미소진폭파 이론을 강의하여, 건설회사 및 설계회사의 실무에 필요한 해안 및 항만공학의 기본적인 지식을 습득하도록 한다. 더불어, 현장견학을 통해 실질적인 항만공사 현황을 이해하도록 한다.

교과목 주요주제

- 기초적인 수학 [벡터, 복소수, 편미분방정식]
- 기초적인 유체역학 [연속방정식, 운동량방정식, 에너지방정식]
- 파도의 종류
- 미소진폭파이론
- 파랑의 변형
- Tsunami and Tide
- 항만구조물

Text

- Lecture Note written by Professor Yong-Sik Cho

References

- **Water Wave Mechanics for Engineers and Scientists**
  written by R.G. Dean and R.A. Dalrymple, World Scientific, Co.,
  ISBN 981-02-0420-5
- **Waves, Tides and Shallow-Water Processes**
  written by Open University Course Team
- **Shore Protection Manual**
  written by Corps of Engineers, U.S. Army
- **항만 및 어항 설계기준**
  written by 해양수산부
- **Video Tape 바다대기행, 살아있는 지구**
  recorded by 한국방송공사(KBS)

Course Grade

- attendance 10%, experiment 10%, homework 10%, final exam 70%

Course Policy

- Homework will be assigned approximately every two weeks.
- No late homework will be accepted.
- Every homework should be typed and printed.
- A duplicate homework including the source will pay serious penalties.
- Every homework will be posted on the course homepage of i-Community.
- You may consult with Professor Yong-Sik Cho.

Course Contents

1. Review of Mathematics (1st week)

1.1 Vector

1.2 Complex Variables

1.3 Trigonometric and Hyperbolic Functions

1.4 Taylor Series Expansion

1.5 Partial Differential Equations and Boundary Conditions

2. Review of Fundamental Fluid Mechanics (2nd and 3rd weeks)

2.1 Classification of Fluid and Flow

2.2 Equations of Continuity and Momentum

2.3 Vorticity

2.4 Laplace Equation

2.5 Bernoulli Equation

2.6 Energy Equation

2.7 Vorticity Transport Equation

2.8 Cauchy-Riemann Equation

3. Small Amplitude Wave Theory (4th-6th weeks)

3.1 Characteristics of Water Waves

3.2 Governing Equation and Boundary Conditions

3.3 Linearization of Boundary Conditions

3.4 Solution of Laplace Equation

3.5 Dispersion Relation

3.6 Velocity Field of Water Particle

3.7 Hydrodynamic Pressure

3.8 Wave Energy and Group Velocity

3.9 Superposition

4. Wave Maker Theory (7th and 8th weeks)

4.1 Types of Wave-Maker

4.2 Theory of Piston-Type Wave Maker

4.3 Propagating and Evanescent Modes

5. Wave Refraction over an Uneven Bottom (9th and 10th weeks)

5.1 Geometric Ray Theory

5.2 Refraction over a Uniform Slope

5.3 Shoaling over a Uniform Slope

5.4 Wave Breaking

6. Tsunami and Tide (11th-13th weeks)

6.1 Governing Equations

6.2 Offshore and Nearshore Tsunamis

6.3 Numerical Simulations of Tsunami Propagation and Run-up

6.4 Characteristics of Tide

6.5 Harmonic Analysis

7. Coastal Structures (14th-16th weeks)

7.1 Classification of Coastal Structures

7.2 Breakwaters

7.3 Run-up and Run-down Heights

The final examination will be taken around 16th week.