

ORE 411 Buoyancy and Stability

Designation

Core Course

Undergraduate Diversification Requirements for Physical Sciences

Catalog Description

Ship nomenclature and geometry, hydrostatic principles of surface ships and underwater vehicles in free-floating, partially water-borne and damaged conditions. Subdivision of ships. Launching. Pre: CEE 270 or equivalent.

Prerequisites by Topics

Calculus

Applied Mechanics

Textbooks

Lecture Notes by R.C. Ertekin

Reference books

1. Rawson, K.J. and Tupper, E.C., *Basic Ship Theory*, Vol. 1, Longman Scientific and Technical, 1983.
2. Papanikolaou, A. *Buoyancy and Stability*, J.K.K. Look Lab., Rep. No. 52, 1981.
3. Benford, H. *Naval Architecture for Non-Naval Architects*, 1991.
4. D'Arcangelo, A.M., *Ship Design and Construction*, SNAME, 1969.
5. Semyonov-Tyan-Shansky, V., *Statics and Dynamics of the Ship*, Peace Publishers, Moscow.
6. Lester, A.R., *Merchant Ship Stability*, Butterworths, 1985.
7. *Principles of Naval Architecture*, Soc. of Naval Arch. and Marine Engr., Vol. 1, 1988

Course Objectives

To familiarize students with the hydrostatics and stability of floating and underwater vehicles.

Topics Covered

1. Introduction
2. Irregular shapes and numerical methods
3. Buoyancy and stability
4. List and ballast free-surface and density effects
5. Stability at large angles of inclination
6. Longitudinal stability, trim, and hydrostatic curves
7. Dry docking and grounding
8. Stability in damaged condition (or bilging)
9. Hydrostatics of offshore platforms
10. Stability of submersibles
11. Stability criteria and standards
12. Longitudinal strength calculations (primary strength)
13. Launching

14. Model tests and scaling

Assessment

9 Assignments (30%)

Midterm Exam (35%)

Final Exam (35%)

Usage of Engineering Tools and Computers

MS Excel Spreadsheet usage for calculations used in homeworks

Use of Ship Hydrostatics and Stability Program SHCP to determine hydrostatic and stability features of an actual seagoing vessel

Schedule

Two 1.25-hour sessions per week.

Contribution to Professional Component

Engineering Science: 1 credit

Engineering Design: 2 credits

Relationship to Program Outcomes

Program Outcome 2: Basic science, mathematics, & engineering

Program Outcome 3: Ocean engineering core

Program Outcome 5: Use of latest tools in ocean engineering

Program Outcome 6: Problem formulation & solution

Program Outcome 9: Professional issues

Prepared by

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