1. Department, Course Number, Title

   ORE 608, Probability and Statistics for Ocean Engineers

2. Designation as a Required or Elective Course

   Elective

3. Course Catalog Description

   Probability and statistical analysis including distributions, multiple regression and correlation, autocovariance, cross-spectra, and practical applications in ocean engineering. Pre: 607 or consent.

4. Prerequisites

   Calculus
   Probability and statistics
   Water wave mechanics

5. Textbooks and/or Other Reading Material

   Textbooks: None
   Reference books:

   1. *Data Analysis Methods in Physical Oceanography* - Emery and Thomson
   2. Extreme Value Theory in Engineering - Castillo
   3. *Numerical Recipes* - Press, Flannery, Teukolsky, and Vetterling
   4. *Probability, Random Variables, and Stochastic Processes* - Papoulis
   5. *Random Data: Analysis and Measurement Procedures* - Bendat and Piersol
   6. *Spectral Analysis and Its Applications* - Jenkins and Watt
   7. *Spectral Analysis for Physical Applications* - Percival and Walden
   8. *Spectral Analysis and Time Series* - Priestley
   9. *The Fourier Transform and Its Applications* - Bracewell

6. ABET Course Learning Outcomes

   (Course objectives) To provide an overview of statistical methods with applications using real data sets from the fields of oceanography and ocean engineering.

7. Topics Covered

Random Variables	Monte Carlo Methods
Probability Density Functions	Stochastic Processes
Moments and Expected Values	Fourier Analysis
Statistics of Extreme Events	Auto-Spectra
Estimation and Sample Distributions	Rotary Spectra
Confidence Intervals	Cross-Spectra
Hypothesis Testing	Digital Filters
Regression and Correlation	Complex Demodulation
Degrees of Freedom	Empirical Orthogonal Functions

8. Class/laboratory schedule

   Two 1.25-hour sessions per week.

9. Contribution of Course to Meeting the Requirements of Criterion 5

Engineering Science: 3 credits

Assessment
50% Homework
20% Midterm Exam
30% Final

Usage of Engineering Tools and Computers
Matlab

Contribution to Professional Component
Engineering Science: 3 credits

10. Relationship to Program Outcomes
Program Outcome 2: Basic science, mathematics, & engineering
Program Outcome 5: Use of latest tools in ocean engineering
Program Outcome 6: Problem formulation & solution

11. Prepared by and date of preparation
M.A. Merrifield, Spring 2009