SIO 272: Special Topics/Marine Biology  
Advanced Statistical Techniques  
Winter 2016

Course Instructor:
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Schedule:
Time: 11:00am – 12:20pm, Tues/Thurs  
Location: Nierenberg 101

Textbooks:
Required
(abbreviated below as ‘C’)

Recommended

Note: Added readings from the literature will be scattered throughout

Grading:
Students will be graded on one final exam (30%), bi-weekly exercises (50%), and participation (20%).

Note that this course will be graded upon a mixture of performance, effort, and personal advancement.
SIO 272: Lecture schedule (Winter 2016)

**Weeks 1 & 2 – Expectations from random sampling**
- 5-Jan: Overview; theory & philosophy of statistical testing
  - Readings: Ch. 1-5 (U)
- 7-Jan: Introduction to sampling distributions
  - Readings: Ch. 1-3, Appendix (C)
- 12-Jan: *Generating distributions through simulation*
- 14-Jan: Descriptive statistics and mathematical expectations
  - Readings: Ch. 1-9 (Z), *as needed*

**Weeks 3 & 4 – Analysis of (simple?) experiments**
- 19-Jan: Experimental design and differences of means
  - Readings: Ch. 6-10 (U)
- 21-Jan: Analysis of variance (ANOVA)
  - Readings: Ch. 4-6, 8 (C)
- 26-Jan: *Permutations of the ANOVA in R*
- 27-Jan: Permutations of the ANOVA in theory
  - Readings: Ch. 10-12 (Z), *as needed*

**Weeks 5 & 6 – Analysis of (some) natural experiments**
- 2-Feb: Handling relationships among continuous data
  - Readings: Ch. 8-10 (U)
- 4-Feb: Patterns of association of two or more variables
  - Readings: Ch. 7 & 9 (C)
- 9-Feb: *Exploring continuous data and assessing fits of assumptions*
- 11-Feb: Linking continuous and discrete factors – ANCOVA

**Week 7 & 8 – Describing more complex patterns**
- 16-Feb: Handling multiple predictors
  - Readings: Ch. 13 (U)
- 18-Feb: Handling non-normal data in models
  - Readings: Ch. 11-16 (C)
- 23-Feb: *Convincing a computer that all error is not necessarily normal*
- 25-Feb: The slippery slope away from being frequentist – GLM

**Week 9 & 10 – Simplifying more complex data**
- 1-Mar: Testing for (and coping with) autocorrelation
  - Readings: Ch. 20-21 (Z), *as needed*
- 3-Mar: Considering multiple response variables (parametric)
- 8-Mar: *Diving deeper into ‘the matrix’*
- 10-Mar: Considering multiple response variables (non-parametric)

**Week 11**
- EXAM WEEK