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Fall 2015

# PHYS 5195

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# S Y L L A B U S

THE UNIVERSITY OF NEW ORLEANS, DEPARTMENT OF PHYSICS
WILL OFFER AT THE STENNIS SPACE CENTER:

## Special Topics in Classical Physics: OCEAN ACOUSTICS
(Physics 5195)
*Fall Semester 2015*

**Instructor:** Dr. Stanley A. Chin-Bing, University of New Orleans, Physics Department

**Text:** Acoustical Oceanography Principles & Applications by Clay and Medwin (John Wiley & Sons, New York, 1977), Fundametals of Acoustical Oceanography by Medwin and Clay (Academic Press, New York, 1997; ISBN: 012487570X)

**Primary Topics to be covered**:
1. Wave Propagation; Spherical Waves; Reflection Coefficients
2. Ray Theory of Sound Transmission with Correction Terms (Modified Ray Theory); Sonar Equations
3. Acoustic Waveguides (Normal Mode Theory) with Impedance Boundary Conditions
4. Acoustic Scattering by Rough Surfaces, and Bubbles; The Helmholtz-Kirchhoff Theory of Acoustic Scattering

**Thrust of the course:** The theory and mathematical framework for ocean acoustics are developed such that a prior knowledge of acoustics is not required. Emphasis is on (1) the physics of underwater acoustic propagation and scattering, and (2) the mathematical methods used to predict and understand the acoustic field as it travels through the ocean environment. Topics in ocean acoustics are studied that are not covered in Physics 4322: Introduction to Acoustics. The course is designed so that it can be a continuation to Physics 4322 or stand alone as an introductory course.
     Knowledge of ordinary differential equations (Math. 2221) and physics as it relates to waves (Physics 2064) should constitute a sufficient background.
     *Each student is given a complete set of class notes in electronic PDF format.*

**Prerequisite:** Physics 2064 and Math 2221, or consent of the UNO Dept. of Physics.

## GRADING
HOMEWORK
     Homework problems are assigned as the relevant material is completed. Strict due dates are rarely applied -- it is expected that the homework assignments will be completed and submitted in a timely manner.
     There are 15-to-20 homework problems. Each problem counts equally. The total homework grade counts as one test.

TESTS
     There are 2 or 3 tests per semester. Each test counts equally. Tests may be in-class, take-home, or some combination of each.

FINAL GRADES
     Final grades will be calculated from the homework problems and the tests.
     If there are only 2 tests, each test counts counts for 33% of the final grade, and the homework counts for 33% of the final grade.
     If there are 3 tests, each test counts counts for 25% of the final grade, and the homework counts for 25% of the final grade.