ESM 206A: Statistics and Data Analysis
in Environmental Science & Management

Instructor: Allison Horst (ahorst@bren.ucsb.edu)
Office: Bren Hall Room 4406
Office Hours: W 11:00am – 1:00pm

TA: Darcy Bradley (dbradley@bren.ucsb.edu)
Office: TB
Office Hours: TBD

Lectures: Bren Hall 1414, MW 10:00am – 11:15am

Labs: Bren Hall 3035
M 1:00pm – 2:50pm
M 3:00pm – 4:50pm
T 1:00pm – 2:50pm
T 3:00pm – 4:50pm

Course Description: Develop skills and conceptual framework to effectively use data to solve practical problems and communicate results. Topics include descriptive statistics, hypothesis testing, experimental design, exploratory data analysis, probability and uncertainty, and effectively communicating quantitative data. Emphasis on case studies from environmental problems.

Grading:
45% Homework
25% Midterm
30% Final

Course Policies:

• Weekly homework will be assigned on Wednesdays, and are due the following Wednesday. Assignments submitted late will only be accepted within one week of the due date, and will be worth 50% of the original score. **Homework submitted more that one week after the original due date will not be accepted.**

• Lab attendance is mandatory.

Bring to Class: Course reader, pen/pencil, calculator (does not need to be a graphing calculator).
TENTATIVE COURSE SCHEDULE:

**Week 1**: Descriptive statistics, graphical representations, getting started in Excel and RStudio, accessing data from online databases and loading into Excel and RStudio

**Week 2**: Basic probability theory and probability distributions, finding summary statistics in RStudio, basic data analysis in RStudio, importing and working with datasets in RStudio

**Week 3**: Sample uncertainties (data spread, standard deviation, standard error), the normal distribution, CLT, calculating and presenting sample uncertainties in RStudio

**Week 4**: Introduction to hypothesis testing, Type I and Type II errors, the $t$-distribution, calculating probabilities for the $z$-distribution in RStudio, meaning of the $p$-value, communicating results of one-sample hypothesis testing

**Week 5**: Two-sample hypothesis testing ($t$-tests), $t$-tests in RStudio, communicating results of two-sample hypothesis testing

**Week 6**: Introduction to regression (single-variate) – linear and non-linear regression, performing regression in RStudio

**Week 7**: ANOVA, performing ANOVA in RStudio, post-hoc testing for pairwise differences, communicating results graphically and in text

**Week 8**: Chi-Squared, concepts and performing chi-squared in RStudio, communicating results

**Week 9**: Multiple linear regression

**Week 10**: Non-parametric alternatives, course wrap-up and review