

Physics 6316 Ocean Data Analysis

Oceanography 6316 – Winter 2007

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This course will cover data analysis techniques in oceanography. We will cover some basic time-series analysis techniques, some of which may be review and will also look into the frequency domain. We will use Matlab as the primary numerical engine since it is easy to use, includes lots of graphic commands and has quite many scripts that we can use to carry out somewhat more sophisticated analysis. Without software like Matlab, it would be much more difficult to progress through the material

Marking Scheme

Assignments (5-6)	- 50%
Paper	- 30 %
Presentation (lecture)	- 20 %

The assignments will be the place where the real learning takes place, hence that is where you will earn most of your mark. The paper will be a detailed review of some technique, with references to the literature, or detailed coding. There are many possibilities for this paper: (i) Maximum Entropy Analysis, (ii) Neural networks, (iii)

Windowing techniques, (iv) Principal Oscillation Patterns (POP's), (v) Wavelets, (vi) NonLinear regression techniques. Students will be free to suggest other possible topics. The lecture will be on one of a list of possible topics suggested by me, material from the book.

Outline

- (1) **Course Outline** – Definitions, concepts, scales
- (2) **Measurement techniques and theory** - Basic observational issues in oceanography
- (3) **Dimensional Analysis and Scaling**
- (4) **Spatial interpolation** - what to do with spatial data
- (5) **Time Domain Analysis** – Probability theory, regression analysis, ARAM modelling
- (6) **Frequency Domain Analysis** - Fourier transform theory, discrete versus continuous, windowing, error estimation, filters

Note that we may add some topics depending on interests of the students and we may not spend an equal amount of time on all topics.

The text for the course will be

William J. Emery and Richard E. Thomson – **Data Analysis Methods in Physical Oceanography**, 2001, Elsevier, 638 pp.