APPLIED ENVIRONMENTAL STATISTICS
Dennis R. Helsel and Edward J. Gilroy
August 25-29, 2014
College Station, TX

DAY 1
Introduction
Helsel/Gilroy 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
Gilroy 8:30 a.m.

General Hypothesis Testing (Chapter 4)
5 categories of hypothesis tests
\( \alpha \) levels and p-values
1-sided and 2-sided tests
exact test vs. large-sample approximations
Helsel 11:00 a.m.

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

PROBLEM: how hypothesis tests work
Helsel 1:00 p.m.

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
Gilroy 1:30 p.m.

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
Permutation Tests
PROBLEM: testing for significant differences
Helsel 8:00 a.m.

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?
Gilroy 1:00 p.m.
PROBLEM: parametric and nonparametric tests

Sample size & power curves
Gilroy 3:00 p.m.

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)
Helsel 8:00 a.m.
Patterns of association with indicators
PROBLEM: Three correlation coefficients
Kendall’s linear model
PROBLEM: Kendall slope estimator

Linear Regression (Chapter 9)
Helsel 9:00 a.m.
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
Helsel 1:00 p.m.

Multiple Regression (Chapter 11)
Gilroy 1:45 p.m.
measures of a good model
plot the data!
multi-collinearity
model selection: surpassing stepwise
PROBLEM: estimating urban non-point loads

Finished 4:30 p.m.

DAY 4

Analysis of Covariance (Chapter 11)
Gilroy 8:00 a.m.
Discrete explanations
PROBLEM: how many regression lines are needed?

Trend Analysis (Chapter 12)
Helsel 10:00 a.m.
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?
Helsel 1:00 p.m.
FINAL EXAM PROBLEM

Class Discussion and Applications

FINISHED 4:30 p.m.

**DAY 5.**

Making Sense of Nondetects

Contingency Tables (Chapter 14)

Logistic Regression (Chapter 15)

Wrap-up

FINISHED 12:00 noon