EOC 4422 OCEAN WAVE MECHANICS

ABET Course Syllabus

1. **Course number and name:** EOC 4422 Ocean Wave Mechanics

2. **Credits and contact hours:** 3 credits / Two 80 minute lectures each week

3. **Instructor's or course coordinator's name:** Dr. Siddhartha Verma

4. **Text book, title, author, and year:**
   Water Wave Mechanics for Engineers and Scientists, by R. G. Dean and R. A. Dalrymple, World Scientific Publications, 1991

5. **Specific course information:**

   (a) Brief description of the content of the course (catalog description): The course deals with small amplitude wave theory, finite amplitude waves, wave generation, wave forecasting, wave measurements. Wave force on fixed structures, floating bodies and moored bodies.

   (b) Prerequisite: EOC 3123 Ocean Engineering Fluid Mechanics (with a grade of C or above)

   (c) Prerequisite or Co-requisite: EGN 4323 Vibration Synthesis and Analysis (with a grade of C or above)

   (d) Indicate whether a required, elective, or selected elective course in the program: Required

6. **Specific goals for the course:**

   (a) Specific outcomes of instruction (course specific objective): The objective of the course is to provide the students with a basic and applied knowledge of water wave mechanics as required in the design of ocean structures, marine vehicles and harbors; in the protection of shores; and for the prediction of sea states.

   (b) Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course. The learning outcomes of the course (and related ABET Criterion 3) outcomes are:

      1. An ability to apply the knowledge of mathematics for formulation and analysis of ocean wave and boundary-value fluids problems. (1)
      2. A thorough knowledge of the basic properties of ocean waves in deep and coastal waters, and mechanisms of wave generation. (1)
      3. An ability to determine wave forces on fixed and floating structures. (1,6)
      4. A basic knowledge of the relation between atmosphere and sea states, and wave modeling and spectra. (1)
      5. An ability to make measurements of surface waves and analyze experimental data. (6)
      6. An ability to work on team projects. (5)

7. **Brief list of topics to be covered:**
   1. Potential flow, Laplace's equation, boundary value problems.

2. Small amplitude waves, linearized boundary conditions.
3. Periodic, progressive and standing wave solutions.
4. Wave kinematics, dispersion relation, shallow- and deep-water waves.
5. Phase and group velocity, energy propagation, capillary waves.
6. Wave and current interaction, shoaling waves and refraction.
7. Long wave theory, tides in channels, storm surge.
8. Wave radiation, wave-maker theory.
9. Wave forces, Froude-Krylov and Morison-equation methods.
10. Wind generated waves, Sea spectra (time permitting)