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MATH35012 - 2007/2008

General Information

- Title: Waves
- Unit code: MATH35012
- Credits: 10
- **This course unit cannot be taken in the same semester as MATH45122 *Non-Linear Waves*.**
- Prerequisites: MATH20401 or MATH20411 *Partial Differential Equations and Vector Calculus*. MATH20502 *Fluid Mechanics* is useful but not essential.
- Co-requisite units: None
- School responsible: Mathematics
- Members of staff responsible: Dr. Richard Hewitt

Specification

Aims

This course unit aims to elucidate some of the physical properties of important types of wave motion and their mathematical descriptions.

Brief Description of the unit

Wave motion occurs in the oceans, atmosphere and in the earth. Problems of wave production and transmission, of wave harnessing or shielding, and of detection will always be of interest. This is a large and important subject area which this course unit can only begin to study, nevertheless this beginning will contain ideas and techniques applicable to a broad range of wave motion.

Learning Outcomes

On successful completion of the course unit students will understand the physical and mathematical reasons for wave motion and be able to formulate and solve problems concerning the propagation of water and sound waves.

Future topics requiring this course unit

None.

Syllabus

1. Introduction: wave kinematics. [1 lecture]
2. Waves on a stretched string. [1]
3. Free surface water waves: Standing/progressive waves, dispersion relations for infinite and finite depth layers. [10]
4. Surface tension effects. [2]
5. Waves in a continuously stratified fluid: internal gravity waves. [2]
6. Sound waves. [8]

Textbooks

- J.J. Stoker, *Water Waves*, Wiley, 1958.
- M.J. Lighthill, *Waves in Fluids*, Cambridge, 1979.

Teaching and learning methods

Two lectures and an examples class each week. In addition students should expect to spend at least four hours each week on private study for this course unit.

Assessment

Coursework: weighting 20%
End of semester examination: two hours weighting 80%

Arrangements