Syllabus: Ocean Measurements
AMP 531 Spring 2007

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Required Texts:

Bendat and Piersol, ”Random data – Analysis and measurement procedures”

Reference Texts:

1. Bendat and Piersol, “Engineering applications of correlation and spectral analysis”
2. Kachigan, “Statistical analysis”
3. Cohen, “Time-frequency analysis”

Purpose:
The purpose of this course is to provide the student with the theoretical basis and the computational skills to analyze and interpret data from ocean experiments in the framework of scientific study. By the end of the course, students will have developed and tested software to do spectral and multivariate regression analysis including statistic significance of the conclusions in a way that is acceptable for publication in scientific journals.

Course requirements:
1. Complete the readings for class.
2. Conduct and submit computational analysis of data sets as homework assignments.
4. Final - Take home exam

Grading:
Grades in this course will be determined based on the following scale:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Class preparation (reference readings)</td>
<td>10%</td>
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<tr>
<td>Class assignments</td>
<td>25%</td>
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<tr>
<td>Midterm</td>
<td>25%</td>
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<tr>
<td>Final exam (take home)</td>
<td>40%</td>
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Course outline:
There are two lectures each week. The first - theory and analysis and the second - a working session on programming and numerical examples.

Week 1
Sampling in space and time, introduction to linear systems

Week 2
Random data and correlation functions

Week 3 - 5
Fourier analysis, spectral and cross spectral analysis, coherency, Z-transforms

Week 6 - 7
Dynamic regression of multi-input systems

Mid-term exam – 1 hour closed book.

Week 8
Spring Break

Week 9- 10
Overview of ocean instrumentation, direct and remote sensing and design of experiments.

Week 11-12
Underwater acoustic signal processing, pulse compression methods.

Week 13
Special topics of interest selected by students

Week 14
Take home exam