Course Outline

Principles of Statistical Inference
HBHE 601
Instructor: J. Michael "Mike" Bowling, Ph.D.
Teaching Assistant: Sarah Newman

Catalog Description

This course will review the use of basic descriptive statistics and equip students with a conceptual understanding of the calculation and interpretation of inferential statistics in public health research. This course will also introduce students to the use of computers in the analysis of data using SAS, a statistical programming package.

Disclaimer

This course will not:

- **Make you a statistician. A first step maybe, but every chapter of our book has a separate course on campus devoted entirely to that subject.**

- **Make you a SAS programmer. You will be introduced to the use of a computer for statistical analysis. I am not aware of any quantitative researcher who calculates statistics entirely by hand, and therefore, you need to be aware of the fundamentals of computer assisted analysis at a very rudimentary level.**

Extended Description

This course is intended for students with some familiarity in the use and interpretation of descriptive statistics in scientific research. While not insurmountable, students who do not have some statistical background may find the initial pace of the course somewhat disconcerting. On the other hand (a commonly used statistical phrase), most first year students find the pace of graduate school disconcerting and therefore will not consider this out of the

"Do you have a performance enhancing vitamin supplement for math?"
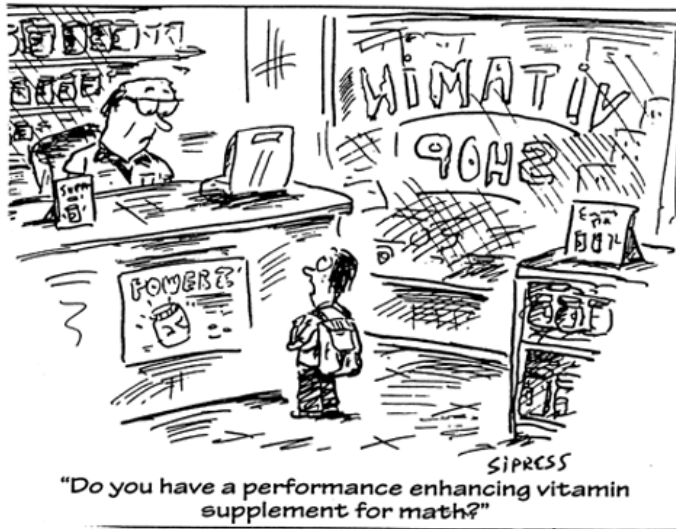
ordinary. I will teach this course from the presumption that each of you can add, subtract, multiply, and divide sufficiently well to balance your checkbook, calculate an appropriate TIP at a local restaurant, and make change. Based upon my previous experience with this course, it seems as though "math anxiety" is a greater impediment to learning biostatistics than math competency. However, this course is difficult and students should take every opportunity to obtain assistance when they are having difficulties.

Global Health Emphasis

In HBHE 601, students will be exposed to a variety of global public health topics. In an effort to enrich students' understanding of global public health issues, global content will be incorporated in a variety of ways, including Global Health homework assignments and readings, lecture examples and test examples.

For the purposes of this course, global content will be defined as "health problems that transcend national boundaries, that may be influenced by circumstances or experiences in other countries, and that are best addressed by cooperative actions, and solutions," whether they occur in developing countries, countries in advanced transition, or industrialized countries. /Source: Institute of Medicine, America's Vital Interest in Global Health, Washington DC, National Academies Press, 1997./ Within many units, questions from "Global Health Activities" will be used to highlight important statistical concepts using examples and journal articles centered on global health topics. Watch for this symbol to indicate that global content is being incorporated.

Assessment

Assessment of instruction and student progress will be based upon four quizzes. Each quiz will have two components: 1) questions to be answered at home representing 90% of the quiz grade and 2) a 15 minute in-class portion consisting of one question. Quizzes during the semester will be distributed on Thursdays and returned the following Tuesdays. The in-class component will be administered on the Tuesday due date of the take home. The fourth take home will be due on the exam day with the final in-class question answered then. Each quiz will be cumulative in that a thorough understanding of the subject matter necessitates the mastery and retention of earlier material. Homework assignments, some involving the computer, will be assigned on a periodic basis. They will not be graded. They are based upon activities that you will be asked to perform on the quizzes. The following scale will be used to assign a letter grade at the completion of the course:

92-100 = H
80-91 = P
70-79 = L
0-69 = F

Text & Equipment

Introductory Applied Biostatistics, Ralph B. D'Agostino Sr., Lisa M. Sullivan and Alexa S. Beiser, Brooks/Cole Cengage Learning, 2006.

This is an exceptional textbook which nicely incorporates interpretation of SAS output. It is the first year I have used this textbook so you will probably not be able to I suggest that you purchase the textbook but it is not mandatory. There is NO required textbook for this course. Some students have found the book useful, while others have not. No homework questions will be assigned from the text. Students should be familiar with all material covered in the assigned pages of the text, but material considered to be most important will be covered in class. Note that purchase of the textbook is optional.

Some Additional Reference Texts

1. "Statistics" by David Freedman, Robert Pisani & Roger Purves.
2. "Fundamentals of Biostatistics" by Bernard Rosner.
3. "Biostatistics, a methodology for the health sciences" by Lloyd D. Fisher & Gerald van Belle.
4. "Statistical Methods" by Rudolf J. Freund and William J. Wilson.
5. "Intuitive Biostatistics" by Harvey Motulsky.
6. "The Visual Display of Quantitative Information" by Edward R. Tufte.
7. "Nonparametric Statistics for Health Care Research" by Marjorie A. Pett.
8. "Statistics, a self teaching guide" by Donald Koosis.

Helpful Computer Programming Texts (one only)

SAS System for Elementary Statistical Analysis, Schlotzhauer, S. and R. Littell, 2nd ed., SAS Institute Inc., 1997.

The Little SAS Book: A Primer, Fourth Edition, Delwiche, L. D. and S. J. Slaughter, SAS Institute Inc., 2008.

Important Class Stuff

Lectures: Tues/Thurs, 9:30-10:45 - McGG 2301
Optional Help Sessions before class: Tues/Thurs, 8:30-9:30, Location TBA

Office Hours: Tuesday 11:00-12:00
Office Location: Room 309 Rosenau

Email: jbowling@email.unc.edu or sn28@live.unc.edu
Telephone
Cell: (919) 302-8166
Home: (919) 928-8955 I don't mind calls before 9:00 PM or weekends.

Course Evaluation

All SPH course evaluations are online. While research indicates that online surveys are the least effective means of collecting data with abysmally low response rates, the SPH has endeavored to prove survey researchers wrong by using online course evaluations. At the end of the semester, I will cajole you, beg you, and probably threaten you to complete the online evaluations.

Class Schedule

Class Date	Topic	Readings	Assignments
Tu 21-Aug	Class Overview		
Th 23-Aug	Presenting and Summarizing Data	D'Agostino, Sullivan & Beiser: Ch. 1 & 2	HW 1
	COMPUTER TRAINING: Thursday, Aug 23, 3:30-5:30 Computer Lab HSL 307	SAS Handout D'Agostino, Sullivan & Beiser: Appendix A	
	COMPUTER TRAINING: Tuesday, Aug 28, 3:30-5:30 Computer Lab HSL 307	SAS Handout D'Agostino, Sullivan & Beiser: Appendix A	

Tu28-Aug	Presenting and Summarizing Data		
Th30-Aug	Probability	D'Agostino, Sullivan & Beiser: Ch. 3.1-3.3	HW 2
Tu04-Sept	Theoretical Probability Distributions: Binomial & Poisson	D'Agostino, Sullivan & Beiser: Ch. 3.4	HW 3

Th06-Sept	Theoretical Probability Distributions: Binomial & Poisson		
Tu11-Sept	Theoretical Probability Distributions: Normal	D'Agostino, Sullivan & Beiser: Ch. 3.5-3.8	HW 4
Th13-Sept	Theoretical Probability Distributions: Normal		
Tu18-Sept	**TURN IN FIRST EXAM**		
Tu18-Sept	Sampling Distribution of the Mean	D'Agostino, Sullivan & Beiser: Chapter 4	HW 5
Th20-Sept	Estimation: Confidence Intervals around Means	D'Agostino, Sullivan & Beiser: Chapter 5.1	HW 6
Tu25-Sept	Hypothesis Testing: One Sample Tests of Means	D'Agostino, Sullivan & Beiser: Chapter 5.2-5.5 D'Agostino, Sullivan & Beiser: Chapter 6	HW 7
Th27-Sept	Hypothesis Testing: One Sample Tests of Means	D'Agostino, Sullivan & Beiser: Chapter 9.1-9.5	
Tu 02-Oct	Hypothesis Testing: Comparison of Two Means		HW 8
Th 04-Oct	Hypothesis Testing: Comparison of Two Means		
Tu 09-Oct	**TURN IN SECOND EXAM**		
Tu 09-Oct	Analysis of Variance	D'Agostino, Sullivan & Beiser: Chapter 9.1-9.5	HW 9

Th 11-Oct	Analysis of Variance		
Tu 16-Oct	Nonparametric Tests	D'Agostino, Sullivan & Beiser: Chapter 12.2-12.3; 12.5	HW 10
Th 18-Oct	*Fall Break—No class and have fun!*		
Tu 23-Oct	Correlation: Pearson's	D'Agostino, Sullivan & Beiser: Chapter 10.1	HW 11
Th 25-Oct	Simple Linear Regression	D'Agostino, Sullivan & Beiser: Chapter 10.2	
Tu 30-Oct	Simple Linear Regression		
Th 01-Nov	Simple Linear Regression		HW 12

Tu 06-Nov	**TURN IN THIRD EXAM**		
Tu 06-Nov	Estimation and Hypothesis Testing for Proportions	D'Agostino, Sullivan & Beiser: Chapter 7.1, 7.4	
Th 08-Nov	Estimation and Hypothesis Testing for Proportions		HW 13
Tu 13-Nov	Contingency Tables: The Chi-Square Test	D'Agostino, Sullivan & Beiser: Chapter 7.2, 7.5, 8.3	

Th 15-Nov	Contingency Tables: The Chi-Square Test		HW 14
Tu 20-Nov	The Odds Ratio and Relative Risk	D'Agostino, Sullivan & Beiser: Chapter 8.1	HW 15
Th 22-Nov	Thanksgiving		
Tu 27-Nov	Logistic Regression	D'Agostino, Sullivan & Beiser: Chapter 10.4, 11.1-11.2	
Th 29-Nov	Logistic Regression		
Tu 04-Dec	A Really Big Party or Review for Exam		
Tu 11-Dec	**TURN IN FOURTH EXAM**	Final scheduled for 9:30 am	

*Note: The fourth exam, like the other exams, consists of a take-home and an in-class portion. If desired, the class may agree on an additional time to take the in-class portion so that students who wish to leave earlier for winter break are able to do so.