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  
7. *Spectral Analysis for Physical Applications* - Percival and Walden  
8. *Spectral Analysis and Time Series* - Priestley  

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