

## Maritime Structures

1. **Course number and name:** 020OUMGS5 Maritime Structures
2. **Credits and contact hours:** 2 ECTS credits, 1x1.25 hours
3. **Name(s) of instructor(s) or course coordinator(s):** Cynthia ANDRAOS
4. **Instructional Materials:**
  - a. Instructor's class notes
5. **Specific course information**
  - a. **Catalog description:** Give students the basics in order to be able to calculate the maritime effects on the components of a port or a maritime work.
  - b. **Prerequisites or co-requisites:** 020FOSGS3 Foundation Engineering
  - c. **Required:** Required course for Water and Environmental Specialty students.
6. **Educational objectives for the course**
  - a. **Specific outcomes of instruction:**

By the end of the course, the students will be able to:

    - Understand the significance of maritime structures in coastal engineering and offshore industries.
    - Explain the different types of maritime structures, such as breakwaters, jetties, seawalls, offshore platforms, and floating structures.
    - Identify the key challenges and considerations associated with designing and constructing maritime structures.
  - b. **PI addressed by the course:**

<b>PI</b>	1.3	4.2	7.2
<b>Covered</b>	yes	yes	yes
<b>Assessed</b>			

7. **Brief list of topics to be covered:**
  1. **Introduction**
  2. **Ports:** Definitions, Major ports worldwide, Functions, Classification of ports based on their main missions, Types of traffic, Types of vessels, Classification based on geographical location, Different environments, Master planning, Composition, Conditions defining the establishment of a port, Ports in Lebanon.
  3. **Dredging Works:** Introduction, Types of dredgers, Material transport, Material storage.
  4. **Swell:** Generalities about sea movements, Physical phenomena of swell, Importance of swell knowledge, Theoretical study of swell, Refraction of swell, Diffraction of

- swell, Reflection of swell, Breaking of swell, Real swell, Swell prediction, Measurement of swell characteristics, Impact of swell on obstacles, Magnitude of swell characteristics, Application example, New techniques.
5. **Physico-Chemical Properties of Seawater:** Introduction, Physical properties of seawater, Chemical properties of seawater, Actions on construction materials.
  6. **External Works of Ports:** Definitions and Functions, Sloping Breakwaters (Generalities, Construction Phases, Outer Armor, Core, Intermediate Layers, Toe Buttress, Crest, Inner Slope, Examples), Vertical Breakwaters (Principles and Types, Construction, Sizing), Composite Breakwaters, Floating Breakwaters, Choosing the type of breakwater.
  7. **Interior Works of Ports:** Definitions and Functions, Quays (Gravity Quays, Sheet Pile Quays), Piers, Dolphins.
  8. **Circulation Structures:** Pile-supported Jetties - Cargo circulation, Locks (and sluices) - River circulation, Fish Passes - Faunal circulation.
  9. **Construction and Maintenance Structures:** Cofferdams, Dry Docks, Slipways, Graving Docks, and Construction Forms.