NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF MECHANICAL ENGINEERING
NAVAL ENGINEERING PROGRAM

MV316 – MARINE MACHINES II

I. GENERAL INFORMATION

CODE	:	MV316 Marine Machines II
SEMESTER	:	9
CREDITS	:	4
HOURS PER WEEK	:	5 (Theory–Practice)
PREREQUISITES	:	MV-315 Marine Machines I
CONDITION	:	Compulsory
DEPARTMENT	:	Naval Engineering
INSTRUCTOR	:	Victor Acosta
INSTRUCTOR E-MAIL	:	vacosta@uni.edu.pe

II. COURSE DESCRIPTION

The course is part of the professional education in the application of concepts, methods and techniques of plant engineering of civil and military ships. The theoretical and practical knowledge of naval propulsion plants with steam turbines, gas turbines, combined systems, electrical systems also sizing and facilities of the various systems that form the plant engineering of civil and military ships are provided. Requirement of Classification Societies. At the end of the course, the student must have the necessary knowledge for the design and selection of all systems used in naval propulsion plants of all types of ships. Problems or situations of engineering application are developed and the use of specialized software is made.

III. COURSE OUTCOMES

1. Analyze the operation of the type of plant engineering. Computes and interprets results in the calculations of power and performance. Explains and determines assemblies or distinct components according to the use of classification societies such as ABS, GL, BV-LLR, NKK, RINA, and others.
2. Understand and apply technical concepts for the calculating of power for different types of plants of naval engineering, main and auxiliary.
3. Interpret the concept of power distribution plant with CODOG, COSAG and CONAG combined systems. Executed or made available plans or general arrangement of machinery and naval systems.
4. Design and explains the operational considerations of plant engineering: speed and autonomy of special ships.

IV. LEARNING UNITS

1. NAVAL PROPULSION PLANTS / 15 hours

Primary and secondary division of propulsion plants. Steam plants. Yields. Sankay diagrams. Marine boilers. The plant engineering description of a naval unit type cruise. Location of the marine boilers: Heat transfer in boilers of military ships, Regulatory classification societies for ships. Marine steam turbines: Classification, turbine components. Emergency Operations: Modern marine turbines - description of a naval engineering plant unit. Thermal balance of a steam plant ship: Methods and final heat balance for boilers and turbines.

2. **GAS TURBINE PLANTS / 10 hours**

   Concepts and thermodynamic cycles. Generations. Types of materials. Calculation of power. Gas turbine. Types of boilers of gas recovery.

3. **MARINE PROPULSION PLANTS OF COMBINED SYSTEMS / 15 hours**

   Types. COGAS of high power. Examples and description of operation. Plant engineering for military frigate type ships. Mixed Propulsion: Diesel Engine - Gas Turbine. Maneuvers at high speeds.

4. **HEAT BALANCES – CALCULATIONS AND DIAGRAMS / 10 hours**

   Diagram of the law of correspondence. Ship speed. RPM shaft and propeller pitch.

5. **PLANTS OF SHIPS WITH NUCLEAR POWER PROPULSION / 10 hours**

   Introduction to nuclear propulsion. Basic concept of nuclear energy. Terrestrial and marine reactors. Project of a nuclear ships. Naval propulsion: submarines and surface ships. Commercial naval propulsion: project costs and fuel for commercial ships. General characteristics of naval plants with nuclear propulsion. Features of naval propulsion systems. Radiation protection of naval reactors. Preventing accidents – accidents occurred. International regulations.

6. **PANORAMA OF VIBRATION ON SHIPS AND NAVAL SYSTEMS / 10 hours**

   Excitatory main sources of vibration on ships. Vibrations of the hull ship. Vibrations induced by machinery.

V. METHODOLOGY

The course is developed in theory and practice sessions .In the theory sessions, the instructor presents the concepts and applications. The theory is applied to calculate performance and power. In the practical sessions, two technical visits to SIMA, Callao will become. Various problems are solved and their solutions are analyzed. The student must submit and present a capstone project. In all sessions, active participation of the student is encouraged.

VI. EVALUATION FORMULA

The Average Grade PF is calculated as follow:

PF = (EP + 2EF + PP) /4

EP: Mid-Term Exam
EF: Final Exam
PP: Average of practices

VII. BIBLIOGRAPHY

1. **UNIVERSIDAD POLITÉCNICA DE MADRID**
   Apuntes de la Escuela profesional de Ingeniería Naval.
2. **HARRINGTON, ROY L.**
   Marine Engineering.