

PH661

**DATA ANALYSIS
AND STATISTICAL METHODS
FOR PHYSICS AND ASTROPHYSICS**

FALL 2008

Instructor: M. Bonamente
Time: (TBD)
Location: OB234
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Web page: http://webpages.uah.edu/~bonamem/PH661_Fall08/PH661_index.html
Office hours: MTWTF 09:00-noon, OB212
Textbook: Bevington, P.R. And Robinson, D.K. *Data reduction and error analysis for the physical sciences*, (3rd Edition) Mc-Graw Hill.

Additional reading:

1. James, F., *Statistical method in Experimental Physics*, (2nd Edition) Elsevier.
2. Bulmer, M.G., *Principles of Statistics*, Dover.

COURSE OUTLINE

1. Probability theory and error analysis: probability theory, random variables and their distributions, Bayes theorem, binomial, Gaussian and Poisson distributions, moments of random variables, the central limit theorem.
2. Parameter estimation and hypothesis testing: Estimation of parameters, propagation of errors and covariance matrix, parametric data fitting, the chi square distribution, the Student's t-distribution, the F statistic, estimation of confidence intervals.
3. Monte Carlo methods: General aspects, Markov chains, Metropolis-Hastings algorithm, Gibbs sampler, convergence tests.

TESTING AND HOMEWORK

1. Weekly homework assignments, often needing computer programming in the language of your choice
2. One midterm test
3. One term paper, consisting of a publication-quality paper on a topic of data analysis and statistics.

Complaint Procedure:

If you have difficulties or complaints related to this course, your first action usually should be to discuss them with me, the instructor. If such a discussion would be uncomfortable for you or fails to resolve your difficulties, you should contact Professor James Miller, Chair of the Department of Physics. Professor Miller's office is OB 201 B and his telephone number is 824-2482. If you still are unsatisfied, you should discuss the matter with the Dr. Daniel Rochowiak, Associate Dean of the College of Science. Dean Rochowiak's office and telephone number are MSB C206 and 824-6605.