

SIO 272: Special Topics/Marine Biology
Advanced Statistical Techniques
Winter 2015

Course Instructor:

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Schedule:

Time: 11:00am – 12:20pm, Tues/Thurs

Location: Vaughan 100

Textbooks:

Underwood, AJ (1997) *Experiments in ecology: their logical design and interpretation using analysis of variance*. Cambridge University Press. (abbreviated below as ‘U’)

Zar, JH (2010) *Biostatistical Analysis* (5th ed). Prentice Hall. (abbreviated below as ‘Z’)

Note: Added readings from the literature will be scattered throughout

Grading:

Students will be graded on one take-home final exam (30%), exercises and reports (50%), and participation (20%).

Note that this course will not be graded on an absolute scale, but instead will be based on a mixture of performance, effort, and personal advancement.

SIO 272: Lecture schedule (Winter 2015)

Week 1

6-Jan	Overview; theory & philosophy of statistical testing	<u>Readings</u> Ch. 1-4 (Z), <i>as needed</i>
8-Jan	Introduction to R	

Week 2

13-Jan	Probability and some general mathematical principles	Ch. 1-5 (U), Ch. 5-6 (Z)
15-Jan	Practical exercises in probability	

Week 3

20-Jan	Sampling distributions I – binomial, Z , and X^2	Ch. 7-9 (Z), <i>as needed</i>
22-Jan	Sampling distributions II – t , F , and others	

Week 4

27-Jan	Applying the F – Analysis of variance	Ch. 6-7 (U), Ch. 10-12 (Z)
29-Jan	Experimental design	

Week 5

3-Feb	Applying analysis of variance to experimental systems	Ch. 8-10 (U), Ch. 17-19 (Z)
5-Feb	Linear regression	

Week 6

10-Feb	Linking continuous and discrete factors – ANCOVA	Ch. 11-13 (U), Ch. 20 (Z)
12-Feb	Designing studies based upon statistics	

Week 7

17-Feb	Analysis of variance with multiple response variables	Ch. 16 (Z)
19-Feb	Ordinations of well-meaning (and trickier) data	

Week 8

24-Feb	Multiple regression	Ch. 20-21 (Z)
26-Feb	Logistic regression	

Week 9

3-Mar	Getting beyond normality – generalized linear models	<i>Handout</i>
5-Mar	Testing for (and coping with) autocorrelation	

Week 10

10-Mar	Getting further beyond normality – bootstrapping	<i>Handout</i>
12-Mar	Let the games begin...Frequentists vs Bayesians	

Week 11

EXAM WEEK