Introduction to Experimental Design and Statistics (BI 399)

Oregon Institution of Marine Biology
B. Bingham
2019

Introduction to Experimental Design and Statistics
BI 399

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Meeting time: M-F 9-5
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Course Objectives: An introduction to experimental design and statistics. This course is designed for juniors and seniors in the biological sciences who want to become more conversant with experimental design and the use of appropriate statistical tests. It will cover data analysis and tests commonly used in biological science. Topics will include descriptive statistics, hypothesis testing, analysis of variance, correlation, regression and experimental design. Course will emphasize practical approaches to real data using the rich marine environment of the Oregon coast.

Materials Needed:

- There is no text. We will use articles from the primary literature and class notes. You may want to have access to a good statistics reference book. I recommend the following, but any introductory statistical book will do:

  Quinn, G.P. and M.J. Keough (2002). *Experimental Design and Data Analysis for Biologists*. Cambridge Univ. Press, Cambridge.

  Sokal, R.R. and F.J. Rohlf (1995). *Biometry*. W.H. Freeman, N.Y.

  Zar, J.H. (1999). *Biostatistical Analysis*. Prentice-Hall, Englewood Cliffs, N.J.

Evaluation of Work:

Midterm exam:	100
Final exam:	100
Homework assignments (8 @ 10 points each)	80
Literature presentations (2 @ 5 each)	10
Total:	290

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Date			Discussion Topic
Aug	19	AM	What is (are?) statistics?
		PM	Populations: Parameters and pitfalls
	20	AM[*1]	Comparing samples? Try a *t*
		PM	Dealing with paired samples
	21	AM[*2]	What can we assume about assumptions?
		PM	Clean glassware, big samples and other keys to power
	22	AM[*3]	t-test = 1-way ANOVA
		PM	Comparing multiple groups: Pairwise comparisons
	23	AM[*4]	Testing more than one factor with ANOVA
		PM	**Midcourse Exam**
	26	AM	ANOVA, ANOVA again
		PM	"Pseudoreplication" produces "pseudostatistics"
	27	AM[*5]	Correlation: What is it and what can it tell us?
		PM	Regression analysis for prediction
	28	AM[*6]	Regression analysis for explanation
		PM	Regression for dummies (dummy variables that is)
	29	AM[*7]	Goodness-of-fit, contingency tables
		PM	What can I do with complex data?
	30	AM[*8]	Review
		PM	**Final Exam**

[*]**Homework assignment due**