



**NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF MECHANICAL ENGINEERING
NAVAL ENGINEERING PROGRAM**

MV323 – VESSEL AUXILIARY MACHINES

I. GENERAL INFORMATION

CODE	: MV323
SEMESTER	: 6
CREDITS	: 03
HOURS PER WEEK	: 04
PRERREQUISITES	: MC411-MN204
CONDITION	: Compulsory

II. SUMMARY

The course provides the student with the necessary information and knowledge regarding the following:

Disposition of Vessel Auxiliary Machine. Auxiliary service systems. Calculation and selection of pumps, pipes, valves and accessories. Freshwater Generators. Heat exchangers. Compressors. Oil/Water Separators. Fuel/Water separators. Hydropneumatic equipment. Hydraulic Power Systems. Auxiliary boilers. Refrigeration systems in warehouses.

III. COMPETENCES

The student:

1. Recognizes which are the auxiliary equipment of the vessel.
2. Defines which are the auxiliary systems of the vessel.
3. Designs the different principle diagrams of the auxiliary systems of the vessel.
4. Determines the classes of piping, valves and instruments to be used in systems.
5. Applies the equations and conducts the pumping system calculations.
6. Applies the equations and conducts calculations of the heat exchangers.
7. Understands and describes the features and operation of the following equipment and systems:
Pumps of naval use, heat exchangers, freshwater generators, Air compressors, centrifugal oil separators and fuel, hydropneumatic systems, Hydraulic power units, auxiliary boilers, refrigerated seawater systems RSW.

IV. LERNING UNITS

- 1. MACHINERY AND AUXILIARY SERVICES (8 HOURS)**
Disposition of Auxiliary Machines within the engine room space.
Auxiliary systems: introduction, classification, diagrams of systems and their components.
- 2. PUMPS OF NAVAL USE (4 HOURS)**
Pumps of naval use: introduction, function, classification, description, characteristics, components, materials used.
- 3. PUMPING SYSTEM CALCULATIONS (4 HOURS)**
Behavioral Curves. Pump selection diagrams. Calculations relating to piping and pumps systems.
- 4. NET POSITIVE SUCTION HEAD (NPSH) (4 HOURS)**
Concepts of NPSH required. Concepts of NPSH Available. Concepts of Cavitation. NPSH calculations. Pump Selection Calculations.
- 5. PIPELINES (2 HOURS)**
Materials, application, standards and calculations.
- 6. VALVES (2 HOURS)**
Valves of naval use, types, features, uses.
- 7. FRESHWATER GENERATORS (4 HOURS)**
Description and uses, features and components, operation, principle diagrams.
- 8. COMPRESSORS (4)**
Función, clasificación, ciclo de compresión de una etapa, ciclo de compresión de dos etapas, características y componentes de un compresor, cálculos de potencia de un compresor.
- 9. HEAT EXCHANGERS (8 HOURS)**
Function, description, types and features, components, manufacturing materials, calculations and sizing.
- 10. CENTRIFUGAL SEPARATORS (4 HOURS)**
Description, classification, operation, principle diagrams.
- 11. HYDRAULIC SYSTEMS (2 HOURS)**
Description, features, components, principle diagrams, operation, application calculations.
- 12. MARINE BOILERS (2 HOURS)**
Types, description, components, operation, diagrams.
- 13. HYDRAULIC POWER SYSTEMS (4 HOURS)**
Hydraulic power units: description, features, components, principle diagrams, operation, application calculations.

- 14. REFRIGERATED SEAWATER SYSTEMS RSW (4 HOURS)**
Description, types, features, components, principle diagrams.

V. METHODOLOGY

- A) Method inductive, deductive and experimental.
- B) Process, analysis y synthesis.
- C) Forms, exposition, dialogue, motivation, teamwork.

VI. EVALUATION FORMULA

Evaluation system "F". Calculation of final grade: $FG = (ME + 2FE + QA)/4$
MT: Midterm exam FT= Final exam QA: Quizzes average
There will be four quizzes, the quiz with the lowest grade will not be taken in consideration.

VII. BIBLIOGRAPHY

TEXTS

- MAQUINARIA MARÍTIMA AUXILIAR WJ FOX
- NAVAL AUXILIAR MACHINERY United State Naval Institute
- MARINE ENGINEERS Society of Naval Architects and Marine Engineers
Harrinton
- BOMBAS. SUS SELECCIÓN Y APLICACIÓN Tyler
- PUMPS HAND BOOK Igor J. Karassik
- COMPRESORES Richard Greene – STEAM Badcock Wilcock

MANUFACTURER CATALOGS

- ITUR – WIER (Pumps)
- WORTHINGTON (Pumps)
- THYSSEN (Pumps)
- IMO (Pumps)
- GRUNDFOS (Pumps)
- FRAMO (Pumps)
- ALFA LAVAL (Chillers, Purifiers)
- BABCOCK WILCOCK (Boilers)
- ATLAS (Freshwater Generators)
- SUIZER (Marine Diesel Engines)

COMPANY REGULATIONS, CLASSIFIERS

- AMERICAN BUREAU OF SHIPPING
- LLOYD'S REGISTER OF SHIPPING
- GERMANISHER LLOYD