NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF MECHANICAL ENGINEERING
NAVAL ENGINEERING PROGRAM

MV476 – NAVAL STRUCTURES I

I. GENERAL INFORMATION

CODE	**:**	MV476 Naval Structures I
GRADE	**:**	5
CREDITS	**:**	4
WEEKLY HOURS	**:**	5 (Theory–Practice)
REQUIREMENTS	**:**	MC361 – MV108
CONDITION	**:**	Mandatory

II. SUMMARY

Course designed to provide the necessary knowledge to understand the mechanical behavior of the various elements that make up a naval structure under certain requirements and hypotheses. The studied behavior comprises the understanding of the combined internal forces that cause the different known structural faults making use of the stresses and / or deformations.

III. STUDENT ACHIEVEMENTS

The student:

1. Knowledge of the science and technology of materials and capacity for their selection and for the evaluation of their behavior.
2. Knowledge of the characteristics of naval structural materials and the criteria for their selection.
3. Capacity for the design and calculation of simple naval structures
4. Manage the rules of classification societies for calculating individual hull structures
5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.
6. Teamwork.

IV. LEARNING UNITS

INTRODUCTION STRUCTURAL ELEMENTS COMPOSING THE HULL OF A VESSEL / 8 HOURS

Description of the main elements, secondary and additions, which make up the structure of typical boats, identification of the master frame.

TYPES OF NAVAL STRUCTURES / 6 HOURS
Transverse Structure / Longitudinal Structure / Mixed Structure

DESCRIPTION AND STRUCTURAL ARRANGEMENTS OF VARIOUS TYPES OF BOATS / 8 HOURS
Oil / bulk / Gas Carrier / Small Vessel
MATERIALS USED IN THE NAVAL CONSTRUCTION / 12 HOURS

Characteristics, properties / mechanical behavior / materials tests / destructive tests / non-destructive tests / steel / aluminum / wood / composite materials (polymers)

EFFORTS ON A SHIP / 6 HOURS
Internal and external requests / Global longitudinal loads. Vessel Beam / Analysis and Calculation of Longitudinal Resistance

THEORY AND CALCULATION OF PLATES / 12 HOURS
Introduction / Determination of stresses / Plates subjected to normal load / load subjected to axial load / Failures in plate reinforcements / bulkheads / work stresses / safety factors

PANDEON THEORY / 8 HOURS
Introduction / Euler theory / Struts / plates subject to buckling / Rankine-Gordon Theory

FATIGUE ANALYSIS / 6 HOURS
Introduction / Fatigue Failure Phases / S-N Curve / Fatigue Life Estimate.

HELMET COAT / 6 HOURS
Estimation and calculation by classification standards thickness of the hull lining / bottom / side / cover / double bottom.

CONNECTION ELEMENTS AND EFFECTIVE WIDTH (6 HOURS)
Section Module / Associated Iron / Cash Width / Cartelas

CALCULATION OF STRUCTURAL ELEMENTS THROUGH THE USE OF STANDARDS
CLASSIFICATION / 8 HOURS
Structural Ring Calculation / Longitudinal Reinforcement / Transverse Reinforcement

V. METHODOLOGY

The course is developed in sessions of theories, practice. In theory sessions, the teacher presents concepts, theorems and applications. In practical sessions, various real-world problems are solved and their solution is analyzed.
Also in the hours of practice are invited exhibitors who are experts engineers of the national or international naval environment, also some technical visit to some shipyard so that the students can better relate and understand the theoretical part with the practice. In all the sessions the active participation of the student is promoted.

VI. GRADING FORMULA

For the final average, the following evaluations will be taken into account:

FA = (ME + PA + FE) / 3

ME: Midterm Exam FE: Final Exam
PA: Average of Practical Works

VII. BIBLIOGRAPHY

Recommended References:
- Shipbuilding, Frans Willems, Lecture notes
- Rules for the construction and classification of ships, ABS
- Rules for the construction and classification of ships, GL
- Calculation of ship structures, Ricardo Domínguez
-Construction Naval - Nomenclature and Naval Technology Fernandez Gonzalez, Francisco.