MARE 250: Statistical Applications in Marine Science

Lecture M 1-1:50, lab W 1-3:50, MSB 112
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The objectives of this course are to teach you some of the statistical analytic methods you will need to analyze scientific data, and in so doing also to teach you how to understand and interpret other people's analytical results. You will learn to do techniques both by hand and using a statistical software package. You will also learn how to present the results of statistical analyses in papers and presentations. This is a required course for the Marine Science major. Because science consists largely of interpretation of data, this course is designed to show you how to do that, at least for many kinds of numerical data.

Textbook: Zar, J.H. 1999. *Biostatistical Analysis*, 4th ed. Prentice Hall. (required)

I will give you copies of my lecture notes for each class, or please come see me if you need copies of any. Reading assignments will always be listed in the lecture notes! Homework and lab assignments on this page will be updated regularly. You will need some floppy discs to save your work, and a print card. You will also occasionally need tidepooling gear.

All homework for a week will be due on Wednesday, I will try to get it to you the week before. Labs will be due on Wednesday the week *after* they are assigned, unless otherwise noted. In general, you should have a week to ten days to work on any given assignment, but feel free to turn in assignments early.

Some homework and lab problems and examples are taken from other texts: References

Group Project assignment!

Date	Lecture Topic	Homework due on Weds.
12/14 January	Introduction, experimental design/scientific method. Populations, sampling, frequency distributions.	(Minitab tutorials, if necessary)
19/21 January	**MLK Jr. Day Holiday** Statistics of location and Statistics of dispersion Lab 1: Intro to Minitab	Homework 1
26/28 January	Stats of dispersion (cont'd), Normal Distribution Proportions of normal distributions Lab 2: Graphing & descriptive stats	Lab 1, Homework 2 **Drop deadline: 23 January (Friday)**
2/4 February	Distribution of Means Intro to Hypothesis testing, Statistical power Lab 3: One sample T-tests, normality	Lab 2, Homework 3
9/11 February	Test for normality, Confidence limits, reporting results **Lab: Exam**	Lab 3, Homework 4
16/18 February	**President's Day Holiday** Two sample tests of means and variance Lab 4: Two sample tests	Homework 5

23/25 February	Nonparametric two-sample tests of means Lab 6: Field Trip (no lecture) - Transect Lab	Lab 4, Homework 6
1/3 March	Introduction to Analysis of Variance Analysis of Variance Lab 6: ANOVA	Lab 5, Homework 7 **Project proposals due 3 March!** **Withdrawal deadline: 5 March**
8/10 March	ANOVA (notes with previous set), Multiple Comparisons Kruskal Wallis test Lab 7: ANOVA, Multiple Comparisons	Lab 6, Homework 8
15/17 March	Nonparametric multiple comparisons **Lab: Exam**	Lab 7, Homework 9
22/24 March	**Spring Break**	
29/31 March	Two-factor ANOVA Two-factor ANOVA and transformations Lab 8: Two factor ANOVA, transformations	
5/7 April	Nested (Hierarchical) ANOVA Lab 9: Factorial and nested ANOVAs	Lab 8, Homework 10
12/14 April	Simple Linear Regression Data transformation Lab 10: Regression	Lab 9, Homework 11
19/21 April	Linear Correlation Multiple Regression Lab 11:	Lab 10, Homework 12
26/28 April	Goodness of Fit tests Lab 12:	**Papers due 30 April!** Lab 10, Homework 12
3/5 May	Lab: Project presentations More project presentations	Lab 11, Homework 13
	Final exam: **Monday May 10 11:50 - 1:50**	

* topics and field trips subject to change.

Course Grades:

- Exams: 50% (3 @ 50points each)
- Labs and homework: 40% (these will look like more, but get downsized to fit 40%)
- Group project: 10% (30 points).

For exams, you will be allowed your books, notes and a calculator. No old exams are permitted. Calculators that calculate descriptive stats are ok. The final will not be cumulative, but the techniques build on each other!

Lab assignments (10 pts.) and homework (5 pts.) will probably add up to more points than they will count in the end; the final total will be proportioned to fit 40% of your score. Assignments out of the book are to be done by hand (except as noted), and lab assignments are to be done using Minitab or Excel, as noted. You may do your labs in groups. I will grade homework turned in late, however it will be automatically penalized by 10% per assignment. It is to your benefit to keep up with the assignments! People who do not tend to do poorly on the exams, and never get caught up. This can wreak havoc on your ability to succeed in the course! Also note, for labs, DO NOT just hand in Minitab output. It is not, by itself, designed to completely answer a question, and you will NOT get full credit for incomplete work.

The group project is essentially a project of your choosing, carried out by about three people together (note details linked above). Your grade will be based on a written report (~10 double-spaced pages, with charts and tables), and a group oral report with visual aids given during the last week of class.

Here's an opportunity for **extra credit**. To learn stats, I had to make something similar to a flow chart or summary chart of the techniques. For extra credit (10 pts.), I want you to make a study aid for yourself in the form of a flow chart or summary chart, which can also be used as a table of contents for your notes. I will look at these twice: before the second midterm and before the final, with 5 pts (maximum) to be given at each evaluation.

Grading policy: Letter grades will be based on a 90-80-70-60 percentage cutoff. If the class mean is below 75%, scores will be adjusted to a mean of 75%.

Students with Disabilities: Any student with a documented disability who would like to request accommodations should contact the University Disability Services Office - Campus Center Rm 311, 933-0816 (V), 933-3334 (TTY) - as early in the semester as possible.

Advising: Advising is a very important resource designed to help students complete the requirements of the University and their individual majors. Students should consult with their advisor at least once a semester to decide on courses, check progress towards graduation, and discuss career options and other educational opportunities provided by UH-Hilo. Advising is a shared responsibility, but students have final responsibility for meeting degree requirements.