

1. Course Number and Title
ORE 411 Buoyancy and Stability
2. Credits and Contact hours
Two 1.25-hour sessions per week. Course is 3 credits.
It can fulfill the undergraduate diversification requirements for a physical science course.
3. Instructor
Michael Krieg
4. Textbooks
Textbook: Biran, A. and López-Pulido R., Ship Hydrostatics and Stability, 2nd Ed., Elsevier Ltd, 2013
 - a. Other Supplemental Materials
 - i. Principles of Naval Architecture, Soc. of Naval Arc. and Marine Engr., Vol. 1, 1988
 - ii. Rawson, K.J. and Tupper, E.C., Basic Ship Theory, Vol. 1, Longman Scientific and Technical, 1983.
5. Course Information
 - a. Course Content: Buoyancy and Stability (3) 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.
 - b. Prerequisites
 - i. Calculus
 - ii. Applied Mechanics
 - c. Designation: ORE required core course
6. Course Goals
 - a. Outcomes of Instruction
 - i. Understand the mathematical principles of buoyancy and stability of floating and submerged bodies,
 - ii. Understand the design principles of intact or damaged ships, offshore platforms, or submersibles to overcome external forces that can overturn them, and
 - iii. Understand the safety of vessels during dry docking and grounding, and their longitudinal strength in calm waters.
 - b. Student Outcomes: (1) Fundamentals. (2) Core program. (4) Problem formulation. (9) Research and experimentation. (10) Constant learning.
7. Topics Covered
 - a. Irregular Shapes and Numerical Methods
 - b. Buoyancy and Stability
 - c. List and Ballast Free-Surface and Density Effects
 - d. Stability at Large Angles of Inclination
 - e. Longitudinal Stability, trim and Hydrostatic Curves
 - f. Dry Docking, Grounding, and Launching
 - g. Stability in Damaged Condition (or Bilging)
 - h. Longitudinal Strength Calculations