

Statistics for Research in the Life Sciences – SYLLABUS

- **Class 1: Introduction and probability**
 - a) *Introduction to the course — syllabus, goals, term project, books*
 - b) *Models, statistical models, and understanding*
 - c) *Intuition (or lack of it)*
 - d) *Probability and probability distributions*
- **Class 2: Fitting models and testing assumptions**
 - a) *Fitting probability distributions*
 - b) *Parametric vs. non-parametric statistics (briefly)*
 - c) *Causal and associative models*
 - d) *Fitting models — a simple example*
 - e) *Data management — Excel, databases, programming, and multiplying file syndrome*
 - f) *Data types*
 - g) *Software options*
- **Class 3: Testing hypotheses**
 - a) *Hypothesis testing — the traditional way*
 - b) *Types of errors*
 - c) *Statistical significance vs. actual significance*
 - d) *Model choice — the new way*
 - e) *Power analysis — a little pain now saves a lot of pain later*
 - f) *Introduction to ANOVA — the main tool for experimentalists*
- **Class 4: Computer lab! OTHER LOCATION — Center for Law and Justice 387**
 - a) *Experiments and experimental design*
 - b) *Using a software package — ANOVA in SPSS*
- **Class 5: General and alternative frameworks for statistics**
 - a) *Linear models, general linear models, and generalized linear models*
 - b) *Frequentist*
 - c) *Likelihood- and Information-based*
 - d) *Bayesian*
- **Class 6: Non-parametric statistics**
 - a) *'Classic' non-parametric statistics*
 - b) *Randomizations*
 - c) *Jackknives*
 - d) *Bootstraps*
 - e) *Monte-Carlo simulations*
- **Class 7: Autocorrelation — the bane of graduate students**
 - a) *What is it?*
 - b) *Do I have it? (Probably.)*
 - c) *Can I ignore it? (Probably not.)*
 - d) *How do I deal with it?*
- **Class 8: Methods for timeseries and spatial data (when autocorrelation is a given)**
 - a) *Removing the autocorrelation — differencing, etc.*
 - b) *Modeling the autocorrelation directly — ARMA, ARIMA, etc.*
- **Class 9: Phylogenetic autocorrelation — the bane of ecology graduate students**
 - a) *Removing the autocorrelation — Independent Contrasts*
 - b) *Modeling the autocorrelation*
- **Class 10: Multivariate methods 1**
 - a) *Problem of multiple tests*
 - b) *Overfitting*
 - c) *Parsimony, or Choosing the best model*
 - d) *Correlated variables*
- **Class 11: Multivariate methods 2**

Statistics for Research in the Life Sciences – SYLLABUS

- *a) Data reduction and ordination*
- **Class 12: MARK**
- **Class 13: Longitudinal studies**
- **Class 14: Presentations**
- **Class 15: Presentations**
- **Class 16: Presentations**