

Course Syllabus for STAT 574E/MATH 574E/CPH 574E

January 2008

Description: Environmental Statistics (3 units) – Statistical methods for environmental and ecological sciences, including nonlinear regression, generalized linear models, temporal analyses, spatial analyses/kriging, quantitative risk assessment.

Prerequisite(s): STAT 571B/MATH 571B, or PSYC 507C, or equivalent.

Purpose of Course: To provide a course of study in data analytic methods for problems in the environmental sciences to intermediate graduate students in ecology, engineering, geology, geography, public health, pharmacology, toxicology, and associated disciplines, and to graduate students in statistics and biostatistics. To provide a foundation for application of environmetric models and methods in future scientific research and policy-driven investigations.

Current Textbook: Piegorsch, W. W., and Bailer, A. J. (2005). *Analyzing Environmental Data*. Chichester: John Wiley & Sons.

Topics:	Book Sections	Time
Statistical Models & Model Fitting Distributions; parameter estimation; Least squares, non-linear least squares; maximum likelihood	A.1, A.3-A.4	1 week
Review of Linear Regression and ANOVA Simple & multiple linear regression One- & two-factor ANOVA; polynomial regression	1.1-1.3, 1.5	1.5 weeks
Nonlinear Environmetric Response Models Threshold & truncated models; growth curves; rational polynomials	2.1-2.5	2 weeks
Generalized Linear Models Logistic regression; log-linear models & other generalized linear models	3.1-3.2.4, 3.3.2, 3.3.4	2.5 weeks
Inference for Temporal Data Time series; harmonic regression; Fourier analysis; AR models; trend & intervention analysis	5.1-5.5	3 weeks
Inference for Spatial Data Spatial point patterns; spatial autocorrelation; variograms and kriging	6.1-6.4	4 weeks
Quantitative Risk Assessment Potency estimators; median effective dose; risk estimation; low-dose extrapolation/benchmark analysis	4.1-4.3	1 week
		15 weeks

Notes: Computer applications in SAS and other packages will be integral to regularly assigned Homework.