

SIO 296: Special Topics/Marine Biology
Advanced Statistical Techniques
Winter 2014

Course Instructor:

Stuart Sandin, Scripps Institution of Oceanography

Office: Hubbs Hall 4150 Phone: (858) 534 4150 email: ssandin@ucsd.edu

Key Contributor:

Gareth Williams, Postdoctoral Scholar

Office: Hubbs Hall 4165

email: gareth@ucsd.edu

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 (2009) *Biostatistical Analysis*. 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 presentations (40%), and participation (30%).

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 296: Lecture schedule (Winter 2014)

<u>Week 1</u>		<u>Readings</u>
7-Jan	Overview; Intro to sampling and data types	
9-Jan	Basic theory of statistical testing	
<u>Week 2</u>		
14-Jan	Probability and some general mathematical principles	Ch. 1-5 (U), Ch. 5-6 (Z)
16-Jan	Probability distributions <i>Exercise – Standard errors and central limit theorem</i>	
<u>Week 3</u>		
21-Jan	Comparisons of means	Ch. 6-7 (U)
23-Jan	More detailed comparisons of means <i>Exercise – Looking for statistics in the literature</i>	
<u>Week 4</u>		
28-Jan	Experimental design	Ch. 8-12 (U), <i>as needed</i>
30-Jan	Even more detailed comparisons of means	
<u>Week 5</u>		
4-Feb	Regression	Ch. 13 (U); Ch. 17-18 (Z)
6-Feb	Complexities of the regression model	
<u>Week 6</u>		
11-Feb	Logistic regression and linear models	Ch. 20 (Z)
13-Feb	Case studies of linear models	
<u>Week 7</u>		
18-Feb	Data transformations	Ch. 13 (Z)
20-Feb	Multidimensional analysis I	
<u>Week 8</u>		
25-Feb	Multidimensional analysis II	<i>Handout</i>
27-Feb	<i>Group presentation</i>	
<u>Week 9</u>		
4-Mar	Power analysis	<i>Handout</i>
6-Mar	<i>Group presentation</i>	
<u>Week 10</u>		
11-Mar	Model fitting	<i>Handout</i>
13-Mar	Frequentists vs Bayesians	
<u>Week 11</u>		
	EXAM WEEK	