SIOB 272B: Advanced Statistical Techniques
Winter 2025

Course Instructors:

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Schedule:

Lecture: 9:00-10:20am, Tues/Thurs Location: Eckart 227
Labs: 2:00-2:50pm, Thurs, and 1:00-1:50pm, Fri Location: Eckart 225

Note: Hour following each lab section will be reserved for additional discussion

Textbooks:

Required

Crawley, MJ (2015) *Statistics: an introduction using R*. John Wiley & Sons Ltd. (abbreviated below as 'C')

Underwood, AJ (1997) *Experiments in ecology: their logical design and interpretation using analysis of variance*. Cambridge University Press. (abbreviated below as 'U'; available as an e-book through the UCSD Library [hyper-linked to title])

Recommended

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

Grading:

Students will be graded on one final exam (30%), three evaluated assignments (30%), bi-weekly exercises (20%), and participation (20%).

Note that this course will be graded upon a mixture of performance, effort, and personal progress.

SIOB 272B: Lecture schedule (Winter 2025)

		Readings
Weeks 1 & 2 – Expectations from random sampling		
7-Jan	Overview; theory & philosophy of statistical testing	Ch. 1-5 (U)
9-Jan	Descriptive statistics – unpacking the familiar	Ch. 1-4, Appendix (C)
14-Jan	Introduction to probability distributions	Ch. 1-7 (Z), *as needed*
16-Jan	Sampling distributions and standard error	
Weeks 3 & 4 – Introduction to analysis of experiments		
21-Jan	Considering differences of means	Ch. 6-9 (U)
23-Jan	Analysis of variance (ANOVA)	Ch. 5-6, 8 (C)
28-Jan	Reviewing power and potential of the ANOVA	Ch. 8-11 (Z), *as needed*
30-Jan	Permutations of the ANOVA	
Weeks 5 & 6 – Experimental design and more approaches of analysis		
4-Feb	Factorial ANOVA	Ch. 10, 13 (U)
6-Feb	Patterns of association for two variables	Ch. 7, 9 (C)
11-Feb	Linking continuous and discrete factors – ANCOVA	Ch. 12-20 (Z), *as needed*
13-Feb	Patterns of association for many variables	
Week 7 & 8 – Describing more complex patterns		
18-Feb	The slippery slope away from being frequentist	Ch. 11-15 (C)
20-Feb	Model fitting and comparison	
25-Feb	Applications of model fitting	
27-Feb	Generalized additive mixed models (GAMMs)	
Week 9 & 10 – Simplifying more complex data		
4-Mar	Handling non-normal data in models	
6-Mar	Describing covariance among multiple variables (PCA / DFA)	
11-Mar	Working with ecological multivariate data	
13-Mar	Now what? Where does all of this end?	
Week 11		
	EXAM WEEK	