ESM 244: Advanced Statistics & Data Analysis
in Environmental Science & Management
Winter 2016

Instructor:        Allison Horst
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Office Hours: TBD. Will be posted on course GauchoSpace site.

Description: This course will cover advanced topics in statistics (non-parametric methods, bootstrapping, transforming data, non-linear models, multivariate statistics, redundancy analysis, binary and ordinal logistic regression, time-series analysis, introduction to spatial statistics) and data analysis (organization, analysis, interpretation, and communication) using real-world environmental data. Weekly lab attendance is mandatory. Labs and course assignments will be completed in R.

Assignments: Graded assignments will be assigned biweekly. There will be several tutorials posted to GauchoSpace that will not be graded, but should be completed individually. For group assignments, all members of the group are expected to contribute to, and understand, the entire assignment submitted. Assignments may involve oral presentations.

Exams:  There will be a midterm exam and a final exam.

The midterm date is TBD, and will be posted on the course GauchoSpace site. The midterm will involve an in-class and a take-home portion.

The final exam will be a take-home assignment and will be DUE on the final day of class.

Grading: Assignments (50% total)
          Midterm (20%)
          Final (30%)

Materials: There is no reader or textbook for this course. All necessary materials will be posted on the course GauchoSpace site. Bring a notebook, calculator, and pen or pencil to each class.
Topics (Tentative):

**Week 1:** Review of Parametric Tests (t-tests, ANOVA, chi-squared, multiple regression)

**Week 2:** Tests with covariates, multi-factors (MANOVA, ANCOVA, MANCOVA), intro to non-parametric data

**Week 3:** Visualizing data, non-Parametric Data (transforming data, non-parametric approaches), bootstrapping

**Week 4 - 5:** Regression with categorical and ordered dependent variables (binary logistic regression, ordered logistic regression)

**Week 6:** Redundancy analysis

**Week 7:** Intro to time series analysis

**Week 8:** Intro to spatial statistics in R (cluster analysis, kriging)

**Week 9:** Intro to Bayesian statistics

**Week 10:** Additional methods and course review