

APPLIED ENVIRONMENTAL STATISTICS

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DAY 1

Introduction

8:00 a.m.

Describing Data (Chap. 1) & Graphical Data Analysis (Chap. 2).

characteristics of environmental data
from samples to populations
dealing with outliers, transformations
why use graphics
boxplots, quantile plots, probability or Q-Q plots
PROBLEM: describing data

General Hypothesis Testing (Chapter 4)

5 categories of hypothesis tests
 α levels and p-values
1-sided and 2-sided tests
exact test vs. large-sample approximations

LUNCH 12:00 - 1:00 p.m.

PROBLEM: how hypothesis tests work

Statistical intervals (Chapter 3)

Coping with uncertainty
Confidence intervals, skewed data ?
PROBLEM: Intervals and transforms
Some other intervals
prediction, tolerance, how to compute
PROBLEM; the three intervals

FINISHED 4:30 p.m.

DAY 2

Comparing Two Groups of Data (Chapters 5 & 6)

Two paired groups
Example & exercise
Have standards been met? Exercise
Quantile test & Exercise
Two unpaired (independent) groups
PROBLEM: testing for significant differences
Different by how much?

DAY 2 cont.

Sample size & power curves

LUNCH 12:00 - 1:00 p.m.

Comparing More Than Two Groups of Data (Chapter 7)

one- and two-factor ANOVA

non-parametric alternatives

multiple comparison tests: who's different?

PROBLEM: parametric and nonparametric tests

Testing differences in Variability

Characterizing differences in variability

Levene's & Squared Ranks tests

PROBLEM: variability of concentrations

FINISHED 4:30 p.m.

DAY 3

Correlation Review (Chapter 8)

Patterns of association with indicators

PROBLEM: Three correlation coefficients

Kendall's linear model

PROBLEM: Kendall slope estimator

Linear Regression (Chapter 9)

Building a good regression model

determining improvements over background noise

PROBLEM: modeling environmental quality

hypothesis tests, confidence and prediction intervals

LUNCH 12:00 - 1:00 p.m.

PROBLEM: estimating total flux

Multiple Regression (Chapter 11)

measures of a good model

plot the data !

multi-collinearity

model selection: surpassing stepwise

PROBLEM: estimating urban non-point loads

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DAY 4

Analysis of Covariance (Chapter 11)

Discrete explanations

PROBLEM: how many regression lines are needed?

Trend Analysis (Chapter 12)

selecting a trend test:

regression vs. Mann-Kendall approaches

removing exogenous effects

monotonic vs. step trends

PROBLEM: Four approaches to trend tests

censored data

dealing with seasonality

LUNCH 12:00 - 1:00 p.m.

PROBLEM: A trend for all seasons?

FINAL EXAM PROBLEM

Class Discussion and Applications

FINISHED 4:30 p.m.

DAY 5

Making Sense of Nondetects

Contingency Tables (Chapter 14)

PROBLEM: Is uranium OK?

Logistic Regression (Chapter 15)

PROBLEM: Estimating probabilities

Wrap-up

FINISHED 12:00 noon