## SIOB 272B: Advanced Statistical Techniques Winter 2024

#### **Course Instructors:**

Stuart S	andin, Professor Office: MCTF 228	Phone: (858) 534 4939	email: ssandin@ucsd.edu
Beverly French, Postdoctoral Scholar Office: MCTF 222			email: bfrench@ucsd.edu
Instructional A Anela A	Assistant: kiona, PhD candic Office: MCTF 240A	late	email: aakiona@ucsd.edu
Schedule:	0:00 10:20am /	Fues/Thurs	Logition, Falser 227
Lecture.	2.00-3.00pm T	hurs or 1.00-2.00pm Thurs	Location: Eckart 227

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

#### **Textbooks:**

#### <u>Required</u>

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%), bi-weekly exercises (50%), and participation (20%).

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

# SIOB 272B: Lecture schedule (Winter 2024)

Weeks 1	& 2 – Expectations from random sampling	<b>Readings</b>	
9-Jan	Overview; theory & philosophy of statistical testing	Ch. 1-5 (U)	
11-Jan	Descriptive statistics – unpacking the familiar	Ch. 1-4, Appendix (C)	
16-Jan 18-Jan	Introduction to probability distributions Sampling distributions and standard error	Ch. 1-9 (Z), as needed	
Weeks 3	& 4 – Introduction to analysis of experiments		
23-Jan	Considering differences of means	Ch. 6-10 (U)	
25-Jan	Analysis of variance (ANOVA)	Ch. 5-6, 8 (C)	
30-Jan 1-Feb	Reviewing power and potential of the ANOVA Permutations of the ANOVA	Ch. 10-12 (Z), as needed	
Weeks 5	& 6 – Experimental design and more approaches of analysis		
6-Feb	Permutations of the ANOVA (cont.)	Ch. 8-10 (U),	
8-Feb	Patterns of association for two variables	Ch. 7 & 9 (C)	
13-Feb 15-Feb	Patterns of association for many variables Linking continuous and discrete factors – ANCOVA	Ch. 17-20 (Z), as needed	
Week 7 &	28 – Describing more complex patterns		
20-Feb	Linear models in practice	Ch. 13 (U)	
22-Feb	Spatial and temporal structure of data	Ch. 11-16 (C)	
27-Feb	Handling non-normal data in models		
29-Feb	The slippery slope away from being frequentist – GLM		
Week 9 &	2 10 – Simplifying more complex data		
5-Mar	Handling multiple predictors	Ch. 20-21 (Z), as needed	
7-Mar	Model fitting as we build our relationship with Rev Bayes		
12-Mar	Considering multiple response variables		
14-Mar	Now what? Where does all of this end?		

#### Week 11

EXAM WEEK