

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

Winter 2017

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

Description: This course will cover advanced topics in statistics (bootstrapping, transforming data, non-linear models, multivariate statistics, binary, ordinal and multinomial logistic regression, intro to time-series analysis, spatial data analysis and interpolation, principal components analysis, partition-based cluster analysis) and data analysis (organization, manipulation, analysis, interpretation, and communication). 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 final exam (take-home) that you prepare over the course of the quarter. The exam topic(s) and expectations will be covered in detail in Week 5. The final exam will be DUE on the last day of class.

Grading: Assignments (70% total)
Final (30%)

Materials: There is no reader or textbook for this course. All necessary materials will be posted on the course GauchoSpace site. Since the lab will be held in a Bren lecture room (1414), you **need to bring your charged laptop with R and RStudio to each lab.**

Topics (Tentative):

- Week 1:** Review of intro hypothesis tests (t-tests, ANOVA, chi-squared, multiple regression), tests with covariates and multiple factors (MANOVA, ANCOVA, MANCOVA)
- Week 2:** MANOVA/ANCOVA continued, dealing with non-parametric data (Mann-Whitney/WSR)
- Week 3:** Data transformation, bootstrapping
- Week 4:** Regression with categorical and ordered dependent variables (binary logistic regression, ordered logistic regression, multinomial logistic regression)
- Week 5:** Nonlinear models
- Week 6:** Intro to time series analysis
- Week 7:** Intro to spatial data (exploration, variograms, kriging)
- Week 8:** Point pattern analysis, dealing with missing data
- Week 9:** Ordination methods (PCA, RDA)
- Week 10:** Cluster analysis, course review